The Europeanisation of National Systems of Innovation: A comparison of the Czech Republic and Hungary

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Abstract

The importance of innovation for ensuring economic growth and solving modern societal challenges is now widely recognised and, consequently, promoting innovation has become a key priority for the EU. In order to achieve this, the EU has emphasised the need to reduce the gap between the better performing Western Member States and the newer Central and Eastern Member states whose innovation performance still lags behind. Through the main question *How is Europeanisation affecting the nature and development of national innovation policies and institutional arrangements in the Czech Republic and Hungary?*, this doctoral thesis focuses on the experiences of the Czech Republic and Hungary since their accession to the EU in 2004.

In so doing, a number of factors are identified which are currently impeding Europeanisation within this vital policy area. Drawing from Historical Institutionalism and Varieties of Capitalism, according to which the Czech Republic and Hungary are defined as Dependent Market Economies, this thesis finds that path dependent historical legacies and economic structure play a significant role in mediating the impact of Europeanisation on the Czech and Hungarian National Systems of Innovation. Furthermore, the findings of this research indicate that the expansion of the EU has led to a diluted version of Europeanisation which not only weakens the influence of the EU but also increases the importance of national factors.

This thesis makes an important contribution to the field of Europeanisation by drawing attention to the role of a number of variables, related to historical legacies and economic structure, which are important in explaining the success, or lack thereof, of Europeanisation. This could be valuable to future studies within this area. In addition, based on the findings of this research, various policy implications are identified which the EU should consider in order to improve the effectiveness of its policy approach and related policy tools. Given the current problems of Euroscepticism across EU Member States, it is crucial that the EU is aware of how to adapt its policy in order to deliver the expected results and improve national perceptions of the EU.

Key Words: Czech Republic, Hungary, Innovation, Europeanisation, National Systems of Innovation, Varieties of Capitalism, Dependent Market Economies, Historical Institutionalism.

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1) Introduction

The critical importance of innovation could hardly be better underlined than by Freeman's (1987:266) rather succinct observation; 'not to innovate is to die'. Not only is innovation vital for a company's survival but, by increasing productivity, innovation is recognised as a key component of economic growth (Freeman & Soete 1997; Grossman & Helpman 1991; Nelson & Rosenberg 1993). Indeed, as the remit of this study was to investigate the economic development of two or more of the Visegrád countries (the Czech Republic, Hungary, Poland and the Slovak Republic), it is the link between innovation and economic growth which served as the catalyst for this research project. Unsurprisingly, given the economic importance of innovation, the race to innovate has become so imperative that companies, universities and governments now invest considerable resources into finding ways to give themselves an innovative edge. With the aim of fostering innovation, the last few decades has, for example, witnessed an explosion of research and development laboratories, science and technology parks and innovation hubs. Moreover, governments now have whole departments, or in some cases even ministries, dedicated to the task of improving the national innovation environment. Yet technological progress is currently moving so quickly that the challenge for innovators, as well as those promoting innovation, seems ever greater. Within such a fast moving world, businesses, and countries, find themselves constantly fighting to remain at the forefront of the innovation frontier.

The topic of innovation has, accordingly, captured a huge amount of academic attention as highlighted by the plethora of academic conferences, research papers and publications now dedicated to discussing innovation. As the number of studies has increased, so too has the academic toolkit with which researchers approach the study of innovation. For example, to name just some of the approaches, innovation has been studied in terms of networks, clusters and systems at national, regional and sectoral levels. (See Chapter 2 for a more detailed discussion of these approaches.) Nonetheless, there is still much uncertainty as to why some countries have been so effective at producing innovations while others have not and, furthermore, why certain policy measures seem to work in some countries but not in others. In other words, in spite of the increased detail with which researchers understand the complexities of innovation,

there remains a lack of consensus regarding what individual countries should do in order to ensure a successful innovation performance.

As is often the case, some countries have received more attention than others. For instance, countries which have been especially successful at innovation, such as the United States, have been of particular interest to researchers (Mowery 1994; Nelson 1993). On the other hand, countries still in the process of developing their innovation systems, such as the Central and Eastern European countries, have traditionally received less scholarly attention. Nonetheless, these countries have steadily been capturing more academic interest and some very notable research has now been carried out on these countries including that of Havas (2011), Lengyel & Cadil (2009), Radosevic (2004), Szalavetz (2014). There have also been a number of comparative studies (Krammer 2008; Suurna & Kattel 2010; Szpor et al. 2014; Tiits et al. 2008) which, although by including several countries have offered considerable breadth, have perhaps not offered sufficient depth to allow for a more thorough understanding of the reasons for the observed similarities and differences. The need for more research into these countries is even more imperative given the sheer enormity of change that they have experienced in recent history. In the nearly 30 years since the fall of communism, these countries have undergone a transformation to liberal market economies, the majority have joined the European Union (EU) and, most recently, they have been exposed to severe global financial and economic crises. Given these developments, it would be expected that change in these countries in terms of their approach to developing their innovation systems, would be rapid and, as such, these countries unquestionably require ongoing investigation. Without further and consistent academic research, these changes may pass by unobserved and the lessons that they could elucidate would be lost to history.

It is for these reasons that this research investigates innovation and, more specifically, the national innovation policies and institutional arrangements of Central and Eastern European countries. The Czech Republic and Hungary offer a particularly interesting comparison because, in spite of a number of similarities, such as similar population size and a shared recent history, several differences are gradually starting to appear. As a result of these developments, the Czech Republic which was, in terms of innovation performance, behind Hungary at the beginning of the 1990s (Fidrmuc et al. 2002), now ranks ahead of Hungary in nearly all innovation indicators according the

EU's 'European Innovation Scoreboard' (EIS) (European Commission 2017a). Furthermore, for the 'Innovation' pillar in the latest World Economic Forum Competitiveness Report (World Economic Forum 2017) the Czech Republic was ranked 36th (out of 142) compared to just 62nd for Hungary. Even more remarkably, in terms of 'Capacity for innovation' - one of the indicators from which the 'Innovation' pillar is compiled - the Czech Republic was ranked 27th compared to a disappointing 96th for Hungary.

Nonetheless, although the Czech Republic has shown some signs of improvement, both countries currently seem to be struggling to make more significant progress in terms of catching up with their Western European counterparts. The EIS (European Commission 2017a), for example, classifies both countries as 'Moderate Innovators' and both fall behind the European average in nearly all dimensions measured by the Scoreboard. (See Chapter 3 for more information on the dimensions used to compile the EIS.) This is all the more perplexing given the many favourable conditions in the Czech Republic and Hungary, including a strong university tradition, geographical proximity to Western European countries and significant investment in terms of foreign direct investment (FDI) and the European Union's 'Structural and Investment Funds' (hereafter 'Structural Funds'). During the course of this study, a number of fundamental problems have come to light which are preventing the Czech Republic and Hungary from capitalising on their considerable advantages.

As both these countries are members of the European Union, the EU would be expected to have played a key role in the development of the Czech and Hungarian innovation systems. Due to the recognised economic, and also societal, benefits of innovation, promoting innovation has become a key aim of the EU. (See Chapter 4 for a discussion on the development of the EU's Innovation Policy). In fact, the importance of innovation, or originally the knowledge economy, came to the forefront of the EU's thinking around the turn of the millennium and featured prominently in the 'Lisbon Strategy' which was originally launched in 2000. This meant that at the time the Czech Republic and Hungary were in the process of accession talks, innovation was already a key EU priority and, in effect, since the beginning of their membership in 2004 they have been subject to the EU's innovation agenda.

It seems logical, therefore, to expect that the EU would have had significant influence in the Czech and Hungarian innovation systems. Indeed, a key aim of the EU is to reduce the innovation divide between the old and new Member States and, accordingly, the EU has invested a sizeable amount of funding, via the previously mentioned Structural Funds, into helping the Czech Republic and Hungary develop their innovation systems. However, serious questions remain about how successful the EU has been in its attempts to bring the innovation performance of the new Member States closer to that of their better performing neighbours. As a result, it is perhaps not surprising that studies and reports (European Commission 2017c; European Commission 2016a) suggest that, on the whole, the new Member States continue to lag significantly behind the old Member States. Given the considerable investment the EU has made into assisting the catch-up of these new Member States, what this would seem to indicate is that, at present, a notable discrepancy exists between the financial input being made by the EU and the value of its output. In fact, the findings of this thesis suggest that problems relating to policy misfit and inefficient policy tools are limiting the EU's attempts to influence the innovation systems of the Czech Republic and Hungary.

The rationale for focusing this research on the influence of the EU on the Czech and Hungarian innovation systems is all the more pertinent considering the launch in 2014 of the EU's latest 'Framework Programme for Research and Technological Development', known as 'Horizon 2020'. Learning from previous experiences, Horizon 2020 supposedly addresses some of the weaknesses of the previous strategy, the aforementioned Lisbon Strategy, such as a considerable divergence in terms of its implementation across Member States. Alongside the launch of Horizon 2020, this time period also witnessed the introduction of the so-called 'Smart Specialisation Strategy' (S3) as part of the EU's Cohesion Policy. All Member States are now expected to design Smart Specialisation Strategies in order to be eligible to receive funding from the European Regional Development Fund (ERDF). As the Smart-Specialisation Strategy approach is still relatively new, there are as of yet few studies which have assessed the response of Member States to designing and implementing their strategies. Through assessing the preliminary impact of the Smart Specialisation Strategy in the Czech Republic and Hungary, this study suggests that the Smart Specialisation Strategy still

has many of the problems of previous strategies and, in fact, some new problems of its own.

1.1) Research aims, questions and significance

In order to understand the factors which have been impeding the Czech and Hungarian innovation performances and which are preventing them from converging with their West European counterparts, there is a vital need for further ongoing investigation into how these countries are developing their innovation systems. With this in mind, this research undertakes to gain a better understanding of the factors determining the national innovation policies and institutional frameworks of the Czech Republic and Hungary. More specifically, this thesis seeks to identity the extent to which these have been influenced by the EU and its innovation agenda. Whilst the EU has sought to be more proactive in encouraging the promotion of innovation within EU countries, as previously discussed, there is much debate about how successful the EU has been at actually achieving this goal. This research, therefore, endeavours to add to the discussion on this topic and to better clarify the current situation. In other words, the main aim of this thesis is to shed light on how strong, or how weak, Europeanisation has become as a driver of national innovation policies and institutional arrangements. In doing so, this research draws from and seeks to add to the discussion on Europeanisation, Innovation and Varieties of Capitalism. (Whilst the relevance of these areas to this researched is explained below; a more detailed discussion of each topic is provided in Chapter 2.)

With regard to the relationship between Innovation and Europeanisation, as mentioned earlier, the EU now has a considerable interest in promoting and encouraging innovation within EU Member States as it fights to carve out an innovative advantage over competitors such as the United States and, in more recent years, the rise of the BRICS countries. Whilst there is a very high-quality scientific base in the EU, there are concerns that the innovation performance of the Member States is not as strong as it should be and, therefore, the EU has taken measures which aim to address the impediments that are preventing Member States from unlocking their innovation potential. There is, however, still considerable concern that the situation is not improving quickly enough and, indeed, about how effective the EU's attempts to

promote innovation have been in reality. This problem is confounded by the considerable divide between old and new Member States which, current studies suggest (European Commission 2017c; European Commission 2016a), remains an area of ongoing concern. This research, therefore, is intended to contribute to a better understanding of the EU's influence on these two new Member States, the Czech Republic and Hungary, in this vitally important policy area. In doing so, it adds to the discussion on convergence, or lack thereof, between Member States and identifies factors which are preventing, or assisting, the EU in its attempts to increase the innovation performance of these Central and Eastern European Member States.

This research seeks to identify any key moments at which the EU has had influence, or whether the EU's influence has increased or decreased over time. It considers the strategic approach of the EU, particularly the latest strategy known as the Smart Specialisation Strategy. It aims to gain a better understanding of how these strategies have been translated and implemented by the Czech Republic and Hungary. It also seeks to identify any strengths or problems with the EU's strategic approach and to consider the effectiveness of the policy tools used by the EU. For example, it considers the use of hard tools such as the Structural Funds and their success at achieving the intended outcome.

Based on these primary aims, the key question at the core of this research is formed:

> **Main Research Question***:* 'How is Europeanisation affecting the nature and development of national innovation policies and institutional arrangements in the Czech Republic and Hungary?'

In order to fully understand the impact of Europeanisation, however, other intervening factors need to be considered. Innovation is a complex policy area in which multiple actors play a role and whose influence must therefore be taken into account. Indeed, research suggests that the national environment plays an important role in the development of innovation systems. The literature of National Systems of Innovation (NSI) (Lundvall 1992; Freeman 1995; Nelson 1993) argues that a country's innovation performance depends on how effectively the actors and institutions can work together as parts of a collective system of knowledge creation. The NSI approach places emphasis on not only the entrepreneurs and innovators themselves but also on government policy, higher education and national institutions. In order to gain a more

in-depth and accurate understanding of the Czech and Hungarian innovation systems, therefore, it is important that these factors are given sufficient attention.

As such, the second aim of this research is to consider the role of these national factors. In doing so, this study seeks to identify whether national specificities impact upon the level of Europeanisation that can take place. For example, this research undertakes to gain a better understanding of the extent to which national factors, such as government policy, the research institute network and even national culture, can create an environment which can support or hinder the EU's influence. As part of this, consideration is given to the role of historical legacies and the extent to which the communist past of the Czech Republic and Hungary continues to play a role in their present development. With these aims in mind, the first set of research sub-questions is:

> **Research Sub-Questions 1:** How important are national specificities to the process of Europeanisation? To what extent have national institutions assisted, or impeded, the process of Europeanisation?

However, it is not just national elements that play an important role in innovation systems; economic factors are also particularly significant. It is in this respect that the Varieties of Capitalism (VoC) literature (Hall & Soskice 2001; Nölke & Vliegenhart 2009) contributes to this research in two key aspects. Firstly, the VoC approach states that a country's model of capitalism will have an impact on the innovation system of that country. This argument suggests that Germany's model of capitalism, for example, creates an environment which is more likely to produce incremental innovations, whereas the United States, by comparison, is more suited to radical innovation. The arrangement in the Czech Republic and Hungary, on the other hand, is very different as these countries returned to a liberal market economy system at a point in time when globalisation was having a notable impact on the way in which businesses and economies operate. As a result, not only did the Czech Republic and Hungary find themselves in a situation in which they needed to manage a transition to market economies, they also had to contend with the pressures and demands of globalisation at the same time. It would be expected for this to have had considerable impact on the development of the Czech and Hungarian models of capitalism and, following the argument outlined earlier, their innovation systems as well.

The second aspect of the VoC literature which is relevant to this research is the relationship between the model of capitalism and the EU. Although the need for researchers of Europeanisation to consider the VoC approach has already been highlighted (Featherstone et al. 2012), there is still a lack of studies which have approached the subject in this manner. Yet by doing so, the VoC toolkit offers a valuable opportunity for researchers to investigate any potential relationship between a country's model of capitalism and its response to Europeanisation pressures. For example, studies could shed light on whether certain models of capitalism allow for a greater extent of Europeanisation than others. This is particularly interesting in the cases of the Czech Republic and Hungary as their models of capitalism differ quite strongly from those of the older Member States. It is for these explanatory insights that the VoC approach is so relevant to this research. Based on this, the second set of sub-research questions has been developed:

> **Research Sub-Questions 2:** What impact have the models of capitalism in the Czech Republic and Hungary had on the development on their innovation systems? To what extent do the models of capitalism in the Czech Republic and Hungary affect their response to Europeanisation pressures? Are there particular aspects of the Czech and Hungarian models of capitalism which can be identified as having assisted, or impeded, the influence of the EU?

In terms of time period, the focus of this research is principally on the period since the Czech Republic and Hungary became EU Member States in 2004. By concentrating on this time period, this study is able to identify not only the extent to which the developments which occurred as a direct result of EU accession have had a long-term impact on the Czech and Hungarian NSIs, but also how changes in the EU's approach towards innovation policy have affected the Europeanisation process. For example, on joining the EU, the Lisbon Strategy was the key document driving the direction of innovation policy in the EU. More recently, however, the Lisbon Strategy has been superseded by Horizon 2020 which aims to address some of the weaknesses of its predecessor and, as such, a number of changes have taken place in terms of the policy direction and the policy support being offered to Member States by the EU. One example of this is the introduction of the Policy Support Facility (PSF), of which Hungary was actually one of the first countries to take advantage. In addition to these developments, as previously mentioned, the EU also announced a new approach

towards strategy formulation as part of its Cohesion Policy, namely the Smart Specialisation Strategy. The Smart Specialisation Strategy approach has been introduced at both national and regional levels and aims to encourage Member States to identify areas for strategic intervention based on a thorough analysis of their current strengths and weaknesses. Using a time frame from 2004 until now enables this research to observe how the countries under study have responded to these changes in the EU's Innovation Policy. In should be noted, however, that although the main focus of this research starts at the point of EU accession, in order to provide background information which is important in explaining the current status of the Czech and Hungarian NSIs, some discussion of their NSIs prior to becoming EU Member States is included (see Chapters 5 and 6).

The impact of this study lies in its ability to offer a current insight into the development of the Czech and Hungarian innovation systems. Empirically, this research shows that some notable differences between the Czech and Hungarian NSIs are now beginning to emerge. Furthermore, this study enables a deeper understanding of the role of the EU in influencing the development of the Czech and Hungarian innovation systems and draws attention to any changes in the EU's influence during the nearly 15 years that these countries have been EU Member States. By doing so, this study provides a clearer explanation of the factors which are mediating the Europeanisation process which could, in turn, offer valuable information for guiding future EU policy-making decisions related to innovation and, potentially, other policy fields as well. This research also has contemporary significance as it will investigate these countries as they respond to the EU's latest innovation-related initiatives, namely Horizon 2020 and the Smart Specialisation Strategy.

In addition to contributing to the literature on Systems of Innovation and Europeanisation, it will contribute to a further understanding of the Varieties of Capitalism approach as identified by Hall & Soskice (2001) and redefined by Bohle & Greskovits (2012) and Nölke & Vliegenhart (2009) for the Visegrád peripheral economies. Theoretically, this research shows how the distinctive variety of capitalism which has developed in these two Visegrád states as a result of their historical legacies and rapid development since their accession to the EU, strongly affects the extent to which Europeanisation can take place. Whilst most other literature has focused on either the relationship between systems of innovation and the EU or systems of

innovation and models of capitalism, this research identifies a clear relationship between all three factors.

1.2) Research structure

This chapter has sought to introduce the topic of this thesis and to make clear the rationale for conducting this particular research project. It has briefly made reference to some of the research which already exists within this field and has explained how this research intends to contribute to the current body of knowledge. It has also drawn attention to the key research aims and questions, both main and sub-questions, which the remainder of this thesis is designed to address. In short, this chapter has laid down the foundations on which the remaining chapters will build.

The literature which has been alluded to in this chapter, namely that relating to Innovation, Europeanisation and Varieties of Capitalism, is discussed in more detail in Chapter 2. This chapter draws out and discusses the main aspects of these three subject areas that are relevant to this research. Additionally, it also draws attention to their strengths and weaknesses, conflicting academic opinions and any current gaps in the literature, especially those to which this research can contribute. Having surveyed and discussed the current available literature, the hypotheses to be tested during the course of this thesis are constructed.

Chapter 3 lays out the theoretical and methodological approach underpinning this study. Firstly, a conceptual framework, which is based on the literature discussed in Chapter 2 and which forms the basis for the main chapters of this thesis, is identified. The use of a historical institutionalist approach and its suitability to this research is given full consideration. Additionally, the case study selection, which has already been briefly mentioned, is explained in more detail during the course of this chapter. The methods of data collection, data analysis and the issues of reliability, validity and ethics are also discussed. Finally, this chapter highlights the advantages and limitations of the methodology that were experienced during the course of the research and how any problems were overcome.

The independent variable of this research, namely the EU's strategy for developing the innovation capacity of its Member States, is considered in more detail in

Chapter 4. In order to assess how the EU's approach towards innovation policy has developed over time, this section is divided into three time frames. The first time frame focuses on the pre-accession period (1989-2004) and considers the role of the EU in the Central and Eastern European candidate countries during this time. The following time frames look at the post-accession period and consider how the EU's policy has changed by analysing the objectives and instruments of, firstly, the Lisbon Strategy and, secondly, the EU's latest policy approach, Horizon 2020. This chapter presents a broad overview of the EU's Innovation Policy with which the experiences of the Czech Republic and Hungary, detailed in the following chapters, are compared.

Chapters 5 and 6 present the main findings of this research for the Czech Republic and Hungary respectively. The structure of these chapters is based on the conceptual framework identified in Chapter 3. These chapters are divided into two sections. The first section of each chapter looks at the historical development of these innovation systems from (a) pre-1989, to (b) the transition period, through to (c) post-accession to the EU. This section also discusses the role of FDI and assesses whether any clear progress in either country's innovation performance can be identified. Secondly, these chapters consider the role of the EU and the EU's policy tools in influencing these developments. In doing so, attention is drawn to a number of areas of misfit between the EU's innovation policy approach and the national specificities of Czech Republic and Hungary, most of which are similar for both countries, which can be seen to mediate the Europeanisation process. Based on data gathered throughout this research, these chapters also present some initial findings on the response of these countries to the EU's latest policy approach and, particularly, the Smart Specialisation Strategy.

A concise conclusion of this research, which is based on the discussions of the previous chapters, is presented in Chapter 7. This chapter also compares the Czech and Hungarian case studies, highlighting a number of differences and similarities in their experiences. This discussion is then used to identify a number of important policy implications. These are constructed with the aim of enabling the EU to play a greater role in assisting the development of the Czech and Hungarian NSIs and, in turn, to improve their innovation performance. Finally, several research limitations and suggestions for future research options are discussed.

2) Literature Review

Introduction

The aim of this chapter is to survey the main bodies of literature in order, firstly, to identify the areas of academic disagreement and research gaps and, secondly, to construct the hypotheses which this research will test. As discussed in the previous chapter, three main bodies of literature have been selected for review on the basis that they shed light on the subject matter of the thesis; Europeanisation, Innovation and Varieties of Capitalism (VoC). In addition to providing a systematic account of the development of academic thought within these fields, this review also aims to draw attention to the key concepts which have been identified to date. In doing so, this chapter seeks to provide a thorough discussion of the advantages and limitations of applying these concepts to this study. Throughout this chapter, conflicting reports and arguments are highlighted, as are areas which have received limited scholarly attention and to which this thesis intends to contribute. Furthermore, several methodological implications are identified which will be addressed further in the following chapter.

2.1) Europeanisation

An introduction to Europeanisation

As demonstrated by the quantity of literature dedicated to Europeanisation (Bache 2008; Green Cowles et al. 2001; Ladrech 2010), this has become an important field of research for scholars drawn to the study of the EU. In spite of the interest it has received, the term has unfortunately become overstretched and inaccurately employed so that it has in fact been used in 'varying and often conflicting scenarios' (Menz 2005:6). The concept of Europeanisation, with which this research is interested, began to be developed in the late 1990s when a shift was witnessed from a focus on the underlying dynamics of European integration (Moravcsik 1998) to one which explored the impact of the EU on the domestic politics and institutions of the Member States (Green Cowles et al. 2001; Featherstone & C. M. Radaelli 2003; Windhoff-Héritier et al. 1996). At this point, it began to become clear that Member States were having to adapt to the EU's enhanced influence in policy-making and that changes within their

domestic structures were taking place. Whilst this may not have resulted in 'seismic shifts' (Ladrech 2010:206) in the operation of national policy-making and institutions, there is strong evidence that membership in the EU does impact the evolving nature of the state (Ladrech 2010).

From this perspective, Europeanisation can be understood as a change within a Member State due to either an EU policy or the EU's decision-making process. Europeanisation, of course, is not the only external pressure impacting on Member States; globalisation too has played a significant role in determining the direction of change in the domestic structures of these countries (for the 'globalisation versus Europeanisation debate' see Fligstein & Merand 2002; Verdier & Breen 2001). 'What distinguishes the argument concerning Europeanization of national political systems from the globalization thesis is the ability to trace specific domestic changes to developments emanating from the policy-making output and/or decision-making style of the European Union' (Ladrech 2010:2). Risse et al. (2001:4), however, suggest that Europeanisation might itself respond to the globalisation process either by reinforcing these trends or protecting Member States against their undesired effects. This presents a considerable challenge to researchers in terms of disentangling the EU influence on national policy-making and institutions from any other external pressure(s).

Indeed, it is not only the impact of the globalisation variable that needs to be considered but also that of domestic politics. The difficulty for researchers here is to ascertain whether domestic change has occurred as a result of Europeanisation or whether Europeanisation has in fact played a negligible role and the impetus for change has actually been provided by domestic politics. This 'problem is compounded by the strategy of political leaders to disguise globalisation or domestic politics under a discourse of Europeanisation – either by blame-shifting strategies or by using the appeal of Europe to add legitimacy to choices originating at home' (Radaelli 2004:8). In addition to this point, Ladrech (2010:29-30) draws attention to the distinction between Member States implementation of policies and the actual consequences of this process 'which may be reflected in the development or creation of new policy instruments, standards, shifts in policy direction, and so on'. In other words, the compliance of Member States in implementing EU policy is not necessarily an indicator of Europeanisation. Rather, it is only if domestic change has taken place as a result of EU influence that Europeanisation can be said to have occurred. Again, these issues need

to be fully considered in the methodology of research in this field and will be discussed in more detail later.

There remains one further initial consideration for research using the Europeanisation concept, namely the consolidation of an appropriate definition. As previously mentioned, the term has been used inconsistently by scholars from different fields (for an overview see Featherstone 2003; Ladrech 2010; Olsen 2002). Dyson & Goetz (2002:2), for example, highlight the diversity in the breadth of focus with which the term has been used stating that 'it is sometimes used narrowly to refer to implementation of EU legislation or more broadly to capture policy transfer and learning within the EU'. This research is aware of some of the conflicting usages of the Europeanisation concept and, therefore, proposes to use a broad definition as a foundation which will then be fine-tuned, as recommended by Ladrech (2010), so that it can precisely and appropriately be applied to answering the particular research questions of this thesis. The broad definition which will be used is provided by Radaelli (2003:30) who defines Europeanisation as:

> '[p]rocessses of (a) construction, (b) diffusion, and (c) institutionalisation of formal and informal rules, procedures, policy paradigms, styles, 'ways of doing things', and shared beliefs and norms which are first designed and consolidated in the making of EU public policy and politics and then incorporated in the logic of domestic discourse, identities, political structures, and public policies'.

In order to 'fine tune' this definition, some of the other elements of the Europeanisation literature will now be considered in more detail and their relevance to this research highlighted.

Bottom-up or top-down?

The emphasis in Radaelli's definition on construction, diffusion and institutionalisation directly relates to an earlier distinction made by Börzel & Risse (2003) between the 'top-down' and 'bottom-up' dimensions in the concept of Europeanisation. Put simply, from a top-down perspective the EU institutions 'download' their norms, rules or policies onto the Member States. From the bottom-up

perspective, on the other hand, these norms, rules and policies may have been influenced by Member States actively 'uploading' their preferences during the policy-making process. Therefore, according to this argument, it is necessary to view Europeanisation as a two-way relationship (Bache 2008:11-12). Whilst this does beg a 'chicken and egg' question in terms of which pressure comes first, a more serious criticism of this concept is that it does 'not adequately reflect the emergence of cross-national policy networks that are not directly 'defined and consolidated in the EU policy" (Featherstone 2003:18). Indeed, in order to overcome this, there have been various studies which have attempted to include a third element of 'cross-loading' into the Europeanisation dynamics (Howell 2005; Major 2005).

Studies from a bottom-up perspective follow a very different research design from those conducted from a top-own perspective. 'Instead of starting from European policies (or politics) as an independent variable and tracking down the consequences for domestic actors, policies and politics, it starts and finishes at the level of domestic actors' (Radaelli 2004:4). The starting point for research conducted using this approach is the system of interaction at the domestic level and, by including time and temporal causal sequences, academics using this approach are able to trace if, when and how pressure from the EU results in change in the main components of the system of interaction, the consequences of which can be measured in change at the domestic level. For example, Ugland (2003) uses a bottom-up approach which starts and finishes at the level of the domestic system of interaction to show that alcohol policy in Finland, Norway and Sweden has shifted from originally being within the remit of health policy to that of competition policy. This, he argues, is due to EU pressure and, more specifically, the introduction of the EU's competition policy.

There are several advantages of using a bottom-up approach to the study of Europeanisation. A particularly significant benefit is that it avoids falling into the pitfall of prejudging the role of Europeanisation (Dyson 2002). As previously mentioned, the implementation of EU policies is not in itself evidence that Europeanisation has taken place as these domestic changes may in fact be the result of another factor. Using a bottom-up approach allows Europeanisation to be seen as a process rather than an end product and for the researcher to investigate 'what goes on inside the process' (Radaelli 2004:5). Furthermore, Europeanisation from a bottom-up perspective does not require its own unique vocabulary but in fact imports theoretical

context from comparative politics and theoretical policy analysis (Featherstone & Radaelli 2003:340). Finally, it also provides a structure which allows space to consider both the vertical processes and the horizontal dynamics of Europeanisation.

The top-down approach, on the other hand, whilst more typical of earlier work, is still used in some current research projects. Research is this area has tended to rely on the following 'chain':

> 'pressure from Europe on member states → intervening variables → reactions and change at the domestic level' (Radaelli 2004:4).

Earlier studies conducted from this angle focused on uni-directional changes and narrow impacts, specifically tracking down the implementation of European policies. More recent and 'theoretically robust' (Radaelli 2004:4) studies have moved away from the analysis of European integration to a focus on the domestic impact of the EU. Ladrech (2010:22), for example, justifies his use of a top-down approach by stating that 'we are not discounting the domestic political dynamics that may have fed into the EU-policy-making process; what we are concerned to isolate is the actual impact – if any – of specific EU-level influences in the domestic arena'. Green Cowles et al. (2001) have also conducted prominent research into Europeanisation from a top-down perspective.

Although the advantages of a bottom-up perspective are considerable, given that this research is focused on the downloading of the EU's Innovation Policy onto the Czech Republic and Hungary, a top-down perspective has been selected as the most appropriate framework with which to conduct this study. This is not to deny the existence of Member State to EU dynamics, but the research aims of this study, namely to better understand the influence of the EU on national innovation policies, are best served by a top-down perspective. The implications of this decision, in terms of the 'dimensions, mechanisms and outcomes' (Börzel & Risse 2007:485) of Europeanisation, will now be carefully considered.

Dimensions, mechanisms and outcomes

There are three main dimensions along which Europeanisation can influence domestic change; politics, polity and policy. Several scholars have used these

dimensions as a framework for their study and have found that Europeanisation can have differential impact across these dimensions (Featherstone 2003). Even the effect of Europeanisation within one dimension has been shown to vary. For example, the impact of Europeanisation has been much more profound in the areas of monetary and trade policy than it has in areas such as health care or employment policy (Bulmer & Radaelli 2004). Radaelli (2004:16) is critical of some of this literature as it has often worked in a 'compartmentalised manner by considering only one dimension and ignoring others. The most exciting projects, however, have shown that the three dimensions (politics, policy, and polity) interact, often in subtle and indirect ways'. This, Radaelli goes on to argue, renders the adage that 'policies change but politics and polity do not' obsolete. Clearly this does represent an important consideration for this research and the interaction between all three dimensions will be taken into account. However, in order to meet the aims of this project, namely understanding the impact of the EU on innovation policies and the institutional framework, it is the domains of policy and polity that require particular emphasis.

A further point regarding the policy dimension, which is of particular importance to this research, is the distinction that has been drawn between the EU's use of 'hard' policy, the traditional method employed by the Commission, and 'soft' policy, which has become more prevalent in the last fifteen years or so. Hard policy has been further subdivided into positive integration, such as social integration and the correction of market failures, and negative integration, such as deregulation and the protection of economic interests. However, it is the area of soft policy, also referred to as 'policy coordination' or facilitated cooperation, which is of particular relevance to this research as much of the innovation policy falls into this category. For example, much of the EU's involvement is 'based on making recommendations to the Member States, setting monitoring and benchmarking activities, encouraging exchange of best practices and proposing voluntary partnerships or coordination initiatives' (European Parliament 2016a:6). This type of policy is best exemplified by the 'Open Method of Coordination' (OMC) which was formally defined as an instrument in the Lisbon Agenda. 'Under facilitated cooperation, the EU organises cooperation among member states, but does not produce European legislation. It produces opportunities for learning – the default explanation of Europeanisation for this mode' (Radaelli 2004:13).

There is much debate about whether or not the OMC can really deliver (De la Porte 2002; Kröger 2009; Hatzopoulos 2007).

The use of soft policy, rather than hard policy, also means that different mechanisms are used to ensure its implementation. Much of the original literature on Europeanisation, particularly studies using a top-down perspective, focused on the concept of 'goodness of fit' as a mechanism for domestic change (Featherstone 2003). According to this argument, depending on the degree of 'misfit' between the Europeanisation processes, on the one hand, and national institutional settings, rules, and practices, on the other, this would result in 'adaptational pressures'. The greater the adaptational pressures, the more the domestic structure of a Member State would have to change in order to comply with European rules and policies. If adaptational pressures are very high, it was argued that 'European institutions seriously challenge the identity, constitutive principles, core structures, and practices of national institutions' (Featherstone 2003:8). This would be met defensively by Member States which might either opt-out or attempt to change EU policies and institutions. From this perspective, the fact that the extent of domestic structural change varied between Member States is accounted for by the existence of mediating or intervening factors, such as multiple veto points or mediating formal institutions, which either enable or inhibit change.

The major criticism of this approach is that 'this is not the only way things work' (Radaelli 2004:7). Indeed, there are examples of Europeanisation occurring in the absence of major adaptational pressure (Jacquot & Woll 2003; Thatcher 2004). The 'goodness of fit' approach, it is argued, overemphasises the role of structure, affording insufficient consideration to the function of agency. For example, Bulmer & Radaelli (2004) argue that, in areas of soft policy, the EU's supranational institutions have very weak powers and cannot act as strong agents promoting Europeanisation. This is not to suggest that Europeanisation is not taking place but that it is much more voluntary and non-hierarchical. The OMC literature has, however, identified a number of mechanisms through which Europeanisation can occur, of particular note are those of policy learning, shaming and peer pressure (Borrás & Radaelli 2010; Büchs 2008). Although empirical studies into the effectiveness of these mechanisms have produced mixed results, there is some agreement that national representatives do feel a pressure to meet common targets and fulfil agreed commitments (Featherstone et al. 2012).

In terms of the outcomes, Börzel & Risse (2007) identify five categories of domestic change in response to Europeanisation pressure: inertia (no change), retrenchment (resistance to change), absorption (low degree of change), accommodation (accommodation without changing core or essential features) and transformation (substantial change). The most occupied categories are those of absorption and accommodation although the difference between these categories in not precise (Ladrech 2010:38). In other words, it is often difficult for the researcher to determine at exactly what point one category ends and the next begins. Although this issue requires consideration, these categorisations can serve as useful benchmarks and have been used by several scholars in their research. Moreover, the literature suggests that it is 'crisis moments in which the EU inputs into a member state resonate far more substantially than would be the case under normal circumstances' (Ladrech 2010:37). Given that this research focuses on the period after the recent financial and economic crises, the category of transformation is of particular interest.

A final point regarding outcome relates to the issue of convergence and divergence between EU Member States as a result of Europeanisation. Europeanisation, it is argued, is not convergence (Radaelli 2004). That is not to say that some convergence in terms of policy outcomes has not occurred but, as Börzel and Risse (2002:12) claim, this is at best '"clustered convergence" and continuing divergence with regard to policy processes and instrument, politics and polities'. However, an important point in terms of this study is the suggestion that 'countries with the same structural characteristics respond with similar strategies to the opportunities and constraints provided by Europeanisation' (Radaelli 2004:14). A similar claim is voiced by Featherstone (2003:18) who argues that there may be patterns in national responses to Europeanisation according to state characteristics. Currently, there is minimal comparative literature discussing the defining characteristics, or lack thereof, in the response of Central and Eastern European countries to Europeanisation pressures.

Europeanisation and Central Eastern Europe

Much of the Europeanisation research agenda developed before EU enlargement in 2004 and had, therefore, primarily focused on the older EU Member States. Ladrech (2010:38-39) identifies four points distinguishing the situation in the new post-

communist Member States during the accession period from their older Western counterparts. Firstly, in the new Member States the role of Europeanisation has been transformative and the downloading of the acquis communautaire has played a much more significant role. Secondly, much of the domestic change occurred prior to actual membership so, strictly speaking, Europeanisation began during the pre-accession period. Thirdly, the position of the new Member States meant that they had very little, if any, role in uploading their preferences to EU policy and were, for the most part, only downloaders. Finally, the strong desire of these countries to gain EU membership coupled with the conditionality of its realisation allowed the EU 'an unprecedented influence on the restructuring of domestic institutions and the entire range of public policies in the CEECs' (Schimmelfennig & Sedelmeier 2008:88).

Whilst the differences between the older and newer Member States are still acknowledged, much of the post-accession research has gone on to consider issues such as the effectiveness of conditionality. Although, on the one hand, some studies argue that conditionality has been relatively successful as a strategy for EU compliance, others find that the EU's influence has been limited through conditionality and that its impact has been differential (Hughes et al. 2004; Jacoby 2004). This latter finding has been described as 'somewhat surprising, as there are good reasons to believe that the EU's impact in the candidates should be more pervasive and induce greater convergence' (Sedelmeier 2011:17). Questions have also been asked about whether the changes which were undertaken in order for the Central and Eastern European countries to achieve EU membership were deep or shallow and what their long-term impact will be (Börzel 2006). A recent study on Europeanisation in Poland by Dabrowski (2012) seems to point to a mixed picture of deep and shallow Europeanisation and suggests that the degree to which Europeanisation can occur is strongly regulated by agency.

Sedelmeier (2011) also raises some interesting points about the readiness of these countries to comply with EU rules post-accession in the absence of conditionality, which he argues was the key mechanism that led to the adoption of EU rules by the candidate countries.

> 'Can the EU's compliance system – the ultimate threat of financial penalties imposed by the European Court of Justice – compensate for the absence of conditional incentives, i.e. the threat of withholding membership? Are the domestic changes generated by conditionality conducive to sustainable compliance – application and enforcement – after accession? What happens in areas of political conditionality where the powers of EU institutions vis-à-vis full members are limited?' (Sedelmeier 2011:25)

Or, as Bohle & Greskovits (2012:267) rather aptly phrase it 'why take the sticks if there are no carrots left?'.

Taking this argument one step further, in a study of the Hungarian innovation system, Szalavetz (2014) argues that the 'EU factor' has in fact been of minor importance in comparison to the influence of globalisation. She argues that the integration of economic actors into global value chains has 'more effectively contributed to knowledge-based upgrading, though the allocation of funding from Structural Funds to multinational companies' local subsidiaries seems to have effectively accelerated this latter process' (Szalavetz 2014:52). Her study also suggests that the EU is restricted in terms of blocking Member States from reversing reform or abusing the opportunities afforded by EU membership. The findings of Szalavetz's study highlights some surprising developments regarding the more recent impact of Europeanisation in Hungary. These will be considered during the course of this thesis.

2.2) Innovation

Innovation and the European Union

In 1991, the World Bank produced a report in which the changing ideas of economists about economic development since World War II were reviewed (World Bank 1991). The report calls into question both classical economic theory and, more particularly, neoclassical economic theory, according to which the sustained economic growth of a country can only be possible through exogenous technical change due to the idea of falling marginal product of input (Solow 1957). In line with the neoclassical tradition, the growth rates of countries with access to the same technology would be expected to converge over time. The report notes, however, that in the developing

countries a divergence in growth rates had taken place and, as a result, it argues that even between countries with access to the same technology, 'national growth rates can differ if human capital and the incentives to adopt new technology differ' (World Bank 1991). In support of this view, the report cites the 'New Growth Theory' which claims that technological change is endogenous and that education and knowledge can result in positive externalities or increasing returns (Romer 1986; Lucas 1988; Grossman & Helpman 1991). In other words, contrary to previous thought, the report suggests that economic growth is determined by investment in intangible knowledge accumulation rather than physical capital investment. In other words, 'endogenous growth theory therefore implies that institutions and policies will have a greater influence on growth rate than is suggested by orthodox neo-classical economics' (Barry Jones 2001:535). Policies which have been recognised to have an impact include those relating to trade, competition, education, taxes and intellectual property.

In an EU context, the impact of this new economic view can clearly been seen in the 'Lisbon Strategy' and its oft cited goal of making the EU 'the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Parliament 2000:5). Initially launched in 2000 (Lisbon I), the Strategy was later relaunched in 2005 (Lisbon II) with a shift in emphasis towards more attention on growth and job creation and less focus on social cohesion. The extent to which the Lisbon Strategy was able to achieve its goals, particularly its aim to create a knowledge-based economy that could rival that of the world leader, the United States, is strongly disputed and there are various studies providing explanations for its failure (Collignon 2008; Copeland & Papadimitriou 2012). The EU's inability to increase R&D spending to even close to the 'Barcelona target' of 3% of GDP by 2010 is seen as a clear example of this failure. On the other hand, some authors, whilst acknowledging the areas in which the Strategy has had limited impact, have also noted some more positive outcomes of the Lisbon Strategy, especially Lisbon II. For example, in his analysis of research and innovation within the Lisbon Strategy, Edler (2012:185) writes that the verdict on Lisbon is 'much less gloomy when we look at the various dynamics that have started to change the governance capacities across Europe, with potentially far-reaching consequences for the effectiveness with which funding for research and innovation may be organised in the future'.

Knowledge still remains an important element in EU discourse and, in fact, the free movement of knowledge was even proposed as the EU's fifth freedom in 2007 (Potočnik 2007). However, as the 2000s progressed, an increasing emphasis on innovation can be seen in EU publications (European Commission 2010). In 2014, for example, the European Commission claimed that the 'EU's future is connected to its power to innovate: to turn great ideas into products and services that will bring growth to our economy and create jobs' (European Commission 2014:3). Furthermore, in 2015, Commissioner Modeas proposed that a European Innovation Council be created as a new instrument to foster innovation in Europe. Indeed, the European Paradox, a term which was introduced as early as 1995 (European Commission 1995), refers to the inability of EU countries to translate scientific knowledge into commercial success. In 2010, the successor to the Lisbon Strategy, Europe 2020, was launched with the aim to deliver smart, sustainable and inclusive growth within the EU. Whilst, in some respects, a continuation from Lisbon II can be observed, the EU claims that Europe 2020 differs as it 'builds on lessons learned from the earlier strategy, recognising its strengths (the right goals of growth and job creation) but addressing its weaknesses (poor implementation, with big differences between EU countries in the speed and depth of reform)' (European Commission 2010). Despite the optimistic claims made by the EU, there is nonetheless concern (Lundvall & Lorenz 2012:349) that without a radical step ahead in the EU integration process, it will not be possible to meet Europe 2020's ambitious targets.

In terms of research and innovation, against a backdrop of economic and financial instability and facing an 'innovation emergency' (European Commission 2011), in 2014 the EU launched its eighth and largest ever 'Framework Programme for Research and Technological Development' called 'Horizon 2020'. Instead of following the sequential numbering system of its predecessors (FP1, FP2 and so on), Horizon 2020 has been given its own unique name and purportedly represents a break from the past and 'a clear departure from business as usual' (Geoghegan-Quinn 2011). Whilst recognising that all Member States have their own research policies and funding schemes, the EU claims that many key issues could be tackled by working together which thereby justifies the funding of research and innovation at the EU level (European Commission 2014:3). Although commonalities between Horizon 2020 and its precursor, FP7, are clearly evident, Young (2013) argues that there is more of a sense

of threat in Horizon 2020 than there had been earlier. He suggests that 'FP7 is more positive in its positioning of the EU seeking to overtake the US as the leader, and by Horizon 2020 there is more a narrative of being under siege, with the possibility of losing position to other countries, most notably China' (Young 2013:5).

Concurrent with the launching of Horizon 2020, this time period also witnessed the upgrading and refinement of the methodology for Structural Funds programming with the introduction of the so-called 'Smart Specialisation Strategy'. National and regional authorities across Member States are expected to design Smart Specialisation Strategies, a prerequisite to receiving funding from the European Regional Development Fund (ERDF), which the EU anticipates will ensure a more efficient use of Structural Funds and also increase the synergies between different EU, national and regional policies (European Commission 2014a:2). These Strategies, it is stipulated, must be done 'through a process of 'entrepreneurial discovery', i.e. involving key innovation stakeholders and business. Thus, rather than being a strategy imposed from above, smart specialisation involves businesses, research centres and universities working together' (European Commission 2014a:7). As this is still a relatively new approach, most academic studies focus on the conception of the Smart Specialisation approach (Capello 2014; Carayannis & Rakhmatullin 2014) and there is currently a lack of published studies investigating the impact of these national and/or regional Smart Specialisation Strategies. (For a more detailed description of the EU's approach towards innovation policy, see Chapter 4).

Defining innovation and innovation policy

It could be argued that the EU's subtle transition from a focus on a knowledge-based economy to one which is more innovation-centred mirrors a distinction made many years earlier by Joseph Schumpeter between inventions and innovations (Schumpeter 1964). According to Schumpeter, inventions, which are exogenous to the economy, may take the form of an idea, a sketch or a model for a new product that does not necessarily lead to technical innovation. Just as invention does not always result in innovation, Schumpeter argues that innovation can even be possible without invention. He distinguishes quite clearly between the intellectual inventor and the volitional businessman or entrepreneur – who may be, or more often not be, an inventor

themselves – who turns the invention into an innovation (Schumpeter 1964:60). In Schumpeterian terms, innovations are accomplished with the first commercial transaction involving the new product, system or device.

Schumpeter's (1964) work has served as the framework for many of the more recent studies on innovation. Schumpeter himself built on the work of the Russian economist Nikolai Kondratiev who had stated that the capitalist economy moves in long, regular cycles. Kondratiev's theory was that these cycles occur regularly, lasting from 40 to 60 years, because they are caused by certain permanent evolutionary factors which must necessarily cause a boom after a recession. Although Schumpeter accepted the existence of the Kondratiev cycle, which many economists prefer to call 'waves' or 'phases' of growth, his explanation for these cycles differed from that of Kondratiev. According to Schumpeter, each business cycle was unique not only because of the historical events such as wars, gold discoveries or harvest failures but, also, because of the variety of technical innovations. As Freeman and Soete (1997:20) note, in Schumpeter's theory, 'the 'successive industrial revolutions' were based on the qualitative transformation of the economy by new technologies, rather than the simple quantitative growth of individual industries'.

A significant shift can be seen between Schumpeter's earlier and later works, also referred to as 'Mark I' and 'Mark II'. Although Schumpeter (1964) always stressed the crucial role of the entrepreneur in the innovative process, Schumpeter 'Mark II' acknowledged the internalisation of much scientific work within the firm. This, it has been argued (Freeman & Soete 1997), reflected the real change that had taken place in the United States between World War I and World War II and, more specifically, the rise of professional R&D. It is, in fact, thanks to Schumpeter that perhaps the most frequently cited definition of innovation, as used by international organisations such as the OECD and EU, has been developed:

> 'An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations' (OECD and Eurostat 2005:46).

Additionally, innovation can be further subdivided into radical and incremental innovations. The former 'entails substantial shifts in product lines, the development of

entirely new goods, or major changes to the production process' whilst the latter is 'marked by continuous but small-scale improvements to existing product lines and production processes' (Hall & Soskice 2001:38-39). As will be discussed in more detail later, the Varieties of Capitalism (VoC) literature suggests that there is a direct link between the category of innovation in which a country tends to predominate, radical or incremental, and its type of capitalism.

Another important distinction is that between innovators and imitators, a separation which though seemingly simple in theory is much more difficult to apply in practice. If, for example, 'Firm A' introduces an innovation in one context and then later 'Firm B' introduces the innovation in a different context, would 'Firm B' be classified as an imitator or innovator? Clearly 'Firm B' has imitated 'Firm A's' innovation but, by applying it in a new context, this is arguably an innovation too. Expanding on these classifications in a study of firm strategy, Freeman and Soete (1997) identify six innovation strategies which firms may choose to follow; offensive, defensive, imitative, dependent, traditional and opportunist. In fact, it has been suggested that rather than try to 'catch-up' to the technology frontier, companies in some countries may be incentivised to imitate and 'fall back' in order to grow more through the diffusion of new innovations originating from the frontier (Benhabib et al. 2014). This is not the only factor to discourage innovation that has so far been recognised. Social institutions which limit inequality have also been shown to reduce the incentives for innovation compared with a social system that encourages the sort of 'cutthroat capitalism' associated with the United States (Acemoglu et al. 2012). Indeed, it is in this respect that the role of national institutions in providing an environment which encourages innovation, and the type of innovation that it promotes, begins to become evident.

With regard to innovation policy itself, one of the difficulties in defining innovation policy and its instruments is that innovation policy regularly overlaps with policies related to science, research and technology. Indeed, the terms are often used interchangeably or in varying combinations. A concise definition of innovation policy is provided by Edler et al. (2016:3) who describe it as 'public intervention to support the generation and diffusion of innovation, whereby an innovation is a new product, service, process or business model that is to be put to use, commercially or non-commercially'. The intervention referred to in this definition is designed and administered by government and its purpose is to provide support not just for the

generation of new ideas, but also for their introduction, diffusion and adoption. In this respect, innovation policy can be targeted at both 'those actors who generate innovations from the supply side and also so those who ask for, absorb and use innovations from the demand side' (Edler at al. 2016:3). The inclusion of not only knowledge production but also its diffusion and absorption marks a considerable development from previous approaches to innovation policy which tended to focus specifically, or even solely, on R&D (such as the EU's earlier innovation policy approach described in Chapter 4).

Perspectives on innovation and the nation state

Whilst the importance of innovation for a nation's economic prosperity has generally been unanimously agreed (Drucker 1985; Freeman & Soete 1997; Porter 1990), there has been considerable debate regarding the actual drivers of innovation. Several perspectives have focused on the nation state as a unit of analysis and, in doing so, they have identified country-specific factors that influence the flow of innovation (Freeman 1987; Furman et al. 2002; Lundvall 1992; Nelson 1993; Porter 1990; Romer 1990). These studies recognise that the national environment has a considerable impact on both the direction of innovation and the speed at which it can occur. The four main paradigms in this area are: (a) endogenous growth theory, (b) microeconomics-models of national competitive advantage and industrial clusters, (c) research on National Systems of Innovation (NSIs) and (d) studies on National Innovative Capacity (NIC).

The first of these theories, the endogenous growth theory, is arguably the most abstract of the conceptualisations (Furman et al. 2002:901). Although the importance of technological innovation to economic growth had been realised much earlier (Abramovitz 1989; Schumpeter 1964; Solow 1957), it was not until the late 1980s that it began to be seen an as an endogenous phenomenon (Romer 1990). The endogenous growth theory stresses the importance of investing in human capital and knowledge in order to secure long-term economic development. For example, according to the growth model developed by Romer (1990), the rate of new ideas is a function of the number of available skilled researchers and the existing stock of knowledge. Although there has been considerable debate about the validity of a model linking ideas production to long-term economic growth (Grossman & Helpman 1991; Kortum 1994),

there is relatively broad agreement that these factors are, indeed, crucial in explaining economy-wide innovation (Furman et al. 2002:902).

In comparison to the endogenous growth theory, which focuses almost exclusively on a set of important but limited factors, the second theory emphasises the importance of microeconomics in the relationship between competition, innovation and economic growth (Furman et al. 2002:902). Much of this work focuses on the role of geographical clusters and the dynamic interactions between these clusters and specific institutions such as universities and public institutes. This concept is primarily associated with Porter (1990) who, building on important studies such as Rosenberg (1963), produced a framework identifying four key drivers of innovation. In Porter's (1990:71-73) 'diamond', the determining factors of national advantage are: (i) the availability of high-quality and specialized innovation inputs, (ii) an intense competitive local context which rewards successful innovators, (iii) the nature of domestic demand for cluster producers and services and (iv) the availability and interconnectedness of vertically and horizontally related industries. Porter (1990:71) argues that nations cannot be competitive in all industries but that they can 'succeed in particular industries because their home environment is the most dynamic and the most challenging and stimulates and prods firms to upgrade and widen their advantages over time'. In addition to placing firms firmly at the centre of his analysis, Porter accords only a partial role to government and its ability to influence the four determining factors of competitive advantage and thereby 'stimulate dynamism and upgrading' (Porter 1990:678).

Literature on the third concept, National Systems of Innovation (NSIs), began to expand in the early 1990s and was quickly adopted by national governments and international organisations such as the OECD and the EU (OECD 1997). This systemic approach has become particularly popular with policy makers around the world as it 'offers them the potential to derive more appropriate leads for innovation policy' (Lankhuizen & Klein Woolthuis 2003:7). Although still a fairly young approach, the concept can in fact be dated back to Friedrich List's (1841) work on political economy, which is seen as the platform for more recent studies on NSIs (Edquist 1997; Freeman & Soete 1997; Lundvall 1992; Mjøset 1992; Nelson 1993). List, who was primarily concerned with the issue of Germany overtaking Britain as the industrial leader in the nineteenth century, developed a national perspective which emphasised the need for

countries to develop 'productive forces'. In doing so, he criticised classical economists for not sufficiently considering the role of science, technology and skills in the growth of nations. He argued for the protection of 'infant-industries' and a broad range of policies aimed at learning about and applying new technologies which he believed would accelerate, or make possible, industrialisation or economic growth. Given the emphasis placed on what would now be considered innovation, it has been suggested (Freeman 1995:5) that List's (1841) book, *The National System of Political Economy*, could just as easily have been called *National Systems of Innovation*.

The NSI concept proposes that innovation is the result of a complex series of interactions between various actors and institutions within the system and that a country's innovative performance will depend on how well these elements can relate to one another as parts of a collective system of knowledge creation (OECD 1997). It moves away from a linear approach towards innovation, which assumed that efforts in R&D cause innovation and commercialisation and subsequently better economic performance, and it places a greater emphasis on the role of government and government policy than Porter's (1990) theory of national competitive advantage. The NSI literature stresses three important aspects: (a) the overall national policy environment (e.g. IP or trade policy), (b) higher education and (c) country-specific institutions (e.g. the funding approaches of specific agencies) (Furman et al. 2002:900). The definition of an NSI varies considerably between researchers (see Table 1) and, as a result, a further subdivision has been made between NSIs in a 'narrow sense' and NSIs in a 'broad sense'. In a narrow sense, NSI research focuses on those institutions that are directly involved with R&D and the dissemination of the results of that R&D. Authors who approach NSIs in a broad sense, however, include not only the diffusion, absorption and use of innovation but it also suggest that there are major sources of innovation other than science. A major source of innovation other than science, for example, is the interactive learning that takes place in connection with production and sales (Lundvall 2005). Nelson's (1993) work provides an example of a narrow sense approach to NSIs whereas Freeman (1987) and Lundvall's (1992) studies characterise NSIs in a broad sense. Whist it is important to be aware of the differences in the approaches to studying NSIs, it should be noted that the importance of national institutions is stressed in both narrow and broad approaches as can be seen in all of the definitions in Table 1 below.

Table 1: Definition of an NSI

NSIs have been defined as:

- all important economic, social, political, organizational, institutional and other factors that influence the development, diffusion and use of innovations' (Edquist 1997:14).
- 'the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies' (Freeman 1987:1).
- 'a set of institutions whose interactions determine the innovative performance…of national firms' (Nelson 1993:5).
- 'the national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country' (Patel & Pavitt 1994:12).
- 'that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies' (Metcalfe 1995:462-463).

The fourth perspective on national dimensions of innovation, National Innovative Capacity (NIC), has sought to integrate the three former viewpoints. NIC is defined as a 'country's potential – as both an economic and political entity- to produce a stream of commercially relevant innovations' (Furman et al. 2002:905). Determinants of NIC are divided into three categories: (i) the common pool of institutions, resource commitments, and policies that support innovation across the economy, (ii) the particular innovation environment in the nation's industrial cluster and (iii) the linkages between them (Furman et al. 2002:905). Using this framework, proponents of the NIC approach have used data to quantitatively calculate the innovative capacity of various countries (Furman et al. 2002). Although some further studies have been carried out using the NIC structure (Hu & Mathews 2005; Hu & Tseng 2007; Natario

et al. 2011), it has arguably received less scholarly attention than the NSI approach and there is a considerably more limited literature dedicated to this concept.

With regard to this research, the broad NSI approach has been selected as the most appropriate framework as it offers a much more extensive model with which to study innovation at a national level than that offered by the endogenous growth theory, the micro-economic models or the NIC theory. By allowing space for the role of government, firms, education and other relevant national institutions and using primarily qualitative data, the NSI concept provides a thorough toolkit with which to understand the complexities of innovation. Indeed the NSI concept has become a popular tool for understanding the differences in innovative performance between countries (Nelson 1993) and also the changing innovative performance within countries. It should be noted, however, that whilst this research will employ a national approach, the systems of innovation concept is not used exclusively at a national level. Other innovation studies have adopted a technological (Carlsson 1995), sectoral (Malerba 2005; Oltra & Saint Jean 2009) or regional (Asheim & Isaksen 2002; Braczyk et al. 1998; Cooke et al. 1997; Cooke 2001) focus, all of which can be grouped into the generic systems of innovation approach. As Edquist (2006:184) notes, '[w]hether the most appropriate conception of the system of innovation, in a certain context, should be national, sectoral or regional, depends to a large extent on the questions one wants to ask'. The national approach has been chosen for this research as it offers the most suitable analytical tool with which to answer the research questions. Whilst there are many advantages of the NSI approach, there are of course limitations which will now be discussed in more detail.

Criticisms of the NSI approach

The NSI approach has been particularly criticised for being conceptually diffuse and ambiguous (Edquist 2005). A clear example of this can be seen in the varying definitions of NSIs (Table 1 above), which underlines the lack of agreement as to exactly where the boundary around the innovation system lies. In many cases, authors have provided 'no sharp guide to what should be included in the innovation system, and what can be left out' (Nelson and Rosenberg, 1993:5-6). Whilst others, Lundvall (1992:13), have insisted that 'a definition of the system of innovation must be kept open

and flexible'. Even the 'system' element of the concept has received criticism for being vague as it could be argued that, in fact, it refers to a 'network level' rather than 'system level' process (Miettinen 2002).

A similar lack of clarity is evident in the definition of an institution, a key element in the NSI approach. Some authors use the term to refer to different kinds of organisations or 'players' (Nelson & Rosenberg 1993), whereas for others (Lundvall 1992), it represents the laws, rules, routines and other 'rules of the game'. As a result, the term institution is used in several different senses in the literature (see Edquist 2005). It is also important, in this respect, to differentiate between formal institutions, such as constitutions and contracts, and informal institutions, such as traditions, customs, moral values and 'ways of doing things' (North 1990). There is a further element of ambiguity *apropos* the theoretical value of the NSI approach as it does not specifically provide propositions regarding causal relations among variables. Given its lack of well-established empirical regularities, Edquist (2005:186) argues that it 'should be labelled an approach or conceptual framework rather than a theory'. This will of course have methodological implications for this research which will be addressed in a later section.

Proponents of the NSI approach have also had to contend with the issue of globalisation, and to a certain extent the issue of devolution, in order to defend the 'national' element of the NSI concept. Due, in part, to the increasing rise in cross-country production systems and interfirm connections, the previously mentioned 'sectoral' and 'regional' innovation systems have been seen by some as an alternative to the national approach. Whilst these approaches represent an important analytical niche, both in their own right and as a compliment to the national approach, they do not represent a replacement of the NSI approach. As Lundvall et al. (2002:215, emphasis in original) note '[a]s long as nation states exist as political entities with their own agendas related to innovation it is *useful* to work with *national* systems as analytical objects'. This opinion is echoed by other authors (Freeman & Soete 1997) including Nelson (1993:18) who notes that some of the striking differences between the systems of countries 'reside to a significant degree, in differences in national histories and cultures'. The rationale for studying innovation at a national level is further substantiated by the fact that national governments have a vested interest in promoting and supporting innovation due to its importance for economic growth and ensuring a

high national employment rate. In other words, whilst the implications of globalisation and, where applicable, devolution need to be understood in the area of innovation research, the nation state still remains a legitimate unit of analysis.

Although it is important to be aware of the weaknesses of the NSI approach, it has nonetheless proved a particularly efficient concept for understanding the reasons for the differing innovative performance of countries. As Lankhuizen & Klein Woolthuis (2003) identify, the NSI approach helps to understand how innovation evolves and what the elements and framework conditions are that determine and affect innovation and economic development. In other words, it 'offers a 'richer picture' of reality compared to mainstream growth models' (Lankhuizen & Klein Woolthuis 2003:12). Similarly, for Suurna & Kattel (2010:647) it 'provides a necessary roof above the aspects related to different actors in innovation, innovation policy and policy-making processes and hence provides necessary structural coherence'. Arguably the conceptual framework of the NSI approach is most effective, and is the method in which it is applied to this study, when used as a 'focusing device' (Lundvall 1992), with which the researcher can decide how and where to channel their research.

National culture and innovation

In spite of its frequent usage in both academic and everyday contexts, the concept of culture is markedly nebulous and agreeing on a precise definition has proven particularly challenging. Offering perhaps one of the most comprehensive definitions, Morris et al. (1994:70) define national culture as

> 'a learned, socially transmitted set of behavioural standards. It is held, expressed, and shared by individuals through their personal values, norms, activities, cognitive processes, interpretation of symbols, feelings, ideas, reactions and morals'.

The importance of national culture is significant because, as noted by Senge (2006:8), it affects the way in which 'we understand the world and how we take action'. In fact, national culture is argued to be more influential in how we process data, draw conclusions, and decide upon our actions than age, race, gender, religion, education or occupation (Livermore 2011; Trompenaars & Hampden-Turner 2012).

Various studies have been undertaken in order to investigate the impact of national culture on innovation performance (*inter alia* Gerhart & Fang 2005; Hofstede 1980; Hofstede 2001; Jones & Davis 2000; Newman & Nollen 1996; Shane 1992). One of the earliest significant studies was conducted by Hofstede (1980) whose landmark study of fifty countries and three regions has served as a frame of reference for many later studies. Hofstede initially identified four, and subsequently five, dimensions of culture; power distance, individualism-collectivism, uncertainty avoidance, masculinity-femininity and long versus short-term orientation. These dimensions, it is claimed, interact with factors linked with the NSI, such as quality of governance and openness which, in turn, impact on a country's ability to innovate. The resulting conclusion is that national culture does indeed have an impact on a country's innovation capacity. For example, a study of the relationship between culture and innovation in European countries (Kaasa & Vadi 2008), which was based on the aforementioned cultural dimensions identified by Hofstede, suggests that regions with lower than average power distance, uncertainty avoidance, family-related collectivism and masculinity exhibit higher patenting intensity.

With regard to Central and Eastern European countries, Kolman et al. (2003) conducted a study of national cultures in the Czech Republic, Hungary, Poland and Slovakia during the pre-accession period in order to gain some insight into the national cultures of these countries. The study serves as something of a benchmark against which changes, which were expected as a result of intensive social, political and economic interactions with other European countries, can be measured. Results found that not only were there significant cultural differences between (a) Western and (b) Central and Eastern European countries, but also amongst the Central and Eastern European countries themselves. Of particular note were the striking differences between the Czech Republic and Slovakia which was particularly surprising given that they had been united within one nation for many decades[1]. The results of this study offer a strong warning against the tendency to group together countries with geographical or historical commonalities (such as ex-Soviet states) into a culturally homogenous collective. Based on the argument that national culture affects innovation capacity, therefore, it could be expected that cultural differences between Central and

[1] In fact, data suggest that the Czech culture is closer to the German and Austrian culture than to the Slovak culture (Hofstede 2001).

Eastern European countries would lead to divergent experiences in their innovation systems and performances.

2.3) Varieties of Capitalism

An introduction to Varieties of Capitalism (VoC)

There have been several studies (Featherstone et al. 2012; Menz 2005) conducted integrating the seemingly disparate VoC framework with that of Europeanisation. In fact, Featherstone et al. (2012) argue that it is even necessary for researchers of Europeanisation to learn from other approaches, such as VoC, in order to explain the varying responses of Member States to external pressures, namely those exerted by the EU. Incorporating the VoC framework into a study of the Lisbon Agenda, they suggested, could help to explain the resilience or inertia of Member States towards the EU's guidelines. Instead of conflicting, 'the two frames are more complementary than competing, as both aim to explain the differential effect of an external stimulus for domestic adaptation(…)Thus, essentially, the VoC offers a new set of 'intervening variables' for Europeanisation, while Europeanisation offers an additional 'external pressure' for the VoC' (Featherstone et al. 2012:67). A corresponding claim has been voiced by Menz (2005) who contends that powerful interest groups, such as trade unions and employer organisations, which play an important role in the divergent VoC typologies, do significantly impact on national attempts of coping with EU-led market liberalisation. In other words, these studies suggest that the Europeanisation and VoC frameworks can be used to complement one another and thereby enrich the findings of research.

Furthermore, given that the literature on VoC directly relates to the study of innovation, its theoretical implications must therefore be considered in the course of this research. Although not a new area of research – for example Schonfield conducted a study on the differences between Western capitalist nations as early as 1965 – the VoC approach which was developed at the beginning of the 2000s has had a huge impact on studies of comparative political economy. It has even been 'heralded as the most important recent theoretical innovation in the comparative social sciences both by its critics and more sympathetic commentators' (Hancké 2001:5). Indeed the

quantity of publications responding to and expanding on the ideas proposed in the original VoC study (Hall & Soskice 2001) is testament to its significance.

Recent history has been characterised by processes of globalisation, Europeanisation and shifting macro-economic paradigms which led many to believe that advanced political economies would inevitably be forced to converge along neo-liberal lines. The conclusion was that 'the deregulating neo-liberal political-economic model would ultimately trump the more coordinated and frequently more socially orientated continental European and South-East Asian economic development models' (Hancké 2001:1). Hall & Soskice (2001), however, proposed a very different argument claiming that not only were economies not converging on the neo-liberal economic model, but that political-economic models were in fact diverging as a result of globalisation, as countries sought to maximise their comparative advantage. Their approach suggested that one political-economic model was not necessarily better than another but that different models could result in distinct comparative institutional advantages.

Hall and Soskice (2001) built on previous studies of models of capitalism, particularly Albert's (1993) research which had identified key differences between what he termed Anglo-Saxon and Rhineland models of capitalism. A significant deviation from much of the previous work, however, was Hall and Soskice's use of microeconomic foundations in order to understand and explain macroeconomic theory. Their analysis centred on the firm and the way in which firms coordinate their endeavours with other actors within that nation's political economy. More specifically, they focused on the way in which firms overcome the coordination problems they face in five spheres of their strategic environment; (1) industrial relations, (2) vocational training and education, (3) corporate governance, (4) inter-firm relations and (5) employees. The solution to these coordination issues, they argue, lies in the historically formed institutional frameworks. Emerging from this analysis are two ideal-type forms of institutional equilibria, liberal market economies (LMEs) and coordinated market economies (CMEs), which sit at either end of a continuum along which other nations can be arrayed.

In developing their LME-CME dichotomy, Hall and Soskice (2001) highlighted national differences in the three main markets to which firms are exposed; product,

labour and capital. An example of this can clearly be seen in Germany, claimed to be the country which most conforms to the CME ideal type, whose labour market is characterised by long-term employment and collective wage negotiation between employers' associations and trade unions. This is juxtaposed with the more flexible labour market of the US, Germany's LME counterpart, which is typically associated with a more 'hire and fire' type of arrangement. A similar contrast can be observed in their capital market arrangements. Whilst the former has traditionally relied on capital provision organised through banks (even despite the recent contribution of international investors, the relations between banks and firms has remained highly coordinated (Hancké et al. 2007:5)), the latter depends on capital provided through a dispersed shareholder system. According to Hall and Soskice, the peculiarities of these capital and, particularly, labour markets have a direct impact on the products in which companies will chose to specialise. From this perspective, a clear link can be seen between labour, capital and product markets.

This relates directly to Hall & Soskice's (2001:18-19) concept of institutional complementarities in which 'nations with a particular type of coordination in one sphere should tend to develop complementary practices in other spheres as well'. The notion of institutional complementarity has also been considerably applied and explored in studies of NSIs (Coriat & Weinstein 2009; Lundvall 1992). According to the VoC approach, firms in LMEs coordinate their activities primarily through hierarchical and competitive market arrangements which are characterised by arms-length relations, formal contracting and supply and demand price signalling (Hall & Soskice 2001; Hall & Gingerich 2004). As a result, labour markets in these countries are fluid and employees are therefore encouraged to develop 'switchable assets' which can be used in different companies. This is complemented by a corporate governance system which focuses on short-term incentive contracts. Companies in these countries typically have easy access to stock market finance for which they are expected to produce significant returns quickly. Hall & Soskice (2001:39) argue that, due to institutional complementarity, companies in these countries will tend to pursue radical innovations in sectors ranging from bio-technology, semi-conductors, software and advertising to corporate finance.

Whilst market conditions do play a part in CMEs, firms here depend also on non-market forms of coordination such as extensive relational or incomplete

contracting, network monitoring and collaborative rather than competitive relationships. Due to a tradition of long-term employment, employees are encouraged to develop 'specific skills' or 'co-specific skills', the values of which can be realised with the active cooperation of others. These economies are characterised by bank or credit-based financial systems and banks and other financial actors have historically had a strong oversight role on firms (Casper 2010:351). As a result of long-term strategies, rule-bound behaviour and the close ties between firms and banks, firms in CMEs are more likely to focus on incremental innovation particularly in capital goods industries, machine tools and equipment of all kinds (Hall & Soskice 2001:39).

Innovation plays a key part in Hall & Soskice's (2001:37) theory of institutional comparative advantage according to which 'the institutional structure of a particular political economy provides firms with advantages for engaging in specific types of activities'. Rather than random geographic agglomeration, the rational responses of firms to the institutional framework will result in national patterns of specialisation in activities and products. Firms will seek to retain capitalist diversity between nations as it provides them with their comparative advantage which, it is argued, rather than being undermined, is actually being strengthened by globalisation. It is claimed, therefore, that '[s]ince FDI will flow to locations rich in either specific or co-specific assets, depending on the sector or firm-specific requirements that investors are searching for, globalisation will reinforce comparative institutional advantage' (Hancké et al. 2007:6).

A critique of Varieties of Capitalism

Given the theoretical importance of the VoC literature to this research, it is important to be aware of some of the main criticisms of this approach. There are two main groups of critics, the first of whom question one of Hall and Soskice's core arguments, namely that institutional divergence is taking place in advanced capitalist economies. The argument of these critics centres around the notion that 'the more capitalist economies at different stages of development become integrated in one world market, the more competition, the driver of innovation, will impose institutional convergence' (Hancké 2001:6). They claim that, as growth becomes intensive rather than extensive, a coordinated system will slow down the pace of adjustment and

therefore these countries will ultimately have to liberalise their economies. Proponents of this position include Eichengreen (2007), Friedman (2000) and Phelps (2006) and it has also been utilised by politicians in the United States, United Kingdom, European Commission, OECD and IMF, amongst others (see Hancké 2001).

The second group of critics broadly accept that divergent forms of capitalism exist but express concerns with elements of the original VoC study. There are several strands to this group of critics. The first strand raises concerns about the use of the firm, which is at the centre of the VoC analysis, almost to the exclusion of other actors, particularly labour and the state. As Hancké (2001:8) notes:

> 'While very few critics fundamentally disagree with the idea of paying attention to the strategic choices of firms and business more generally, most of them would argue that the conditions under which firms operate, and especially the nature of the state, the role of labour law and collective bargaining, and the institutionalized power of labour unions, are as crucial in understanding the modern capitalist world and the choices that capitalists make.'

Bringing the state and labour back into the analysis has been considered paramount in the work of this group of VoC critics.

Within this group of critics, a second strand of criticism highlights some weaknesses in the key building blocks of the VoC framework, particularly institutional complementarity and institutional competitive advantage. For example, Amable (2004:10) claims that institutions represent 'a compromise resulting from the social conflict originating in the heterogeneity of interest among [various] agents'. This would suggest that institutional complementarity reflects not only an economic function, as implied by the original VoC study, but one which is also social and political. In other words, these critics argue that in order for the notion of institutional complementarities to work in a broader, political economic sense, social and political considerations need to be taken into account (Morgan & Kubo 2005). The notion of comparative institutional advantage has also been questioned in a study by Herrigel and Wittike (2005) which found that the US and Germany, opposites on the VoC classification scale, were in fact following similar strategies in certain manufacturing firms.

A further issue with the notion of institutional complementarity results from its inherent connection to the concept of path dependency (discussed in Chapter 3). Whilst institutional complementarities can explain 'on-path' change, in the form of continued diversity, it offers little explanation for fundamental, or 'off-path', change. In other words, the concept of institutional complementarity is unavoidably opposed to the idea of radical change. However, observations in advanced capitalist economies suggest that profound institutional changes can occur without exogenous shock and thereby draw attention to the limits of path dependency and, consequently, institutional complementarity. As a result, some have argued for the possibility of change to be reintroduced into the theory of path dependency (Crouch & Farrell 2004; Thelen 2003).

A third strand of criticism stems from the lack of diversity in the VoC approach, questioning whether variety is in fact missing in the original VoC concept. The binary LME-CME classification adopted in the VoC approach risks presenting countries that do not conform to either of these, including countries with a strong state influence such as France and the Mediterranean countries, as being somehow anomalous or deviant. Indeed, further studies have identified cases which do not conform to the LME-CME typologies, such as a Mediterranean Market Economy (Hall & Gingerich 2004) and a Dependent Market Economy (in some Central and Eastern European countries) (Nölke & Vliegenhart 2009), to name but a few. Still others have developed entirely different classification systems such as the 'National Business Systems' (Morgan 2005; Whitley 1999) and 'Social Systems of Production' (Amable 2004; Crouch et al. 2005).

Related to this strand of criticism is the argument that, not only does the VoC approach not offer sufficient variety in its binary classifications, but that these classifications do not adequately capture the differences between countries which allegedly fall into the same category. For example, according to the VoC literature, both Germany and Japan are classified as CMEs. Yet, in spite of the fact that their corporate government arrangements produce similar outcomes, they differ considerably in terms of the institutional system on which they are based and the historical forces which shaped them (Yamamura & Streeck 2003). Critics have argued that by placing Germany and Japan into the same classification, insufficient attention is drawn to the differences between the structures and their political economies. Similar arguments have also been made about the inability of the VoC framework to account for the

differences between LMEs (Cheffins 2002). In addition, using a comparison of the pre- and post-Thatcher eras in the United Kingdom, authors have argued that the VoC model is unable to explain changes which can occur within an LME over time (Howell 2003).

Varieties of Capitalism and Central and Eastern Europe

The lack of variety in Hall & Soskice's (2001) categorisations represents a significant problem in terms of classifying the types of capitalism present in post-communist Central and Eastern European countries. In this respect, one of the major limitations of the VoC approach is that it focuses on, and can only really be applied to, the advanced economies of the US and Western Europe. As Bohle & Greskovits (2012:11) note, 'to assume that these models can be readily applied to less developed market societies seems far too much of a stretch'. Expressing their reservations about the applicability of the VoC approach to Central and Eastern European countries, these same authors also highlight the importance of the timing of these countries transition period and, more specifically, the impact of globalisation. These countries found themselves contending with a considerably different global economy than Western European countries had in the period after World War II. Therefore, the role of international and transnational factors and actors need more consideration in Eastern and Central Europe than is provided by the original VoC framework.

There, have nonetheless, been some attempts to classify Central and Eastern European capitalisms according to the LME-CME typologies (Cernat 2002; Crowley 2005; Lane 2005; McMenamin 2004). Slovenia, for example, has been identified as a CME whilst Estonia, it has been argued, possess the traits of an LME (Buchen 2007; Feldmann 2006). Some authors, on the other hand, have suggested the existence of a hybrid variety of capitalism which combines features of both LMEs and CMEs (Iankova 2002; King & Sznajder 2006). Recognising some of the limitations of applying the VoC approach to Central and Eastern European countries, Nölke & Vliegenhart (2009) also expanded the VoC model by adding a third classification to the original study, namely the Dependent Market Economy (DME). Focusing their study on the four Visegrád countries, the Czech Republic Hungary, Poland, and the Slovak Republic, they found that the LME-CME categorisation could not adequately describe the variety

of capitalism in these countries as it did not allow for consideration of the impact of external dependency, a central characteristic of the region. They argue that the competitive advantage of DMEs comes from the assembly and production of relatively complex and durable goods. 'These competitive advantages are based on institutional complementarities between skilled, but cheap, labor; the transfer of technological innovations within transnational enterprises; and the provision of capital via foreign direct investment (FDI)' (Nölke & Vliegenhart 2009:672). By incorporating transnational influences, especially that of MNEs, and introducing a new categorisation, Nölke and Vliegenhart managed to overcome, to a certain extent, the previously mentioned drawbacks of applying the VoC approach to the Visegrád Four. Nölke & Vliegenhart (2009:674) note that whilst DMEs can successfully compete in world markets for a certain period of time, their long-term prospect looks uncertain as 'their comparative advantages are constantly being threatened by countries located further to the east'.

Whilst recognising its merits, Bohle & Greskovits (2012) have not been convinced that expanding the VoC concept to include a DME classification satisfactorily encapsulates the key elements which define the diversity of capitalism within the Central and Eastern European countries. For them, a crucial element was still missing and '[a]ny meaningful conceptualization of the new configurations must therefore include propositions about transformative political agents and their interplay with transnational and supranational actors' (Bohle & Greskovits 2012:12). Bohle and Greskovits apply a Polanyian-based theoretical framework, which recognises the inherent tension between the interests of the economic, social and political domains, in order to distinguish the varieties of capitalism present in Central and Eastern European countries. Their study uncovers three 'regime' types which result from a combination of historical legacies and the decisions of elites during the transition period: neoliberal (the Baltic States), embedded neoliberal (the Visegrád 4) and neocorporatist (Slovenia). Slovenia's status as the sole neocorporatist representative highlights the increasing movement towards forms of neoliberal, or even pure neoliberal, regimes witnessed since the end of the 1990s (Bohle & Greskovits 2012:268).

In terms of a theoretical framework, Bluhm et al. (2014) recognise the advantage of the Polanyian approach but they also highlight its limitations such as its market centeredness and its view of institutions as mainly external constraints on self-

regulating markets. On this basis, they refuse to reject the VoC approach entirely. In fact, Bluhm et al. (2014) cautiously apply the notion of a DME, aware of a major weakness of this approach in overstressing the role of foreign investors and giving insufficient attention to the influence of domestic actors. Moreover, in the case of this research the DME approach does have some considerable merits, particularly the positioning of MNEs at the core of its framework. Whilst aware of its limitations, it is due to its suitability in achieving the aims of this study that the DME framework has been selected as the reference point with which to conduct this investigation. Indeed, it is important to keep in mind that VoC is not an end point but, as Hall & Soskice (2001:68) themselves suggested, an invitation to a 'fruitful interchange among scholars interested in many kinds of issues in economic, industrial relations, social policy making, political science, business, and the law'. By placing emphasis on the role of national institutions as well as foreign actors in order to explain differing national experiences, the DME approach both complements and contributes to the study of NSIs and Europeanisation.

2.4) Hypotheses

This chapter has hilighted some of the key concepts which will frame the direction of this research. Furthermore, the review of the bodies of literature on Innovation, Varieties of Capitalism and Europeanisation has underlined the sustained importance of national institutions, both in their informal and formal sense. The idea that 'instutions matter' is hardly a new concept; it has long been a matter of discussion amongst political economists. The growing body of literature on systems of innovation and Europeanisation has begun adding more evidence in support of this argument. However, it is not only the signifcance of institutions that this chapter has hilighted, but also that of agency. Indeed, to a large extent, these two elements are intirnsically linked. As Amable (2000:3-4) notes, 'a link is provided between the role of history-dependent institutions and individual behaviour since instituional arrangements define the incentive framework in which agents take decisions'. The review of this literature has drawn attention to the consideration that needs to be given to the role of institutions and agency in order to answer the questions of this study.

Based on the survey of this literature and with the research aims discussed in the previous chapter in mind, the following three central hypotheses have been developed for testing through the course of this study. Whilst Hypothesis 1 directly addresses the core question of this research, Hypotheses 2 and 3 have been framed as reverse hypotheses in order to rigorously test and challenge Hypothesis 1.

1. **The EU's innovation agenda, currently being driven by Horizon 2020 and the Smart Specialisation Strategy, will have a strong impact in terms of promoting innovation, encouraging the development of innovation strategies and influencing the direction of these strategies in the Czech Republic and Hungary.**

1. **The extent to which the EU is able to influence the national innovation systems of the Czech Republic and Hungary will be strongly influenced by the compatibility, or lack thereof, between the demands and objectives of the EU and the Czech and Hungarian national institutions (both formal and informal).**

2. **Given the economic dependence on foreign firms in the Czech Republic and Hungary, the response of the Czech and Hungarian national governments to the pressures of Europeanisation will be heavily mediated by the needs and expectations of these foreign actors.**

Conclusion

This chapter has undertaken to provide a thorough analysis of previous research and literature related to this study. In doing so, it has highlighted areas on which there is academic difference and also several areas which would benefit from further research contribution. This discussion has also sought to draw together the three areas of Innovation, Europeanisaiton and Varieties of Capitalism and to demonstrate their related relevance in answering the questions at the centre of this study. Additionally, this review has enabled the construction of a number of hypotheses which this thesis will seek to investigate. This does of course denote several methodological considerations which will be addressed in detail in the following chapter.

3) Methodology

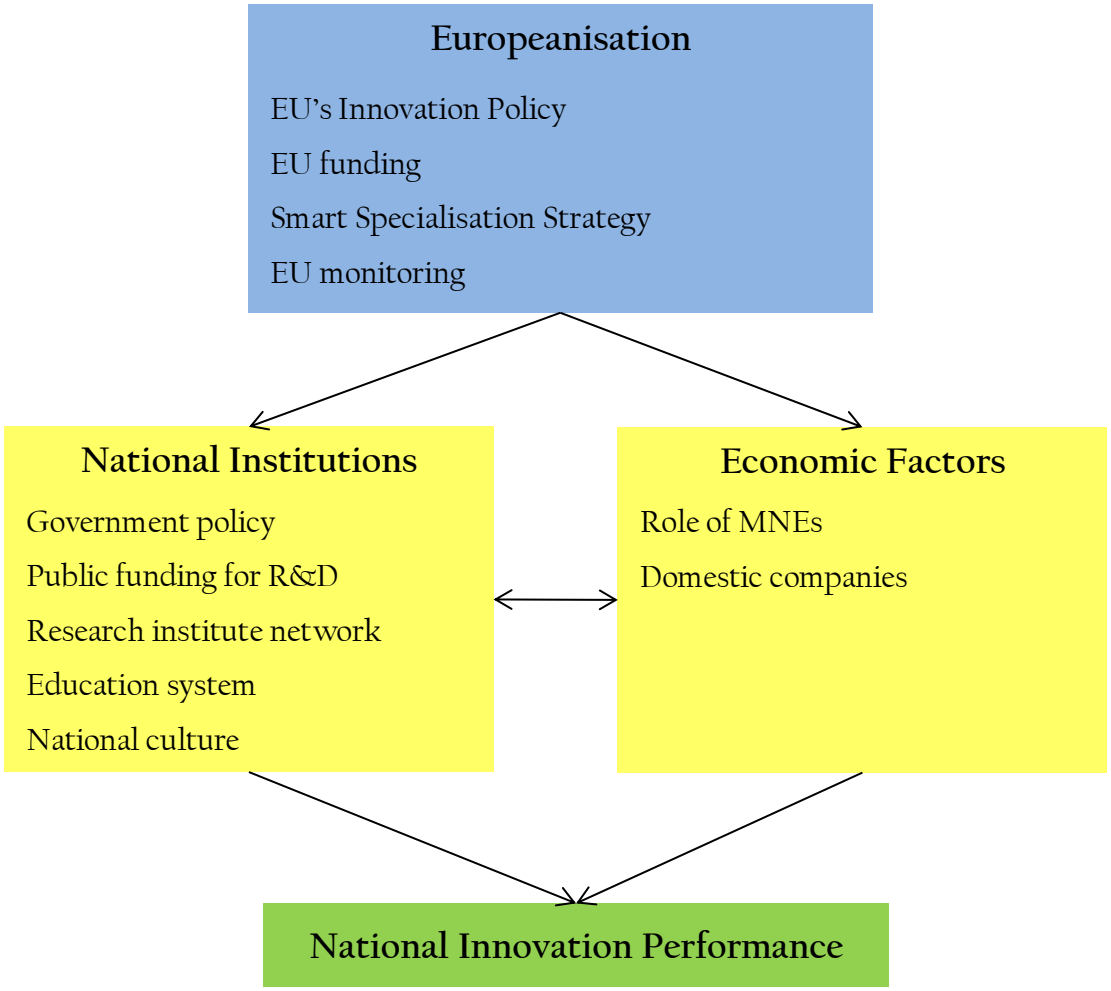
Introduction

As has been highlighted in the previous chapter, since the latter part of the 20th century, ensuring economic stability and growth through innovation has begun to be viewed as an issue of critical importance to the EU. The financial and economic crises which began in 2008 have exposed severe weaknesses in some EU economies and added additional urgency to this task. As a result, the EU is attempting to play an increasing in role in the funding of innovation-related projects and the development of national innovation policies. The extent to which the EU is succeeding at influencing the NSIs of these Member States in practice, is at the core of this study. In order to address the questions of this research, an appropriate methodology has been followed which is described in the following four sections. The first section identifies the conceptual framework on which this research is focused. The theoretical approach with which this research is undertaken is discussed in the second section. The third section explains the research design including the case study selection. Finally, the methods used for data collection and analyses are described in the third section.

3.1) Conceptual Framework

In order to test the hypotheses formulated in the previous chapter, and in turn meet the aims of this study, a conceptual framework has been devised which is informed by the literature reviewed in Chapter 2. Three main concepts have been identified and their selection for this study justified; National Systems of Innovation, Dependent Market Economies and a top-down approach to Europeanisation. The discussion of these concepts has also helped to identify various variables on which to focus this research. The following conceptual framework has been developed using these variables (Figure 1). The variables included in the conceptual framework are by no means exhaustive, rather they have been selected from the plethora of options due to their suitability and, most importantly, their necessity in answering the questions at the core of this thesis.

Figure 1: Conceptual framework



This conceptual framework provides a simplfied overview of the direction of impact of the various variables which were identified in the previous chapter as having a singifcant influence on the innovation peformance of NSIs. Furthermore, it highlights the interaction between (a) Europeanisation and NSI variables and (b) NSI and DME variables. For example, the EU's innovation policy is expected to have considerable impact on the innovation policy of the respective national governments. National governments, in turn, would also be expected to signifcantly impact upon the role of MNEs within that country. Equally, the demands of MNEs would be expected to have a notable impact on the direction of governemnt policy. Of course, there are likely to be some notable complexities within these relationships. This conceptual framework

serves as a useful reference point with which to investigate these finer points in more detail.

3.2) Research approach

The review of the literature carried out in Chapter 2 highlighted the importance which has been placed on the role of institutions in the literature on Innovation, Varieties of Capitalism and Europeanisation. The significance of institutions has long been recognised; indeed, until the 1950s, political science was largely dominated by institutionalism. Political scientists focused on, for example, 'comparing executives and legislatures, or parties and electoral systems, across countries and over time' (Lowndes & Roberts 2013:1). The 'old institutionalism' received criticism for its largely descriptive nature, its tendency to make assumptions about what constituted a 'good political system' and its bias towards only the formal instructions, rules and procedures (Hodgson 1993). Consequently, with the behaviourist turn in the post-World War II era and its shift away from the state and towards a more society-centred focus, its popularity began to wane. However, in the early 1980s, institutionalism witnessed something of a revival, or a second phase, which has been termed the 'new institutionalism' which was based on the premise that the 'organisation of political life makes a difference' (March & Olsen 1984:747). This reflected a gradual and diverse reintroduction of institutions into a large body of theories, such as behaviourism, pluralism, Marxism and neorealism, in which institutions had originally been absent or, at best, peripheral. In contrast to the more input-weighted political analysis of behaviourism and rational choice theorists, new institutionalists attempted to bring the state back into the centre their analysis. As Lowndes & Roberts (2013:6) note the 'basic argument is that institutions do matter, and that they matter more than anything else that could be used to explain political decisions'.

Not strictly a single theory, new institutionalism is a set of approaches which, though each approach views institutions in a different way, draw out the manner in which institutions impact on political processes. Whilst building on the earlier work of old institutionalism, new institutionalism departs in two notable ways (Lowndes & Roberts 2013:2). Firstly, instead of returning to the descriptive and atheoretical style of an earlier generation of institutionalists, the new institutionalists developed a more

expansive definition of their subject matter which includes informal conventions as well as formal rules. Secondly, the new institutionalists operate within more explicit, albeit arguably diverse, theoretical frameworks. In contrast to the grand theories of neo-functionalism and intergovernmentalism, new institutionalism is described as a middle-range theory and is being applied increasingly often, and with growing success, to the study of the EU as a polity and to European integration as a process. Lowndes & Roberts (2013:3) argue that new institutionalist theory 'provides a good set of conceptual tools for analysing contemporary governance precisely because it does not equate institutions with organizations, nor assume that politics is determined by formal structures and frameworks alone'. Its most important benefit, however, is that it underlines the 'double life' of institutions, in which institutions constrain actors, but are also human creations (Grafstein 1988:517-518).

As new institutionalism has gained popularity, so too have the number of new institutionalist variants increased. There are now at least nine different strands of new institutionalism; constructivist or discursive institutionalism, empirical institutionalism, feminist institutionalism, historical institutionalism, international institutionalism, network institutionalism, normative institutionalism, rational choice institutionalism and sociological institutionalism. The majority of writers, however, agree that the debate is dominated by the three main strands of rational choice, sociological and historical institutionalisms. The development and distinctiveness of each these three strands, and their relevance to this research, will now be considered in more detail.

Rational Choice Institutionalism (RCI)

Rational Choice Institutionalism developed from the field of Rational Choice Theory. Rational choice institutionalists argue that actors are rational and strategic individualists who calculate the costs and benefits of the decisions they make. For rational choice institutionalists, actors are assumed to be selfish, utility maximising individuals. Accordingly, actors make decisions which will maximise their personal or individual gain. Institutions are thought to be important because they frame the individual's strategic behaviour by shaping the preferences they pursue. The emphasis placed on rational calculation suggests that institutions are not just an important cause

of behaviour but are, in fact, also an effect of behaviour. It is argued that 'institutions are constructed by individual actors for rational purposes and that individual actors engage in changing and shaping institutional environments to suit their goals' (Bell 2002:6). As will be discussed later, this contrasts considerably with the other two principal strands of new institutionalism.

In their seminal work, Hall & Taylor (1996) identify several advantages of the rational choice institutionalist approach. Firstly, rational choice institutionalism is able to more precisely elucidate the relationship between institutions and behaviour and has developed a highly generalizable set of concepts which enable systematic theory building. Rational choice analysts can also 'incorporate into their analyses a much more extensive appreciation for the role that human intentionality plays in the determination of political outcomes, in the form of strategic calculation' (Hall & Taylor 1996:18). However, rational choice institutionalists have received some criticism for the 'relatively thin theory of human rationality' (Hall & Taylor 1996:18) on which their arguments are based. Several critics have questioned the notion that actors are always driven by motives which are based solely on maximising personal gain and have criticised the use of relatively simplistic behavioural assumptions (Hodgson 2012). A final advantage of this approach is its value in explaining the continued existence of institutions as, according to rational choice institutionalists, the survival of an institution depends on the benefits it can deliver to the actors with which it is associated. On the other hand, rational choice institutionalism is much more limited as a framework for explaining the origins of institutions.

Sociological Institutionalism (SI)

The second strand of new institutionalism, sociological institutionalism, developed from the old institutionalist influence in organisation theory. In contrast to rational choice institutionalism, sociological institutionalism does not view actors as self-interested, rational decision makers but rather it considers human beings to be fundamentally social beings. For sociological institutionalists, actors are not strategic utility maximisers, rather they are habitual satisificers who act by following a 'logic of appropriateness' (March & Olsen 2011). This implies that rather than making decisions by asking what is to be gained, individuals base their decisions on what should be done

or what would be most appropriate. For sociological institutionalists, 'institutions frame the way in which people see their world and are not just rules within which they try to work' (Sven Steinmo 2008:126). According to Lowndes & Roberts (2013:30-32) sociological institutionalism is based on three related ideas. Firstly, human action is strongly dependent on the social context in which it takes place. Secondly, these contexts are usually heavily institutionalised. Finally, these institutions also operate at a sub-conscious level and, therefore, effectively act as a taken for granted 'cultural infrastructure' in society. In this respect, the sociological approach 'breaks down the conceptual divide between 'institutions' and 'culture'' (Hall & Taylor 1996:14).

One of the advantages of the sociological approach is that it may be able to better explain the relationship between institutions and actions which are not highly instrumental and cannot be well-modelled by rational choice theory. For example, sociologists 'tell us that even a highly instrumental actor may be choosing strategies (and rivals) from culturally-specific repertoires, thereby identifying additional respects in which the institutional environment may affect the strategies that actors choose' (Hall & Taylor 1996:19). By emphasising the role played by social legitimacy, sociological institutionalism also helps explain why many social and political institutions continue to persist despite their apparent inefficiencies. On the other hand, sociological institutionalism has been criticised for focusing too much on macro-level processes at the expense of the actors involved within these processes. Some have argued that sociological institutionalists do not afford sufficient attention to the power struggles between actors with competing interests and the impact of this on institutional creation or reform (Hall & Taylor 1996).

Historical Institutionalism (HI)

Historical institutionalism developed in response to the group theories of politics and structural-functionalism which were prominent in political science during the 1960s and 1970s. Historical institutionalists stand somewhere between the sociological institutionalists and the rational choice institutionalists in their belief that human beings can be norm-abiding rule followers as well as self-interested rational actors. 'How one behaves depends on the individual, on the context and on the rules...What a HI scholar wants to know is why a certain choice was made and/or why

a certain outcome occurred' (Sven Steinmo 2008:126). Hall & Taylor (1996:7-8) divide historical institutionalists into two categories, those that follow the calculus approach and those that follow the cultural approach. They suggest that, 'those who follow a calculus approach focus on those aspects of human behaviour that are instrumental and based on strategic calculation', whilst those who follow a cultural approach stress 'the degree to which behaviour is not fully strategic but bounded by an individual's worldview' (Hall & Taylor 1996:7). There has been considerable debate about the possibility of historical institutionalists working within both a calculus and a cultural approach (Hall & Taylor 1996).

Historical institutionalism has been criticised due to the fact that radical change can be observed at times which cannot be explained with the use of historical institutionalist concepts. It has also received criticism for not having developed a sufficiently sophisticated understanding of exactly how institutions affect behaviour (Hall & Taylor 1996:17). Historical institutionalism has, however, received considerable attention and has been fruitfully applied to various studies. As Lowndes & Roberts (2013:38) note, the 'Varieties of Capitalism school is a good example of the historical institutionalists concern with collecting comparative data on how institutions associated with the same policy problems have developed in different ways across different countries, and the extent of their stability over time'. Much of the work conducted from a historical institutionalist approach consists of cross-national comparisons of public policy which, typically, emphasise the impact of national political institutions structuring relations among legislators, organised interests, the electorate and the judiciary.

Relevance to this research

Given how important the role of historical development is to this research, the historical institutionalist approach has been selected for this study as it offers the most useful tools with which to understand why certain decisions were made and why a particular outcome was produced. Historical institutionalism is distinct from other social science approaches due to 'its attention to real world empirical questions, its historical orientation and its attention to the ways in which institutions structure and shape political behaviour and outcomes' (Steinmo 2008:150). By focusing on

institutions over a longer period of time, as opposed to placing emphasis on personalities or confining the scope of the research to a brief snapshot in time, studies from a historical institutionalist perspective are able to provide more comprehensive and accurate answers to the big questions. It is for these reasons that historical institutionalism is particularly appropriate for this research.

The historical institutionalist approach has often been taken for granted in studies of Europeanisation as it was seen as implicitly built into the 'misfit' hypothesis of the Europeanisation literature (discussed in Chapter 2) since the 'central claim made was that existing institutional paths are "sticky" and resistant to change' (Mastenbroek & Kaeding 2006:4). However, a number of more recent studies have (Graziano 2012; Mendez et al. 2008) have paid closer attention to the historical intuitionalist approach by historically reconstructing the fit-misfit relation. The basic assumption of these studies is that in cases of misfit, 'the "stickiness" of institutional path can only be challenged when the adaptational pressure of the EU are particularly strong' (Dabrowski & Graziano 2016:81). In other words, institutional paths will only be altered if the EU's policies are especially binding.

With regard to this research, it is important that any study undertaken from a historical institutionalist approach gives careful consideration to both elements from which its name is derived. Firstly, 'historical institutionalists take history seriously – as something much more than instances located in the past' (Pierson & Skocpol 2002:700). This is because (a) political events happen within a historical context and this, in turn, has a direct consequence on decisions or events, (b) actors or agents learn from previous events and (c) expectations are moulded by the past (Steinmo 2008:164-166). The second key element of historical institutionalism is the institutions themselves which Hall (1986:19) defines as 'the formal rules, compliance procedures, and standard operating practices that structure the relationships between individuals in various units of the polity and economy'. Nonetheless, although a historical intuitionalist approach draws attention to the role of institutions, both formal and informal, it does not do so to the exclusion of other factors, such as socioeconomic development and the diffusion of ideas (Hall & Taylor 1996:10).

There are several well-recognised key concepts within the historical institutionalist approach which require highlighting due, in particular, to their

relevance to this study: path dependency, positive feedback loops and critical junctures. A lengthy but thorough definition of path dependency is provided by Levi (1997:28) who writes that:

> 'once a country has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice. Perhaps the better metaphor is a tree, rather than a path. From the same trunk, there are many different branches and smaller branches. Although it is possible to turn around or to clamber from one to the other – and essential if the chosen branch dies – the branch on which a climber begins is the one she tends to follow.'

In other words, after actors have ventured some distance down one path, it becomes increasingly difficult to change and, as a consequence, the original path becomes yet more dominant. Reversing course may become so difficult that political alternatives which were at one point possible may become irretrievably lost. Arguments about path dependency are particularly useful as they can 'help us to understand the powerful inertial 'stickiness' that characterizes many aspects of political development' (Pierson 2004:11).

Linked to the notion of path dependency is that of positive feedback loops, which Farrall et al. (2014:7) describe as the 'phenomenon whereby each successive step along a path produces consequences which help to sustain the path in question'. Positive feedback loops, sometimes also referred to as increasing returns, create incentives for actors to continue along the same path with potentially high costs if they were to deviate. In other words, each step down a particular path increases the probability of further steps along the same path being taken because 'the relative benefits of the current activity compared with other possible options increase over time' (Pierson 2000:252). Positive feedback loops are well-recognised as an intrinsic part, or even source, of path dependency.

Also of crucial importance to the historical institutionalist approach and to the concept of path dependency is the role of critical junctures. Critical junctures are described as 'the moments when institutional arrangements are placed on particular pathways which are difficult to subsequently alter or change' (Farrall et al. 2014:14).

The moments are rare and are often the starting point for the path dependent process described above. Critical junctures are particularly important because it is during these periods that actors are able to actualise significant change. Whilst critical junctures can occur relatively suddenly, they can also emerge slowly as a result of an accumulation of events. It should be noted, however, that 'whilst a particular historical moment may create a critical juncture, it does not mean that all institutions will be affected' (Farrall et al. 2014:6). Indeed, is possible for some institutions to remain unaffected despite widespread change taking place throughout the rest of the system.

Of course this is not an exhaustive list of the concepts promoted by historical institutionalists. In fact, given the diversity amongst historical institutionalist approaches, it is hardly surprising that there is much debate about which key concepts to include, how to define them and how to operationalise them when conducting research. A full discussion on these different views could fill several chapters by itself. The aim of this section has been to highlight the advantages of using a historical institutionalist approach for this study and to draw attention to the key elements of the historical institutionalist approach that can help to focus this research. The decision to conduct this research using a historical institutionalist approach presents a number of research design considerations which will now be discussed in more detail.

3.3) Research design

This study is conducted using a comparative research design, a method which is frequently used not only in the fields of comparative politics, international relations, public policy and developmental politics but is also often employed by historical institutionalists (Immergut & Anderson 2008; Steinmo & Thelen 1992). Whilst comparison is an implicit part of everyday life – 'to compare is to be human' (Landman 2003:4) – comparative politics has moved away from implicit comparisons towards explicit ways of comparing political systems and related processes. As Keman (2014:48) notes, the 'major modern development in comparative politics is in linking theory to evidence by means of comparative methods'. One of the advantages of comparative politics is that researchers are able to identify causal variables which, without the use of a comparison, could not have been deduced.

Landman (2003:5-10) identifies four main reasons for researchers to undertake a comparative study; contextual description, classification, hypothesis-testing and prediction. Comparative research can provide rich, contextual description which 'allows political scientists to know what other countries are like' (Landman 2003:4). By observing similarities and differences between the cases under study, the researcher is able to organise the data through a process of classification. The 'types', 'classes' or 'categories' which result from this, can then serve as 'building blocks' for theory development. It also allows for hypothesis-testing which can either reinforce the validity of explanatory theories or eliminate rival explanations. Finally, comparative research can make possible some degree of prediction 'about the likely outcomes in other countries not included in the original study, or outcomes in the future given the presence of certain antecedent factors and conditions' (Landman 2003:4).

Within the field of comparative research, a distinction can be made between case-oriented and variable-oriented approaches both of which are legitimate and can be the most appropriate depending on the aims of the research. According to della Porta (2008:198) '[v]ariable-oriented studies mainly aim at establishing generalized relationships between variables, while case-oriented research seeks to understand complex units. Whereas variable-oriented research uses statistical comparison to build law-like propositions, the case-oriented strategy aims at the in-depth understanding of a context or, in other words, searches for the 'causes-of-effects''. Given that the aim of this research is to gain a better understanding of the factors influencing the innovation policies of the selected countries, this research uses a case-based approach. Rather than focusing on generalisation, this research requires a detailed understanding about a complex unity, which can only be obtained with a case-study strategy. There are, following on from this, several other research design considerations which require highlighting.

The choice of case-oriented versus variable-oriented research is directly linked to the research method. Within the comparative framework, three main types of research method have been distinguished; large-N, small-N and single-N. Although it may seem incongruous for a single-N, or case study, to be considered comparative, there is a considerable amount of comparison that can take place within one case, such as between regions of a country or between different periods of time. All three methods have distinct advantages and limitations, indeed '[t]here is often thought to be a trade-

off between the in-depth, intensive knowledge derived from the study of a small number of cases, on the one hand, and the extensive, cross-case knowledge based on the study of a large number of cases, on the other' (Halperin & Heath 2012:172). Whereas the small-N, which is typically anywhere between 2 and 20 cases, or single-N study may be able to function at a lower level of abstraction and potentially enhance the validity of the concepts under study, these studies also sacrifice the ability to make broad empirical generalisations. Conversely, large-N studies, which are typically based on quantitative data, may be able to observe a strong statistical relation and allow for robust inferences but, in exchange, they work at a higher level of abstraction and a lower level of complexity. Whilst large-N studies are typically variable-oriented, small-N studies and single-N studies more frequently use a case-oriented approach.

In addition to considering the objectives of the research and the type of design which could most effectively allow for these to be met, other factors which play a significant role include time, cost and availability of data. If, for example, the information is readily available and at minimal cost, it may be possible, and even advantageous, for the researcher to conduct a large-N study. Whereas, if the research requires in-depth information which is harder and more time-consuming to collect, it may only be possible to include one or a few case studies. Having considered the aims of this research and the resources and time available, this research was conducted with a small-N research design using qualitative data. A small-N study was selected as it allows for a more in-depth, richer picture which would be able to provide the data necessary for answering the questions of this research. The total number of countries selected was two as this was considered a feasible number for obtaining sufficiently detailed data given the time and financial resource constraints.

Whilst there are many recognised advantages of using a comparative research method, there are also several limitations which need to be recognised. These include; too many variables and too few countries, establishing equivalence, selection bias, spuriousness, ecological and individualist fallacies and value bias. This research has been conducted using a case-oriented, small-N approach and 'comparing few countries involves significant and intentional choices, any one of which may limit the inferences made possible' (Landman 2003:81). The issue of too many variables and too few countries, or 'too many inferences and not enough observations' (King et al. 1994:119), is of particular concern for small-N research. 'This problem arises when more factors of

explanation for the observed outcome have been identified than there are countries (or observations) in the study, leading to what is called indeterminate research design' (Landman 2003:30). This means that the outcome becomes open to several different explanations since it is not possible to control for the impact of all operational variables on the dependent variable with the number of cases available. Selection bias is also a significant issue when comparing few countries. This arises from the intentional choice of countries as opposed to random selection 'as well as the use of historical accounts and sources that favour the particular theoretical position of the comparativist' (Landman 2003:36).

A final consideration for comparative research is whether to adopt a 'most similar systems design' (MSSD) or a 'most different systems design' (MDSD). It is claimed that a most similar design system or, if using Mill's definitions, 'method of difference', works particularly well for research within area studies, such as the area of Europe. 'Whether it is common history, language, religion, politics or culture, researchers working in area studies are essentially employing a most similar systems design, and the focus on countries from these regions effectively controls for those features that are common to them whilst looking for those features that are not' (Landman 2003:71). A MSSD facilitates the *ceteris paribus* rule or, in other words, reduces the number of disturbing variables to be kept under control. It has also been recognised (Przeworski & Teune 1970) that the MSSD is particularly useful for identifying the features that are different amongst otherwise relatively similar structures. Some of the disadvantages of a MSSD are that it cannot be used to go beyond middle-range theories and that there is still a risk of overdetermination as variables may intervene for which it is not possible to control. This implies that the contexts of the compared situations are never similar enough and the researcher must still be aware of the contextual variables which could not be kept constant (De la Porta 2008:215). Whilst aware of these concerns, this research, as discussed in the following section, is conducted using an MSSD approach.

Case study selection for this research

The remit of this research was that it should focus on one or more of the Visegrád states (the Czech Republic, Hungary, Poland and the Slovak Republic). The

Czech Republic and Hungary were selected for comparison for several reasons. Firstly, there are many similarities between the Czech Republic and Hungary. For example, both countries share a recent history having been part of the Soviet bloc and both acceded to the EU in the same year, 2004. The Czech Republic and Hungary have comparable population sizes, 10.5 million and 9.9 million respectively (The World Bank 2016). Both countries also have a relatively strong university tradition, including the prestigious Charles University in Prague and Eötvös Loránd University in Budapest, a factor which has been recognised as necessary for a strong NSI. Furthermore, since the transition to capitalism, both countries have attracted considerable amounts of FDI and their economies have witnessed a rapid development. In fact, FDI has been so significant that, in 2017, inward FDI stock as a percentage of GDP was 78.3% in the Czech Republic and 74,5% Hungary (United Nations Conference on Trade and Development 2018a; United Nations Conference on Trade and Development 2018b).

However, in spite of these similarities, there are a number of notable differences between the Czech Republic and Hungary according to several measurements of their innovative performance. For example, according to the Global Competitiveness Report produced by the World Economic Forum (World Economic Forum 2016; World Economic Forum 2006), Hungary is still in transition from an efficiency-driven economy to an innovation-driven economy and has been for over a decade. The Czech Republic, on the other hand, has been categorised as innovation-driven since the 2008-2009 report (World Economic Forum 2008). The fact that a number of differences are beginning to emerge despite the similarities of the Czech and Hungarian systems presents something of a paradoxical situation. Again this reinforces the advantages of using a MSSD as this will allow for the factors which can explain these observed differences to be identified.

On the other hand the European Innovation Scoreboard (EIS), a tool which is produced by the EU in order to examine and illustrate the innovative performance of EU Member States, suggests that the Czech Republic and Hungary, who are both classed as 'Moderate Innovators', are quite close in terms of their overall innovation performance (European Commission 2015a). The EIS uses quantitative data gathered from Eurostat, OECD, United Nations, CWTS (Thompson Reuters), Science-Metrix (Scopus) and the Office for Harmonization in the Internal Market. There are 8 'dimensions' used in order to capture the overall performance of Member States; (1)

human resources, (2) open, excellent research systems, (3) finance and support, (4) firm investments, (5) linkages and entrepreneurship, (6) intellectual assets, (7) innovators, (8) economic effects. In spite of the overall performance of the Czech Republic and Hungary being quite similar, the Czech Republic has consistently ranked higher than Hungary in all dimensions except that of 'economic effects'.

Some initial investigation into these two countries suggests that there are a number of similarities, such as recent history, geographical location and population size. This offers a considerable advantage for this research as it helps to reduce the number of disturbing variables. However, there are also a number of differences which are gradually becoming more pronounced. This offers the opportunity for this study to probe these differences, to question how far-reaching these differences really are, to identify the explanatory variables and to analyse the impact these differences are currently having on the Czech and Hungarian NSIs.

3.4) Data collection and analysis

Data collection

There are two main stages to this research. Firstly, due to the fact that this research is conducted using an historical institutionalist approach, and given how important the role of history is to historical institutionalism, the first stage of this research is to trace the key historical developments in the Czech and Hungarian NSIs. The focus for this section is on two significantly distinct time periods; (1) the communist period (pre 1989) and (2) the transition period (1989-2004). This section of the study is mainly based on qualitative secondary data, consisting primarily of publications by key authors within the field. There are also a number of studies by the OECD and various other organisations which are incorporated in order to add more breadth to this historical discussion. In addition, statistical data from the OECD and Eurostat are included where possible.

The second section of this study investigates the development of the Czech and Hungarian NSIs since their accession to the EU in 2004. Data for this section are gathered from three main sources; (1) elite interviews, (2) documentary data and (3) statistical data. By incorporating a variety of data sources, this allows for a significant

amount of triangulation or, in other words, the 'observation of the research from (at least) two different points' (Uwe Flick 2004:178). Triangulation is a technique frequently employed in qualitative research in order to increase the credibility and validity of the results. Data on the innovation performance of both countries have been collected from the World Economic Forum's 'Global Competitiveness Reports' and, especially, the previously mentioned European Innovation Scoreboards. Although there have been some criticisms of the EIS (Edquist & Zabala-Iturriagagoitia 2015), it does, nonetheless, provide a relatively detailed annual analysis of the innovation performance of EU Member States. Whilst care should be taken in interpreting these results, the EIS does provide some very useful data especially if used to measure any significant changes within or between countries, specifically those with comparable histories or at similar stages of economic development.

Interviews form a large and important part of the data gathering for the second section of this research. The majority of the interviews were carried out during three field trips to Prague (21st to 25th November 2016), Budapest and Szeged (25th November to 2nd December 2016) and Brussels (30th January to 3rd February 2017). The interviews used a semi-structured format which meant that, unlike the rigorous question and answer style of a structured interview, the interviews were able to be led more by the responses of the interviewees and to follow-up on areas of interest which the interviewees had themselves brought to attention. The participants contacted were selected due to their involvement in or knowledge of the innovation policies in the selected countries. A contact at CZELO (the Czech Liaison Office for Research, Development and Innovation based in Brussels) kindly provided a long list of contacts in all relevant research institutes, universities and government departments in the Czech Republic. This research is also grateful for the assistance of a contact at the European Commission who provided a detailed list of potential contacts in Hungary. In addition, a number of participants were identified using a snowballing technique. Many interviewees were very helpful at suggesting, and even arranging, interviews with other specialists within the field.

In order obtain different perspectives and for reasons of validity, a wide variety of actors from universities, research institutes, government and business was sought. In total, 30 interviews were carried out. The response rate from businesses was particularly low and the response from Hungarian participants was lower than that of

Czech participants. As a result, more interviews were carried out with Czech participants (17) than Hungarian participants (11). Interviews were conducted with government officials (12), academics (5), business leaders (5), research institute specialists (4), EU officials (2), an investment specialist and a policy analyst. Participants were initially contacted by letter which included a 'Project Information Sheet' with brief details about the research. This was then followed up by an e-mail and later a telephone call if necessary. In preparation for the interview, an interview schedule was drawn up which included questions on core areas for comparison and was adapted for each participant to cover their area of expertise. (For a full list of the interviews and an example interview schedule, see Appendix.) In order to ensure that the questions were valid to the research, the interview schedule was discussed with the supervisory team before commencing the field work. All of the interviews were recorded and later transcribed.

The total number of interviews includes a number of telephone and video interviews (9 in total), most of which were conducted prior to undertaking the field research. This was particularly advantageous as not only did it allow participants to be interviewed with whom meeting may not have been possible, for reasons such as limited resources in terms of time and/or budget, but it also enabled a better preparation for the interviews conducted during the field trips themselves. Telephone interviews have long been a method of gathering data, especially, in the social sciences. Video interviews are also increasing in popularity especially as both hardware and software become cheaper and more widely used. A considerable disadvantage of video interviews is that it can restrict the participants to those who have access to the necessary technology and peaks in network traffic can cause a dramatic slowdown or break in transmission. Although the former of these concerns was not problematic for this research, there were several instances of poor connection and also a couple of occasions when the recording software failed to function and/or there were problems with the quality of the recording. Notes made during the interviews were able to correct this issue to a certain extent but, unfortunately, this did result in direct quotes not being possible for two of the interviews.

In terms of documentary and statistical data, there were a number of published reports by the OECD and the EU which were particularly informative. A 'Peer Review of the Hungarian Research and Innovation System' and 'Pre Peer Review of the

Hungarian Research and Innovation System' conducted by the EU (European Commission 2016; European Commission 2015b) which had involved a number of elite interviews provided some correction for the, previously mentioned, lower number of interviews with Hungarian participants. Various national publications and policy documents, produced by government departments and research institutes, also provided a significant amount of documentary data. As regards statistical data, Eurostat and the OECD had a considerable amount of data relating to the topic of this research such as R&D spending, graduate numbers and FDI.

Data analysis

The interview data were analysed using a qualitative content analysis approach. Content analysis has a long history in research and has developed considerably since its use as a tool for analysis in mainly quantitative research. 'Research using qualitative content analysis focuses on the characteristics of language as communication with attention to the content or contextual meaning of the text' (Hsieh & Shannon 2005:1278). Qualitative content analysis can be applied to a variety of texts including data which have been obtained from interviews, narrative responses and focus groups and also print media such as articles, books or manuals. It should be noted that the focus for qualitative content analysis is not on 'counting words' but it goes much further by 'examining language intensely for the purpose of classifying large amounts of text into an efficient number of categories that represent similar meanings' (Hsieh & Shannon 2005:1278). The goal of content analysis is 'to provide knowledge and understanding of the phenomenon under study' (Downe-Wamboldt 1992:314).

In practice, this meant that after gathering the data they were systematically coded according to relevant concepts, themes, events and examples. Once the data had been coded, all of the excerpts that had been coded with the same label were then sorted into a single computer file in order for the data to be compared and analysed. For example, all the data gathered in interviews and published documents related to the Smart Specialisation Strategy were arranged in a single file and subcategorised into the Czech Republic, Hungary and the EU. The data were then further categorised into those which related to the development of the Smart Specialisation Strategy and those which related to its implementation. The data were logically ordered, for example, in

this instance data were organised according to the advantages and disadvantages of Smart Specialisation. Once this had been completed, the data from the three subcategories could be contrasted, compared and analysed.

Reliability, validity and ethics

The issues of reliability, validity and ethics are extremely important in social science research. Reliability refers to the fact that the 'data are dependable, trustworthy, unfailing, sure, authentic, genuine, reputable. Consistency is the main measure of reliability' (Pierce 2008:83). As already mentioned, in order to overcome this issue, the technique of triangulation was used where possible. Not only did combining elite interviews, documentary data and statistical data help in terms of ensuring the reliability of the research but it also meant that any gaps or inconsistencies in the data could be identified and further investigated.

Validity refers to how relevant data is to answering the research question, which can be difficult for researchers of political science who often 'have to use best available information whose validity may be weak' (Pierce 2008:83). Ensuring validity in any research, both quantitative and qualitative, can be challenging and Babbie (2013:193) argues that '[u]ltimately, social researchers should look both to their colleagues and to their subjects as sources of agreement on the most useful meaning and measurements of the concepts they study'. In order to secure the validity of these data, the input of the author's supervisory team was invaluable. Considerable time was spent reviewing the conceptual framework and the interview schedules and discussing their appropriateness for addressing the questions at the core of this research. The initial interviews were treated as pilot interviews and adaptations were made to the interview schedules; for example, some of the initial questions had been too broad and had not been able to elicit the more specific responses which were required, in order to ensure the validity of the data gathered.

Ethical considerations were taken very seriously during the course of this research. Burnham et al. (2004:253) identify five main ethical principles which were carefully adhered to during this research; (a) avoidance of harm, (b) avoidance of deception, (c) privacy of individuals, (d) confidentiality and (e) consent. Prior to

conducting any research, ethical approval was sought and granted from Cardiff University's School of Modern Languages Ethics Committee. In the letter and accompanying 'Project Information Sheet' sent to participants, it was made clear that data they provided would be held anonymously and that they had the right to withdraw from the research at any point if they chose not to continue with their role. This point was also verbally reinforced before conducting the interviews. Participants were requested to sign a 'Research Ethics Consent From for Confidential Data' before commencing the interview. All transcripts have been anonymised accordingly. The transcripts were securely stored on a password protected computer.

Conclusion

This chapter has sought to describe the method with which this research has been conducted and to justify the methodological decisions which were made. Using qualitative data, gathered through semi structured interviews and documentary evidence, this research uses a MSSD to identify the explanatory variables for the observed differences between the Czech Republic and Hungary, which have occurred in spite of their similar systems. Some of the weaknesses of the methods chosen and problems encountered have also been identified. By being aware of these issues, they can be factored into the analysis and discussion of the research findings. In addition, this chapter has set out the conceptual framework which will serve as the reference point for the following chapters. The discussion in Chapter 2 highlighted the importance of institutions for understanding political developments and, therefore, an institutionalist approach, specifically historical institutionalism, has been identified as the most appropriate theoretical approach with which to conduct this research. Before the main research findings can be presented (Chapters 5 and 6), the following chapter provides a targeted overview of the development of the independent variable of this research, the EU's Innovation Policy.

4) Innovation Policy and the EU

Introduction

As the Czech Republic and Hungary undertook the task of transitioning to democratic market economies and, later, that of downloading the *acquis communautaire* and meeting the requirements for EU membership, a considerable developmental gap existed between their NSIs and those of the older EU Member States. In order to achieve the EU's goal of becoming the world's leading knowledge-based economy, therefore, an important target for the EU has been to reduce the disparity between old and new Member States. To gain a better understanding of how influential the EU has been at doing this in practice, this section looks in detail at the independent variable of this research, namely the EU's strategy for developing the innovation capacity of its Member States. For the Czech Republic and Hungary, two distinct phases can be identified – pre- and post-accession – and this chapter aims to highlight how the dynamics between the EU and these countries have developed as they progressed from candidate status to officially becoming EU Member States. In doing so, attention is drawn to how the tools with which the EU can encourage Europeanisation have changed and how this has affected the EU's ability to influence the domestic decision-making processes of these two Member States. In short, this chapter prevents a broad overview of how the EU's innovation policy approach and accompanying policy tools are intended to work, Chapters 5 and 6 will then look at how this compares with the observed experiences of the Czech Republic and Hungary. This section is divided into three timeframes, the first of which focuses on the pre-accession period (1989-2004) and considers the overall role of the EU in the Central and Eastern European candidate countries during this time. In addition, this section highlights the main instruments used by the EU to promote Europeanisation and the specific aspects of the accession preparations which affected the development of these countries' NSIs. Sections two and three consider how the EU's innovation policy has developed since by analysing the objectives and instruments of the Lisbon Strategy and the EU's latest policy approach, Horizon 2020, respectively.

4.1) Pre-Accession

Although the Czech Republic and Hungary did not officially become members of the EU until 2004, the EU's involvement in these countries had in fact begun much earlier and notably so through the 'Poland and Hungary: Assistance for Restructuring their Economies' (Phare) programme which was launched in 1989. Initially aimed at only Hungary and Poland, and later extended to include twelve other Central and Eastern European countries – including, from 1990, the Czech Republic – Phare was a financial instrument designed to assist these countries with their transition to a decentralised liberal democratic system. The Phare programme was reformed considerably during the 1990s strengthening the influence of the EU and changing the support away from transition issues and economic restructuring towards assistance for the accession process, prioritising institution building and investment support (European Parliament 1998). Indeed, by the time these countries were preparing to fulfil the requirements of the *acquis coummunautarie* – the body of common rights and obligations binding all Member States together and the adoption of which has become institutionalised as the EU's 'classical method of enlargement' (Preston 1997) – Phare had become an instrument which was primarily aimed at supporting this process.

Conditionality – namely the linking of perceived benefits to the fulfilment of certain conditions – formed an important part of the EU's approach towards accession for Central and Eastern European candidate countries. In fact, from as early as 1988, when the EU negotiated trade agreements with Central and Eastern European countries, the EU had already begun to attach conditions to aid, trade and political relations (Smith 1997). By making funding and technical assistance conditional on meeting the aims of the generally neo-liberal agenda that the EU put forward, the Phare programme provided the EU with a significant lever with which to influence the Central and Eastern European countries. Additionally, the use of suspension clauses in agreements made between the EU and the candidate countries – in which discussions could be suspended if a candidate country was judged not to have met certain criteria – is a further example of the use of accession conditionality. As discussion on EU membership for a number of Central and Eastern European countries gained momentum, the EU formulated, and later modified, the most extensive accession conditions to date (discussed below). Or, in the words of Dimitrova (2002:175), having

invited the Central and European countries to join, the EU subsequently created 'an ever more elaborate web of conditions and criteria to evaluate their readiness to do so'.

In an attempt 'to minimize the risk of new entrants becoming politically unstable and economically burdensome, and to ensure that the countries joining were ready to meet at the EU rules, with only minimal and temporary exceptions' (Grabbe 2002:251), three conditions were established at the Copenhagen European Council in 1993 (European Council 1993):

1.) Membership requires that the candidate country has achieved stability of institutions guaranteeing democracy, the rule of law, human rights and respect for and protection of minorities.
2.) Membership requires the existence of a functioning market economy as well as the capacity to cope with competitive pressure and market forces within the Union.
3.) Membership presupposes the candidate's ability to take on the obligations of membership including adherence to the aims of political, economic and monetary union.

Not only were the so-called 'Copenhagen criteria' more extensive than the accession requirements applied to previous candidate countries (Grabbe 2006), but they also represented a notable shift in terms of the EU's role in the accession process. As noted by Janse (2019:47), the main significance of the Copenhagen European Council was not the criteria themselves but the decision of the EU to 'actively monitor and steer the manner in which candidates prepared themselves for membership'. As political and economic conditions feature prominently in the Copenhagen criteria, the EU effectively established a position with which it could attempt to influence decisions being made about the politico-economic trajectory of these Central and Eastern European countries during the post-communist transition period. The Copenhagen criteria were followed by the formal launch of the 'pre-accession strategy' at the Essen European Council in 1994, which aimed 'to provide a route plan for the associated countries as they prepare for accession' (European Council, 1994:4).

A subsequent important development resulted from the Luxembourg European Council in 1997 and the establishment of a 'reinforced' pre-accession strategy, which was designed to ensure that applicant countries adopt as much of the *aquis communatiare*

as possible before accession. A key instrument for achieving this was the 'Accession Partnerships', which 'set out the priorities to be tackled in preparation for membership and the framework for all pre-accession assistance' (European Commission 2000a:3). They were intended to make conditionality stricter and considerably increased the involvement of the EU in domestic policy-making, both in comparison to the EU's previous role in Central and Eastern European Countries and also relative to its role in the existing Member States. In line with this, and as previously mentioned, the focus and conditions of the Phare programme were reoriented towards assisting candidate countries in their adoption of EU legislation and policies. At this point in time, conditionality for Phare, which had previously been demand-driven and dependent on meeting very general economic and political objectives, became more strongly driven by the Commission with funding specifically aimed at meeting the priorities set out in the Accession Partnerships (Grabbe 2006).

By 1999, the EU judged that all the Central and Eastern European candidates had met sufficient requirements in order for negotiations on the *acquis communautaire* – which had been broken down into 31 chapters including a chapter on 'Science and research' (Chapter 17) – to be started at the Helsinki European Council that year. In terms of innovation, the *acquis communautaire* in the field of science and research did not require any transposition into the national legal order. However, in order to ensure the successful implementation of the *acquis* in this domain, especially the implementation of the Research and Technological Development (RTD) Framework Programmes, it was stated, somewhat vaguely, that 'future Member States need to have appropriate capacities in the field of RTD' (European Commission 2005:81). After successful completion of the negotiations and ratification of the accession treaties, ten of the candidate countries, including the Czech Republic and Hungary, joined the EU in 2004.

It has been argued (Schimmelfennig & Sedelmeier 2008; Sedelmeier 2011) that it was during this pre-accession period that the EU was able to have the most significant impact on the institutional arrangements and policies of the then candidate countries. What is particularly notable about this period, as identified by Grabbe (2006), is the number of influential mechanisms available to the EU to promote Europeanisation: (1) gate-keeping (access to negotiations and further stages in the accession process), (2) models (provision of legislative and institutional templates), (3) benchmarking and

monitoring, (4) money (aid and technical assistance) and (5) advice and twinning. According to Grabbe's analysis, the EU's most effective conditionality tool was that of gate-keeping, which meant that a country's ability to gain candidate status or reach the next stage of negotiations was dependent on that particular country meeting a number of specific conditions. A clear example of this in practice, and the first instance in which this form of conditionality was explicitly applied, is the exclusion of Slovakia from the first round of negotiations in 1997 on the basis that the country was judged not to have met the necessary democracy criteria. The introduction of the Accession Partnerships provided an additional conditionality tool through which the EU could determine the policy priorities which had to be implemented and a timeframe – short-term (within a year) and medium-term (5 years) – for doing so.

As well as being a Europeanisation mechanism in its own right, as countries progressed through the accession process and moved into an increasingly closer relationship with the EU, gate-keeping also provided a coercive tool to reinforce other mechanisms such as, firstly, the provision of legislative and institutional templates and, secondly, the practice of benchmarking and monitoring candidates' progress. Through a process of both 'vertical harmonisation' – in which there is an adaptational pressure to conform to EU policy models – and 'horizontal harmonisation' – 'the diffusion of ideas and discourses about the notion of good policy and good practice' (Radaelli 2003) – candidate countries were expected to transfer EU policies and institutional models into the domestic arena. In practice this meant that, in addition to the compulsory downloading of EU models, applicant countries were also 'encouraged to comply closely with minimalist directives and non-compulsory directives, in order to convince reluctant Member States that they will be good partners in sensitive policy areas' (Grabbe 2003:313). An example of this, which relates to innovation, is the invitation for candidate countries to shadow the Lisbon process (discussed below), in spite of it not officially being part of the *acquis communautaire*. Through benchmarking and monitoring, the EU was able to influence candidate countries by providing examples of best practice that the applicants could seek to emulate and by assessing the progress that countries were making in the relevant policy areas.

With regard to financial assistance, during this period the EU became the largest external source of aid for Central and Eastern European countries and provided funding not only administered through the European Commission but also through

bilateral programmes with individual Member States. As already discussed, the Phare programme became the EU's main funding channel and, as the candidate countries moved through the accession process, its conditions were adapted to reflect the changing priorities of the EU. By the end of the 1990s, a sizeable proportion of Phare funding was redirected towards institution building in order to assist candidate countries in their efforts to develop the capacity required to implement EU legislation and participate in EU policies. An important part of institution-building, as set out in the 1998 Annual Report for Phare (European Commission 2000b), was the concept of twinning in which EU practitioners, known as Pre-Accession Advisors, were seconded to the institutions in the candidate countries responsible for implementing the *acquis communautaire*. In other words, through its twinning programme, the EU was able to open up a direct line into policy-making structures in the applicant countries. Although this represented a clear mechanism for EU influence, it has received criticism due to the fact that, firstly, advisors tended to focus more on standards and technical issues rather than overall institutional models or policy direction and, secondly, for the advice lacking a consistent European model and instead being strongly influenced by the background of the individual Pre-Accession Advisor (Grabbe 2006).

In terms of the impact of this pre-accession time frame on the innovation systems of the Central and Eastern European countries, there are several areas which require highlighting. The first of these areas relates to the development of administrative capacity in Central and Eastern European countries which, as accession discussions progressed, received increasing attention from the EU. The disbursement and absorption of the Phare programme highlighted issues with the administrative capacities of the Central and Eastern European candidate countries and the perceived limited progress in developing these capacities raised questions about their administrative preparedness (Verheijen 2000:15). Having identified weak administrative capacity in the candidate countries as an obstacle to the downloading of the *acquis communautaire*, the Madrid European Council in 1995, stipulated that the Central and Eastern European countries would need to adjust their administrative structures in order to prepare for enlargement on the basis of the Copenhagen criteria and in the context of the pre-accession strategy defined in Essen. Following on from this, in 1997, the Commission published 'Agenda 2000' which 'set forth administrative reform not as a supplementary task, but as a necessary condition for accession,

seemingly on a par with the first three Copenhagen criteria' (Dimitrova 2002:178). The main areas which candidate countries needed to address as identified by the EU are shown in Table 2 below.

Table 2: Areas of public administration to be addressed by Central and Eastern European candidate countries

- The development of an impartial and professional administration (based on a civil service law).
- The development of a training system.
- Adequate policy development and policy coordination capacities.
- An effective accountability system (with particular emphasis on the system of Internal and External Financial Control)
- The extent to which special structures and procedures have been put in place to manage EU affairs.

(Source: Verheijen 2000:16)

The impact of the EU's conditions on the development of administrative capacity in Central and Eastern European countries have been highly debated. For example, a report published by the World Bank in 2006 (World Bank 2006), two years after the first Eastern enlargement, found that there was considerable variation in terms of the performance of the new Member States. With ongoing concerns in most Central and Eastern European countries about, firstly, weak strategic planning and policy coordination and, secondly, even a regression in the creation of a professional merit-based administration, the report concluded that the 'results of the study were not encouraging' (World Bank 2006:v). Explanation for this variation in performance has been provided by theories related to the ongoing influence of post-communist legacies, domestic opposition, the lack of a single EU model of administration and the inconsistent application of conditionality (Sedelmeier 2011:22). Nonetheless, notwithstanding these observations, what did happen was that Central and Eastern European countries became engaged in a transition from a centralised public administration system based on egalitarian principles to one that has adjusted to a market-oriented environment, deconcentration and decentralisation. Pridham

(2005:129) argues that the EU played an important role in this as it 'certainly hastened such reform and gave it a visibility it would not otherwise have achieved as well as providing some legitimation for such change'.

A second aspect of this time-frame which had an impact on innovation relates to the economic and industrial elements which formed Point 2 of the Copenhagen criteria (above). Indeed, it has been suggested that the 'EU affects economic governance to a very large degree owing to its huge regulatory agenda for CEE [Central and Eastern Europe] connected with compliance with Single Market norms' (Grabbe 2003:320). The EU insisted that candidate countries needed to achieve a certain level of competitiveness by the time of accession to enable them to cope with competitive pressures and market forces within the Single Market. In order for these countries to be successful in their application for EU membership, therefore, industrial adjustment was seen as one of the key areas in which urgent attention was required. Of particular importance was the EU's industrial policy which combined instruments from a number of Community policies, and included both those related to the operation of markets (product specification and market access, trade policy, state aid and competition policy) as well as measures related to industry's capacity to adapt to change (such as stable macro-economic environment, technology and training) (European Parliament 1999). With regard to innovation, the introduction of competition policy was also seen as not only an essential part of a market economy but also, by promoting competition between firms, vital for fostering innovation and increasing economic efficiency. From a business perspective, harmonisation with EU regulations had a significant impact in the areas of environmental regulation, health and safety requirements, employment legislation and single market standards covering individual product specification.

Implementing these new regulations – which usually demanded higher standards in, for example, health, safety and environmental protection – often required significant investment by companies in Central and Eastern Europe. This meant that Central and Eastern European industry 'was forced to modernize their products and production facilities rather drastically, to subject themselves to mergers with bigger players with greater economies of scale, or close down altogether' (Tiits et al. 2008: 76-77). As a result, it has been argued (Havlik et al. 2001) that, in terms of innovation, that the adoption of the *acquis communautaire* was a much more substantial driver of the modernisation of industry in Central and Eastern European countries than the direct

efforts towards promoting innovation during the 1990s. The significance of this is that it marked 'the first step in CEE [Central and Eastern Europe] towards actively managing economic policy and thus innovation and industrial restructuring in a distinctly different manner from the previous period where the free market and external forces were seen as key drivers of change' (Kattel et al. 2009:22). In other words, meeting the economic aspect of the Copenhagen criteria required a significant change of approach towards industrial-related policies in Central and Eastern European countries and one which, thanks in part to the EU's conditionality requirements, could be strongly influenced by the EU's agenda.

4.2) Lisbon Strategy (2000-2010)

On becoming EU Member States, a significant change took place with regards to the dynamics of the relationship between the EU and the now new Member States. The pre-accession period had been one characterised by power asymmetry, in which the candidate countries had been expected to download the EU's policies, policies which had been designed by the EU and which the candidate countries had not played a role in formulating. Additionally, the pre-accession period was one in which conditionality – an instrument which was at that time especially powerful owing to the attraction of EU membership to these countries – played an important role in promoting Europeanisation. After accession, however, these new Member States not only had a role in contributing to decisions on EU policies – or, in other words, uploading their policy preferences – but also, as the reward of membership was no longer a lever with which to influence decision-making and policy direction, the EU's ability to use conditionality to encourage certain outcomes became a much more limited tool (Schimmelfennig & Sedelmeier 2008).

With regard to innovation, the time at which these Central and Eastern European countries were undertaking accession negotiations coincided with a period of notable development in the EU's approach towards innovation policy. As discussed in Chapter 2, in 2000, the EU devised the Lisbon Strategy which aimed to make the EU the most competitive and dynamic knowledge-based economy in the world (European Parliament 2000). The primary incentive was to assist the EU in improving its economic performance relative to its main competitors, especially the United States

and, with this aim in mind, research and innovation formed the cornerstones of the Strategy. Although the Lisbon concept included a strong integrationist element (discussed below), as noted by James (2012:10), it 'should not simply be seen as a further step in Europe's internal integration process; rather it represents the most recent external expression of Europe's desire to catchup with the rest of the world'. The impetus for doing this was a view that the EU lacked R&D investment, had a low ability to turn knowledge into innovation, and was fragmented when it comes to supporting and framing knowledge generation and innovation (European Parliament 2000).

The Lisbon Strategy's approach to innovation contrasted with the way in which the EU had addressed innovation until then as it began to view innovation more in the context of a system, rather than the previous linear approach which had focused almost exclusively on research as the main source of innovation (European Parliament 2016a). In March 2003, the Commission published an update of its vision for innovation in the context of the Lisbon Strategy which stated that the innovation process should be viewed as 'complex interactions between individuals, organisations and their operating environment' and noted that 'innovation policies must extend their focus beyond the link with research' (European Commission 2003:4-5). By including a wide range of policy areas – Single Market, competition, regional policy, taxation policy, labour market, education and training standards, intellectual property rights and sectoral policies like environmental policy – the communication also began to draw attention towards the ubiquitous nature of innovation policy. Furthermore, the challenges of enlargement were identified with the communication noting that the legacies of the centrally-planned economies had left their mark on the economic, institutional, educational and social frameworks of the Central and Eastern Europe countries and acknowledging that strengthening their innovation capacity would need a considered policy response by the EU (European Commission 2003:11).

An indication of just how significantly innovation rose on the EU's policy agenda can be seen in the increase in allocated funding that took place during the Lisbon period. The 7th Framework Programme which ran from 2007-2013, a period overlapping the end of Lisbon and the beginning of the superseding strategy, received a budget allocation of €50.5 billion which, if taken as a yearly average, represented €7.21 billion per year. This was a considerable increase from the previous Framework

Programme (FP6 2002-2006) which, with a budget of €19.3 billion over 5 years, worked out at an annual average of €3.86 billion (Reillon 2005). Providing extra funding, however, was just one of the measures taken in order to achieve the goals of the Lisbon Strategy. Another notable initiative was the establishment of the European Research Area (ERA) which was intended to address the scattered research landscape that existed between EU Member States prior to the Lisbon Strategy. The aim of ERA was to provide a unified research area which was open to the world and would enable the free circulation of researchers, scientific knowledge and technology. The main objectives of the initiative were to boost Europe's competitiveness, to improve the coordination of research activities on national and European level, to develop human resources and to increase the attractiveness of European research to the best researchers from all over the world (European Commission 2000a). In order to encourage national policies to align with the EU's agenda, the Lisbon Strategy also set out a number of common indicators, most notably the ambitious goal of spending 3% of GDP on R&D by 2010.

However, these developments only represent one part of the Lisbon project. Indeed, as noted by Papadimitriou (2012:2, emphasis in original), the significance of the Lisbon Strategy 'rests as much on *what* it has aimed to achieve as on *how* its targets have been pursued'. Under the 'Open Method of Coordination' (OMC), discussed in Chapter 2, the EU pioneered new modes of governance that enabled not only the participation of a wider range of stakeholders in the policy process but also allowed the EU to enter into policy areas that were not explicitly part of the EU's area of jurisdiction. Or, in other words, 'the flexibility of the OMC was a key factor behind the broad level of support for Lisbon to include policy areas that had hitherto been considered politically too sensitive for exposure to EU scrutiny' (Copeland 2012:231). With an emphasis on non-legally binding tools such as benchmarking and sharing of best practice, the Lisbon Strategy relied heavily on voluntarism, peer pressure and naming and shaming for its implementation. This marked 'a major departure from the legalism of the community method that had shaped the development of the Single European Market (SEM) and other major EU policy initiatives' (James 2012:10). In this respect, it was clearly recognition of the democratic deficit that had resulted from the functionalist approach to integration that the EU had pursued until then.

Rather than producing EU legislation, the OMC is 'a method of soft governance which aims to spread best practice and achieve convergence towards EU goals in those policy areas which fall under the partial or full competence of Member States' (Prpic 2014:1). The European Council is usually the first to set policy direction but as binding rules cannot be used, this type of governance relies on other mechanisms to achieve its aims. These mechanisms include establishing guidelines, quantitative and qualitative indicators, benchmarks, national and regional targets and the use of periodic evaluations and peer reviews. During the Lisbon timeframe, a number of measures were established to provide benchmarking and reporting data on the NSIs of Member States, including Trendchart, the European Innovation Scoreboard, the Community Innovation Survey, commissioned studies and the Community Research and Development Information Service (CORDIS). Furthermore, the later period of the Lisbon Strategy witnessed the introduction of National Reform Programmes (NRPs) in which Member States were expected to report on progress in their national innovation policy and improvements in its governance.

Although, by its very name, the OMC emphasised the role of coordination, the governance architecture of the Lisbon Strategy should not simply be seen as a transition from harmonisation to coordination, or hard to soft law. Indeed, as noted by Smismans (2011), owing to the complexity of the relationship between these different approaches, it is important to avoid viewing them as opposing instruments. He argues that under the Lisbon Strategy, harmonisation remained a key policy instrument and that the ideational repertoire of the Lisbon Strategy had a notable effect on the nature of EU law. Rather than replacing harmonisation, coordination was 'the key organizational component of the Lisbon architecture' (Smismans 2011:520). As part of his analysis, Smismans draws attention to different discursive uses of the concept of coordination, identifying four main dimensions. Firstly, 'member state coordination' under Lisbon implied that the Member States were the competent level of government with a supplementary role for the EU, in the form of providing guidance. Secondly, 'vertical actor coordination' refers to the decentralised approach in which different levels of government – EU, Member States, regional and local – were expected to be actively involved through various forms of partnership. 'Dual partnership coordination' emphasised the need for the objectives to be tackled in a dual partnership between the EU and the Members States. Finally, 'horizontal policy coordination' involved the

grouping of different policies and policy areas in order to achieve a broad set of objectives. This latter dimension, included not only the horizontal coordination of policy but also the coordination of instruments, especially the Structural Funds (discussed below).

Following a disappointing start for the Lisbon Strategy, 'the Commission conceded that nationally based efforts and their coordination did not result in the dynamic growth as expected' (Edler 2012:171). In order to identify the cause of this, a mid-term report was carried out which provided a rather damning overview of the lack of progress made since 2000. The so-called 'Kok Report' claimed that the slow progress was due to 'an overloaded agenda, poor communication and conflicting priorities' as well as a lack of determined political action (Kok 2004:6). In response to this, in 2005 the Lisbon Strategy was relaunched (Lisbon II) in an attempt to strengthen the internal governance of the Strategy and enhance Member State engagement. In order to achieve this, the Commission (a) developed larger new initiatives at the EU level, (b) shifted its policies to be more holistic and demand-driven, (c) integrated innovation policy with aspects of the ERA and (d) broadened the OMC-like approaches of learning, benchmarking and reporting (Edler 2012:171)

A key aspect of delivering this revised Lisbon Strategy was that the EU's Cohesion Policy and its instruments – primarily the Structural Funds – were, following the advice of the Kok Report, adapted to closely mirror the Lisbon priorities. This included a requirement for Member States to set targets on the percentage of Structural Funds that would be spent on Lisbon objectives (European Commission 2005). The aim of the Cohesion Policy is to tackle the problem of regional disparity by promoting economic, social and territorial cohesion and, as such, the majority of Cohesion Policy funding is concentrated on less developed European countries and regions. Through the cohesion programmes, €86.4 billion was allocated for investment in knowledge and innovation between 2007 and 2013 (European Commission 2018a) with a particular focus on improving the innovation capacity of businesses, encouraging the dissemination, use and design of technologies and promoting a more flexible workforce. For Central and Eastern European countries, the introduction of the EU's Structural Funds after accession represented an important tool with which the EU could assert its influence in these new Member States. Although, as discussed in the previous section, the EU had begun to offer financial assistance to these countries through the Phare

programme from 1989, this was a much more limited amount than that which is provided through the Structural Funds.

Nonetheless, despite the efforts made by the revised Lisbon Strategy, structural difficulties and economic disparities within the EU continued to exist and were compounded by the financial and economic crises which began in 2008. Indeed, with its focus on coordination and its attempt to align all EU Member States behind a grand design of policy direction and purpose, from the outset the Lisbon Strategy faced enormous challenges of complexity and country diversity. Whilst the Lisbon Strategy has played a significant role in drawing attention to the importance of innovation as a source of economic development and international competitiveness, it was arguably overambitious and there is much debate about how impactful the Strategy has been in practice (Kaiser & Prange 2005). In fact, it has been suggested that the Lisbon Strategy may one day even 'come to symbolise the EU's 'lost decade" (Copeland 2012:236), a period in which the EU failed to realise the economic reforms which could have created the foundations for future growth and prosperity. Indeed, the Lisbon Strategy fell short on nearly all targets, the most notable being the target to increase spending on R&D to 3% of GDP. Member States, in practice, recorded an average increase from 1.8% to only 1.9% between 2000 and 2010 (Eurostat 2018e).

4.3) Horizon 2020 (2010-2020)

In response to the financial and economic crises, in 2010 the Lisbon Strategy was superseded by Europe 2020, the EU's agenda for growth and jobs for the current decade. The priorities of Europe 2020 are to encourage smart growth (as a result of developing an economy based on knowledge and innovation), sustainable growth (by promoting a more resource efficient, greener and more competitive economy) and inclusive growth (through fostering a high-employment economy delivering social, economic and territorial cohesion). The implementation of these reforms are supported by seven flagship initiatives: (1) innovation union, (2) youth on the move, (3) digital agenda for Europe, (4) resource-efficient Europe, (5) an industrialisation policy for the globalisation era, (6) an agenda for new skills and jobs and (7) European platform against poverty. Although the Innovation Union is the most directly linked to innovation, others, such as the digital agenda, the agenda for new skills and jobs, the

resource-efficient agenda and the industrialisation policy for the globalisation era are also closely connected to the EU's goal towards economic growth and innovative excellence.

The EU states that the Innovation Union 'aims to improve conditions and access to finance for research and innovation in Europe so that innovative ideas can be turned into products and services that create growth and jobs' (European Commission 2010a). The Innovation Union plan contains over thirty action points, with three specific aims:

1.) To make Europe into a world-class science performer.
2.) To remove obstacles to innovation, like expensive patenting, market fragmentation, slow standard-setting and skills shortages, which currently prevent ideas getting quickly to market.
3.) To revolutionise the way public and private sectors work together, notably through Innovation Partnerships between European institutions, national and regional authorities and businesses.

The financial instrument which provides for the implementation of the Innovation Union is known as Horizon 2020. Running from 2014 to 2020, it is the EU's 8th Framework Programme for research and the first to integrate research and innovation. With €74.8 billion of funding available (Reillon 2005), Horizon 2020 is the EU's biggest research and innovation programme to date. Horizon 2020, it is claimed, 'promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market' (European Commission 2018c). Horizon 2020 was supposed to represent a break from previous Framework Programmes, as exemplified by the decision to give it a unique name rather than the sequential numerical naming of the previous seven Framework Programmes. Although it is still too early to assess how successful Horizon 2020 has been at achieving these goals, the financial investment being made is a clear demonstration of the EU's ongoing commitment to developing the innovation capacity of its Member States.

In spite of the fact that, on the face of it, the goals of Europe 2020 are similar to those of the Lisbon Strategy, they are considered to be 'more targeted, actualised and defined in a more operational and less pompous way' (Van Iersel 2011:153). The Lisbon Strategy was seen as an overburdened 'laundry list' of actions that made it too broad

and led to difficulty prioritising measures. Europe 2020, by comparison, focuses on a limited number of areas and targets that underpin the main objectives of the strategy. This has been achieved by streamlining the headline targets (see Table 3), introducing the seven flagship initiatives (discussed above) and reducing the number of guidelines (the so-called Integrated Guidelines). Member States are expected to translate these EU headlines into national targets and report annually to the European Commission on the progress achieved and on the challenges encountered through the European Semester mechanism (discussed below).

Table 3: Five headline targets of Europe 2020

1.) Increasing the employment rate of the population aged 20-64 to at least 75%.
2.) Increasing combined public and private investment in R&D to 3% of GDP.
3.) Climate change and energy targets:
    - Reducing greenhouse gas emissions by at least 20% compared to 1990 levels.
    - Increasing the share of renewable energy in final energy consumption to 20%.
    - Moving towards a 20% increase in energy efficiency.
4.) Reducing school drop-out rates to less than 10% and increasing the share of the population aged 30-34 having completed tertiary education to at least 40%.
5.) Lifting at least 20 million people out of the risk of poverty and social exclusion.

(Source: European Commission 2011b)

In terms of the governance of innovation policy at EU level, this appears to be a somewhat complex arrangement. The DG which is directly responsible for carrying out the EU's policies on research and innovation is DG RTD (Research and Innovation). Other DGs which also play a significant role include DG COMP (Competition), DG EAC (Education and Culture) and DG REGIO (Regional and Urban Policy). This is, however, not an exhaustive list and, in fact, up to 18 DGs have been identified as having some role in innovation-related polices in the EU (Granieri & Renda 2012:80). It was noted in expert interviews conducted as part of this research that the governance

structure was confusing and that it also made it difficult to compile strategic documents which would meet the demands of the various DGs (Government Official 1 2016; Government Official 4 2016). To add to this complexity, there are also so many innovation-related budget instruments (Table 4) that it has become difficult for companies wishing to receive funding to know where to go. The problems caused by the ongoing fragmentation of institutional competences across DGs and the many different funding instruments under Horizon 2020 have been noted by Granieri & Renda (2012). An example of this fragmentation is provided by the eco-innovation support with is managed by DG ENV (Environment) under the resource-efficient Europe initiative but whose funding is managed by DG ENTR (Enterprise and Industry) under the Innovation Union initiative. Granieri and Renda (2012:117) argue that considerable simplification of the system is required in order to prevent valuable resources from being wasted and to achieve the EU's ambitious innovation-related goals.

Although a continuation with Lisbon can be seen in regards to the substance of Europe 2020, notable change has occurred to way in which the EU's latest strategy is governed. Importantly, in contrast to the Lisbon Strategy, Europe 2020 includes a reinforced role for the Commission and more transparency and commitment is required from Member States. An important tool in this respect is the NRPs which were initially developed as part of Lisbon II and which, under Europe 2020, form the central mechanism for national reporting on domestic action to achieve the EU's targets. What is especially important is that 'Member States are requested to enter into dialogue with the European Commission in setting the specific national contributions to meeting EU-level targets, thus avoiding the risk of poor performing states freeriding on the better performance of others' (Armstrong 2012:225). Through doing so, this strengthens the role of the Commission and, in turn, represents a move away from horizontal multilateral coordination, which was a key feature of the Lisbon approach, towards a more vertical and bilateral approach to increasing domestic policy effort (Zeitlin 2008). In order to ensure that the Member States are actually delivering on their commitments, the monitoring role of the Commission has become better defined, more systematic and better organised under Horizon 2020 (Van Iersel 2011:153).

Table 4: EU innovation-related budget instruments

Programme	Funding	Objective
Programmes fully dedicated to supporting R&I activities		
Horizon 2020	€79.4 billion	Research projects
Programmes including funds for R&I activities		
Cohesion Policy	€110 billion (out of €352 billion)	National/regional programmes
Galileo	€7.1 billion	Satellite navigation system
Copernicus	€4.3 billion	Earth observation programme
Programmes connected to R&I activities		
CEF (Connecting Europe Facility)	€27.4 billion	Energy, telecom and transport
Erasmus+	€14.7 billion	Support for education, training, youth and sport
LIFE (Environment and climate action)	€3.5 billion	Environment
COSME (Europe's programme for SMEs)	€2.3 billion	Finance for SMEs

(Source: European Commission 2018a)

The new strategy also represents a more holistic approach by addressing microeconomic issues, through the previously discussed Flagship Initiatives, as well as macroeconomic issues. In terms of macroeconomic governance, the key architectural development is the introduction of the European Semester which is the main tool with which the EU can monitor national progress on economic and fiscal policies. Born out of a perceived need for stronger economic governance and better policy coordination between EU Member States, the European Semester refers to the 6-month period at the beginning of the year during which time Member States are expected to align their budgetary and economic policies with the objectives and rules agreed at EU level.

Starting with the publication of the Annual Growth Survey in January, which sets the basis for building a common understanding about the priorities for action at EU and national levels, by April the Member States are required to submit their NRPs together with their Stability and/or Convergence Programmes for assessment by the EU. After evaluation of these programmes, the EU provides each country with so-called 'Country Specific Recommendations' which are expected to be taken into account in budgetary and policy decisions. Through this system, the European Semester provides the Commission with a tool with which it can annually monitor and influence the direction of policy-making in its Member States.

In terms of the tools being used under Europe 2020, an important development has taken place in the EU's approach towards Cohesion Policy. As shown in Table 4, between 2014 and 2020, €352 billion has been set aside for Cohesion Policy in order to address the diverse development needs of the EU regions and, of this, €110 billion has been dedicated towards research and innovation activities. As part of the latest reforms to the Cohesion Policy, and in keeping with the aims of Europe 2020, the EU announced that the development of a Research and Innovation Strategy for Smart-Specialisation (RIS3) would, from 2013, become an ex-ante conditionality for investment from the European Regional Development Fund (ERDF), the EU's fund aimed at reducing regional disparity within Member States. The RIS3 approach 'combines industrial, educational and innovation policies to suggest that countries or regions select a limited number of priority areas for knowledge-based investments, focusing their strengths and comparative advantages' (OECD 2018c). It supposedly embraces a broad view of innovation and would theoretically, in that respect, suggest an improvement on the EU's previous policies which were criticised for being too narrow and linear in their approach. (See Table 5 for the key elements of the RIS3 approach.) A Smart Specialisation Platform provides guidance material, access to relevant data in order to inform strategy formation and help train policy-makers. (The Czech and Hungarian experiences of and responses to the Smart Specialisation Strategy approach are discussed in Chapters 5 and 6.)

Table 5: Key elements of Research and Innovation Strategies for Smart Specialisation

- Smart-specialisation is a place-based approach, meaning that it builds on the assets and resources available to regions and Member States and on their specific socio-economic challenges in order to identify unique opportunities for development and growth.
- To have a strategy means to make choices for investment. Member States and regions ought to support only a limited number of well-identified priorities for knowledge-based investments and/or clusters.
- Setting priorities should not be a top-down picking the winner process. It should be an inclusive process of stakeholders' involvement centred on 'entrepreneurial discovery' that is an interactive process in which market forces and the private sector are discovering and producing information about new activities, and the government assesses the outcomes and empowers those actors most capable of realising this potential.
- The strategy should embrace a broad view of innovation, supporting technological as well as practice-based and social innovation. This would allow each region and Member State to shape policy choices according to their unique socio-economic conditions.
- Finally, a good strategy must include a sound monitoring and evaluation system as well as a revision mechanism for updating strategic choices.

(Source: Gianelle et al. 2016:114)

In addition, under Europe 2020, the EU has further expanded its collection of soft policy tools. For example, as part of the Innovation Union initiative, a Policy Support Facility (PSF) has been introduced which provides practical support to countries through peer reviews, mutual learning exercises and specific support to countries. The PSF, it is claimed, 'replies to the strong need to offer more customer-oriented services to support evidence-based policy making' (Research and Innovation Observatory 2018). As Hungary was one of the first countries to make use of the peer review option offered via the PSF, the Hungarian experience of this is discussed in more detail in Chapter 6. Furthermore, in terms of qualitative indicators, the EU continues to

develop and expand on the tools it uses to monitor the innovation performance of Member States including, amongst others, the previously mentioned European Innovation Scoreboard (EIS), the Regional Innovation Scoreboard (RIS), the Innobarometer, the Business Innovation Observatory and the Key Enabling Technologies (KETs) Observatory.

Conclusion

This chapter has highlighted the key developments in both the relationship between the EU and the countries under study as well as the changes in the EU's approach towards innovation policy since these countries became EU Member States. In theory, the Copenhagen criteria provided the EU with an unprecedented amount of influence in the decision-making and institution building process of these Central and Eastern European countries as they transitioned to democratic market economies. The pre-accession period was characterised by power asymmetry in which the EU, thanks in large part to the attraction of EU membership, had a number of powerful tools with which to promote Europeanisation in the candidate countries. In terms of innovation, the requirement to download the *acquis communautaire* and incorporate the EU's competition and industrial policies into the domestic arena can be seen as having a direct impact on these countries NSIs by promoting competition and increasing industrial standards.

Whilst the pre-accession period gave the EU a fairly commanding position in the candidate countries, the Commission's role under the Lisbon Strategy was more of providing supplementary guidance. Although the Lisbon Strategy was very innovative in terms of developing a method of soft governance – the Open Method of Coordination – which enabled the EU to enter into policy areas that were officially controlled by Member States' national governments, the Lisbon Strategy largely failed to actualise the intended economic development. Europe 2020, which by strengthening the role of the Commission and streamlining the number of aims, has attempted to overcome the main weaknesses of the Lisbon Strategy. What has been particularly noticeable about both Lisbon and Europe 2020 is how the EU has not only continued to develop its soft policy tools but also how it has proceeded to link the provision of financial aid ever closer to the condition of adopting the EU's aims and priorities. This has been shown to have

occurred firstly in the Phare programme and in more recent years with the EU's Cohesion Policy and the introduction of an ex-ante conditionality – the development of a Smart Specialisation Strategy – in order to receive ERDF funding. This development will be discussed in more detail in the following chapters.

5) Czech Republic

Introduction

Claiming to be one of the ten most industrialised countries in the world prior to World War II (Ministry of Foreign Affairs of the Czech Republic 2018), Czechoslovakia, as it was then, has an impressive industrial record. However, the communist period resulted in a huge restructuring of the industrial and research environment which had many negative consequences and, even since returning to a market economy, the Czech Republic has struggled to recapture much of the success it formerly enjoyed. In spite of the EU's attempts to support the advancement of the Czech NSI and to improve its innovation performance, this research suggests that a number of historical legacies together with the Czech Republic's economic structure are preventing the EU from having a more significant impact. In order to gain a thorough understanding of the situation, this chapter begins by looking at the historical development of the Czech NSI over three timeframes: (1) pre-1989, (2) the transition period and (3) post-accession to the EU. This section also considers the role of FDI and assesses whether any clear progress in the Czech Republic's innovation performance can be identified since becoming an EU Member State. The second part of this chapter considers the role of the EU in influencing the development of the Czech NSI. Using the theoretical framework constructed in Chapter 3, this section goes on to discuss how the existence of several areas of misfit can explain why the EU has not been able to exert a greater influence.

5.1) Development of the Czech NSI

Pre-1989

Due to the fact that the model inherited from the USSR greatly affected the research and innovation systems of Central and Eastern European countries, understanding the key elements of the Soviet research and innovation system is important in explaining the development of the Czech NSI (and also Hungarian NSI in the following chapter). This is not to suggest that all Soviet bloc countries should be

considered as a homogenous group. Indeed, differences in each country's history greatly affected the initial conditions at the time of downloading the Soviet research model and, subsequently, political and economic developments during the communist period also had an impact on the way in which the Soviet model was implemented over time. There is, however, a 'common structural heritage in the research systems of Central and Eastern Europe rooted in the shared past' (Balázs et al. 1995:615) – a basic template which transformed the NSIs of Central and Eastern European countries, albeit not with uniform results. What this section aims to do, therefore, is highlight the main commonalities of the Soviet research model transposed onto Central and Eastern European countries and to draw attention to the specifics of the Czech experience including any significant changes which occurred between the earlier and later communist period. This will help to identify key Soviet-related characteristics of the Czech NSI with which the country entered the post-Soviet transition period.

Science played a significant role in the ideology and politics of socialist societies. Indeed, the 'scientific-technical revolution' was seen as an important condition for not only the development of socialism but also as the main area of competition between capitalism and socialism. Additionally, there was a political expectation that science would be capable of solving problems in all areas of society (Meske 2004). It is perhaps not surprising, therefore, that during the communist era there was considerable awareness regarding the importance of investing in tangible and intangible assets in order to achieve ideological goals as well as the ambitious growth objectives of the government of the USSR. In fact, according to Freeman's (2006:15) calculations, the USSR actually committed a higher ratio of gross domestic expenditure to research and development (GERD) to GDP than even the USA. This has led to the conclusion that 'whatever the problems may have been with respect to the post-war growth of the East European economies, they were not problems of sheer lack of quantitative investment, whether in tangible or intangible capital' (Freeman 2006:16).

Notwithstanding this sizable economic commitment to R&D, it should be noted that the communist research systems where somewhat skewed owing to the absolute priority afforded to military R&D and military production. Although there is some difficulty in obtaining reliable statistics for these countries during this period, it has been estimated that up to three quarters of the total R&D was conducted directly for military objectives (Freeman 2006:19). The military to civilian technology spin-off

argument which has been promoted by military and space agencies in the US and other OECD countries in defence of their large R&D expenditures, has received considerable resistance from economists who argue that 'very few technologies have proceeded effortlessly from defence conception to commercial application' (Alic et al. 1992:9). In the case of the USSR, it has been suggested (von Hirschhausen & Bitzer 2000:17) that the lack of spin-offs was even more pronounced due to the high level of secrecy surrounding the research results of military R&D. In purely economic terms, the burden of military expenditure was considerable, especially considering the weak position of the USSR's economy at the time. Moreover, the high ratio of investment in military R&D resulted in a much smaller proportion of R&D funding being available to the development of research within other scientific fields.

In terms of the institutional structure of the research system, given the high importance attached to science and research, Soviet politicians were keen to control and manage this sphere as effectively as possible (Meske 2004). In part because of this, science became integrated into national planning and 'R&D was directed administratively by the centre and subordinated to centrally defined economic goals' (OECD 1992:14). Most R&D organisations came under the control of the federal bodies (state commissions and ministries) and were financed by the state, based on the requirements of the National Economic Plan. The politically-governed Soviet approach followed a linear model of innovation (see Chapter 2) in which each link was institutionally separate – training, basic research, applied research, development and production – resulting in a highly fragmented system. Indeed, as noted by Balázs et al. (1995), the institutional complex developed in the USSR and introduced in Central and Eastern European countries followed the general principles of central planning: specialisation, rationalisation and centralisation. The Soviet model divided research and innovation into three sectors – (1) academies, (2) universities and (3) an industrial or 'branch' sector – each of which had a distinct function and were markedly separated from one another.

Perhaps unsurprisingly, considering the importance placed on science, the communist period witnessed a huge increase in the number of research personnel in Czechoslovakia from about 14,000 in 1951 to around 198,000 by 1988 (OECD 1992:15). Due to the abolition of private ownership when Czechoslovakia became part of the Soviet bloc in 1948, R&D became part of the state sector and the research system

underwent a sizeable reorganisation. Firstly, in accordance with the Soviet model, basic research became concentrated mainly in the research institutes of the Academies of Sciences. In Czechoslovakia, these were the Czechoslovak Academy of Sciences which was founded in 1952 and the Slovak Academy of Sciences founded in 1953. These Academies were hierarchically structured and, as by law the coordination of all basic research was under their responsibility, they enjoyed a privileged position in the Czechoslovak research system (Provazník et al. 1998:28). A combination of learned society and system of research institutes, the Academies constituted an important part of the Czech research system (OECD 1992). The Academies covered all scientific fields and, as well as conducting research, they also played a notable role in training scientists. For example, during the 1980s, the Czechoslovak and Slovak Academies trained an annual average of about 1,500 postgraduate students (OECD 1992:63).

The creation of the Academy research institutes significantly weakened the research activities of universities whose role within the national research system essentially became confined to teaching, particularly in the initial communist period. During the communist era, Czechoslovak universities witnessed a sizeable increase in the number of students, rising from 45,200 in 1950 to 167,395 in 1985, with almost 50% of students in engineering and agriculture and a much lower share in the natural sciences and humanities. This increase, however, was not matched with a corresponding rise in the number of university teachers (OECD 1992:54-55). Due to the reorganisation of the research system, many scientists actually left the universities in order to join the Academy research institutes. The equipment in universities was significantly inferior to the Academy research institutes and this, together with few incentives to engage in research and heavy university teaching loads, 'weakened the link between research and teaching in a number of areas' (OECD 1992:15). Although a marginal amount of university research did continue, the university research sector during the communist period occupied a relatively weak position within the Czechoslovak research system.

Despite the universities and Academy research institutes being legally, organisationally and financially separate, some attempts were made to foster cooperation between the sectors through, for example, conducting joint research projects, Academy scientists teaching and lecturing part-time at universities and some university teachers carrying out research in Academy institutes. This cooperation 'was

primarily facilitated by good informal contacts and communication among scientists from both research sectors' (OECD 1992:58). In other words, although the universities and Academies were technically separate, they were not, in practice, completely isolated from one another. However, whilst by the end of the communist period there was some, albeit still limited, cooperation between the Czechoslovak universities and Academies, the links between universities and industry, by contrast, were not well developed (Müller 1995).

With regard to applied research, the link between this field of research and production was notably weakened at the beginning of the 1950s with the introduction of a network of industrial research institutes. These institutes were controlled by branch ministries and operated according to the plan for the firms of each particular branch. As a result, industrial research became 'institutionally separate from the enterprises which, according to the tenets of central planning were simply operational units whose sole role was to execute production plans' (Balázs et al. 1995:616). The role of the firm was effectively limited to that of a production unit with very little, if any, internal research or innovation-related activities. Much like university research had suffered after the establishment of the Academy research institutes, so too in-house R&D was damaged by the expansion of the industrial research institutes. Although some effort was later made to improve the link between research and production in the second half of the 1980s, this was impeded by the monopolistic structure of the economy, with production dominated by few, large enterprises with little interest in innovation (OECD 1992:15). It has been argued (Balázs et al. 1995) that this institutional heritage was responsible even in the post-Soviet transition period for the small amount of in-house R&D in Central and Eastern European countries.

However, regarding in-house research, some notable differences have been observed in the Czechoslovak system. As the centralist system came under pressure in Czechoslovakia during the 1970s and 1980s, two significant changes took place in the research system.

> 'First, enterprises were allowed to retain 2% of turnover to spend on R&D, thereby creating a new 'R&D Fund'; this was a sort of R&D subsidy. Second, enterprises were allowed to form groupings or 'combinates' which enabled the

> concentration of enterprises' economic power and enhanced technology-based networking between companies' (Müller 1995:808).

Shifting power to the enterprises represented something of a decentring process although, without removing the administrative, social and regional structures and expectations, the ability of enterprises to pursue economic goals still remained limited. It also led to a reorientation in the sectors performing research and, by the end of the 1980s, to some recovery in the in-house research and technological capacities of the enterprises, which had previously been weakened by centralisation practices. Thus, Müller (2004) argues that by the beginning of the transition period, in-house industrial R&D potential in Czechoslovakia was increasing and the industrial R&D system had moved closer to the Western model and quite different from that of the former Soviet Union.

In addition to the formal institutional changes that resulted from the implementation of the Soviet research model, a report by the OECD (OECD 1992) on the state of the Czechoslovak R&D system at the beginning of the transition period also draws attention to another important legacy of the communist period, namely the public attitude towards science and technology. As all institutions were controlled by the political apparatus and society had limited ability to assess them, the traditional forms of interaction between science, technology and society became undermined. Science became discredited because it was part of the bureaucratic system and, as a result, 'a good deal of hostility developed towards science and technology, as well as to 'official experts' in general' (OECD 1992:75). This situation was confounded by the selection of research personnel who were often rewarded based on their political and ideological allegiance rather than their scientific achievements and, conversely, many capable intellectuals were removed from their positions. As science and technology was so closely linked with politics and political cadres, the OECD report (OECD 1992:120) uncovered a strong distrust amongst the general public, and even ridicule, of the notion of a positive, future-oriented policy in this area.

The issue of distrust, or at least lack of trust, was not confined just to science and technology policy. The Soviet system had caused the public to feel alienated from the political institutions and had led to a general lack of trust in most public officials and institutions. For example, a survey carried out in Czechoslovakia by the Institute

for Research of Public Opinion in 1988 (cited in Millar & Wolchik 1994:19) showed that only a small percent of people, 14% and 24% respectively, were willing to serve as local level officials or members of local government commissions. Reasons given for this lack of interest included low evaluations of the effectiveness of local governments and of citizens' possibilities to influence politics, as well as previous negative experience with local government. These findings 'further reflect the negative assessments of local-level officials and institutions' (Millar & Wolchik 1994:19). Not only does this highlight the feeling of division between the public and the political arena but it also suggests that the negative perception of politics had, for many, become a deterrent to working in a (local) governmental or official role. In addition, the perception that corruption was an intractable part of politics had a serious effect on the levels of trust between society and the state.

Moreover, political trust – the support of citizens for political institutions such as government and parliament – is important for not only a wide range of political and economic outcomes (Pop-Eleches & Tucker 2011:9), but recent research has also suggested that there is strong correlation between satisfaction with political governance, on the one hand, and (generalised) social trust on the other (Newton 2007; Sztompka 2000; Zmerli & Newton 2008). Social and political trust, in other words, are closely related and mutually supportive. Indeed, it is not just low levels of political trust but also social trust which are widely acknowledged as being legacies of the communist regime in Central and Eastern European countries (Kornai & Rose-Ackerman 2004; Rose-Ackerman 2001). As stated by Gibney (1997:95) '[o]ne of the hallmarks of communist rule…was the perversion of civic society. In place of a sense of community, these 'societies' were instead marked by a mutual distrust between the state and its people, and between the people themselves'. The networks of secret police led to general public fear and distrust and the post-regime revelations of spying by friends, colleagues, family and spouses created a rational basis for political and social distrust, both during and after the communist period. Indeed, the scarcity, or lack, of trust has been seen as a major obstacle to the establishment of effective democracy and market economy in the Czech and Slovak Republics (Musil 1992).

In short, at the end of the communist period, the Czechoslovak R&D system had grown considerably in terms of the number of researchers and was characterised by a high degree of separation between the various sectors – the research institutes of the

Academies, the universities and the industrial institutes. Although some cooperation did take place, notably between the universities and the institutes of the Academies, the various sectors remained financially and organisationally separate. Universities had predominantly become teaching institutions and university research had been severely weakened by the establishment of the research institutes of the Academies which dominated the field of basic research. The role of R&D within companies, which had been significantly weakened in the initial part of the communist period, gradually became re-established after a decentring process benefiting the enterprises that began in the 1970s. Nonetheless, as the Czech and Slovak Republics undertook their transitions to democratic market economies, they did so with a significant amount of inherited lack of political and social trust.

Transition period

Having described the backdrop against which Central and Eastern European countries entered the transition period to a liberal democracy and market economy, this section looks more closely at the transition time period with a focus of the particularities of the Czech experience. The situation in the Central and Eastern European countries is somewhat unique due to the fact that these countries had to manage their transitions whilst adapting to the opportunities and pressures which resulted from globalisation. Whilst the collapse of the communist regime provided the possibility for political, economic and social reform, it also resulted in some significant challenges. These endeavours were made additionally difficult by the fact that '[p]articularly after the Berlin Wall, most countries saw deep dives in their growth rates and in industry as well as service-sector value added' (Kattel et al. 2009:11). In fact, some analysts have found that it took almost a decade for most of these countries to even regain the growth and development levels of 1990 (Tiits et al. 2008). According to the World Bank and IMF, factors accounting for this recovery and growth were initial conditions, macroeconomic policies and structural reforms (IMF 2000). These efficiency gains are considered more short-term benefits as opposed to the long-term opportunities associated with research and innovation.

With regard to the specific experience of the Czech Republic during the transition period, this was initially affected by the fact that until the late 1980s

Czechoslovakia had retained a very orthodox version of the socialist economic system. Despite formally committing itself to the introduction of perestroika, the actual commitment in terms of action was slow and minimal. Czechoslovakia remained one of the most centralised economies with only 1.2% of the population employed in the private sector in 1989 (Hanousek et al. 2004:2) and not even partial reforms towards economic liberalisation were implemented until after the fall of communism. The state continued to be omnipresent and omnipotent and private entrepreneurial activity, a factor which is considered vital to improving a country's innovative capacity, was essentially absent. When the transition period officially began in 1989, the level of political freedom was negligible and that of economic liberalisation, non-existent. Like other Central and Eastern European countries, the Czech Republic underwent a rapid and extensive process of privatisation during the transition period. In fact, according to the World Bank (World Bank 2002:6), the private sector share of GDP in the Czech Republic grew from 12% in 1990 to 80% in 1999 which was even higher than the private sector share in Western capitalist countries (up to 65%) (Rodríguez 2011:2).

The transition strategy pursued by the newly elected government was one of shock therapy and rapid change with most of the reforms being introduced in 1991. The first stage of privatisation was completed in 1990-1991 and a second was launched in 1994 after the separation of the Czech and Slovak Republics. The dissolution of Czechoslovakia into the Czech and Slovak Republics in 1993 slightly postponed economic recovery (Fidrmuc et al. 2002) although, on the whole, the experience was less negative for the Czech Republic which inherited better economic structures than its Slovak neighbour. The Czech Republic, for example, had a strong tourism industry, centred on Prague, and a number of SMEs which were already trading reasonably well with EU countries. Furthermore, much like its neighbours, Germany and Austria, engineering has been an area of considerable strength in the industrial development of the Czech Republic and has traditionally been the backbone of the Czech economy (Rammer et al. 2007:5). The Slovak Republic, on the other hand, inherited 'a relatively unattractive industrial structure made of large industries such as steel, armaments, and chemicals that could not trade successfully in the competing markets of the EU' (Koyame-Marsh 2011:74). These many reforms in combination with the disbanding of the Comecon and the related loss of foreign markets for Czechoslovak products, caused a notable decline in output and led to a predicted transition recession in the early 1990s.

Growth gradually increased again until the beginning of 1997 when the Czech Republic witnessed a dramatic slow-down necessitating the introduction of 'a new package of economic measures, including further stabilisation measures as well as a number of structural reforms designed to eliminate the systematic and institutional shortcomings of the Czech economy' (European Commission 2014a).

Along with the radical transformation of the economy, the transition period also saw the introduction of a new research system which was 'based on the principles of scientific freedom, institutional autonomy, pluralism of funding sources and competition' (Müller 2004:1998). There was considerable debate about whether the transformation should be 'organised' and 'politically governed' or whether it should follow a spontaneous evolutionary process, carried out on the basis of natural selection (Müller 2004; Provazník et al. 1998). The latter option eventually won the support of state authorities along with the majority of the scientific community and so a transformation took place which was not centrally directed and differed according to the conditions in each particular R&D institution (Provazník et al. 1998:26). The approval of three acts – the Academy of Sciences Act, the Governmental Support for Scientific Activities and Technology Development Act and the Higher Education Act – created the basis for the abolition of central planning and management of science and research and of direct state intervention into the activities of research institutions. An expert advisory governmental board comprised of scientists and researchers – the Council for Science and Technologies – was established in 1991, offering advice on how R&D should be coordinated at the executive level.

Arnold (2011) has distinguished two distinct periods during the transition period. The first, from 1990 to 1998, involved institutional readjustment and during this time the Czech Government 'was strongly averse to central planning so budget responsibility for the R&D system was decentralised to the ministries and the Academy' Arnold (2011:ii). This decision was, in part, due to the profound mistrust of governmental planning and quantitative goal setting. The second period, from 1998 to 2003, is represented by the Czech Republic implementing measures in preparation for EU membership. During this period, the government started to move away from unconditional funding towards institutional funding based on plans called 'research intentions' which connected government support for research to specific objectives. This period was characterised by a focus on R&D as opposed to innovation, the latter

only receiving policy attention after EU accession (see below). The first 'National Research and Development Policy of the Czech Republic' was established in 2000 which aimed to improve the coordination of research activities, stressed the importance of evaluation of R&D results and identified the need to restructure state R&D administration in order to improve its efficiency (Arnold 2011:16).

An important initial consequence of the reforms to the Czech research system was a sizeable reduction in its size as shown by the decrease in R&D funding and employment, as shown in Table 6 below. Although, as the transition period progressed, funding for R&D was gradually restored, thanks in part to a resolution by subsequent governments to increase public support for R&D (Müller 2004), the number of R&D staff remained much lower than it had been at the end of the communist period. In terms of the R&D funding system, the first steps towards competitive funding were made by the creation of the Grant Agency of the Academy of Sciences which was soon replaced by the Science Foundation of the Czech Republic, also known as the Grant Agency of the Czech Republic (GA CR), in 1992. GA CR is an independent public organisation supporting and distributing funds for basic research in the Czech Republic through calls for proposals and public competition. It was also intended that GA CR would encourage trans-sectoral research projects although, in practice, the cooperation between some sectors, especially the academy and industry sectors, remained weak (Müller 1995). Ministries, state agencies and the Academy were all allocated an R&D budget which resulted in a complex funding system involving twenty funding bodies. A lack of coordination led to fragmentation of R&D support with programmes being launched with unclear, and often overlapping, objectives (Arnold 2011).

With regard to the various research sectors, the role, and even the existence of the Academy – which after the dissolution of Czechoslovakia was re-established as the Czech Academy of Sciences (CAS) – came under much questioning after 1989. Instead of abolishing CAS altogether, 'the opinion won that it was possible to convert the Academy into a modern institution of non-university research which in size, level and organisational ways will produce a performance comparable with the analogous scientific centres in western democracies' (Provazník et al. 1998:28). The Academy retained its independence but lost its privileged position as the coordinator of all basic research and was transformed into a democratic organisation. A system of independent

peer reviews was adopted, with input from foreign scientists, leading to the evaluation of the Academy research institutes and personnel based on their scientific merit and level of performance. Poor performance in some areas resulted in a sizeable reduction in the number of research centres and staff. In fact, by 1994, the number of Academy personnel was almost half what it had been in 1989 (Müller 2004:201). Nonetheless, in spite of this, CAS still remained the main public research performer in the Czech Republic.

Table 6: R&D expenditure and R&D staff in the Czech Republic 1989-2003

Year	1989	1990	1991	1992	1993	1994	1995
Total R&D Expenditure (Million CZK)	21,420	12,415	15,211	14,499	9,750	12,983	13,982
Total R&D Staff	137,927	105,916	76,487	57,227	40,214	38,752	47,455

1996	1997	1998	1999	2000	2001	2002	2003
16,264	19,477	22,865	23,646	26,487	28,337	29,552	32,247
49,921	52,245	51,198	52,716	53,506	51,939	53,695	55,699

(Sources: Eurostat 2018c and Müller 2004)

As part of the transformation, the Academy research institutes adopted a funding model combining institutional funding with competitive-project funding, to the extent that gaining project funding became crucial to the survival of some research institutes (Müller 2004; Provazník et al. 1998). A large part of the success of the Academy sector was due its ability to gain international grants, scholarships and contracts and to integrate into the international scientific community. The transition period also witnessed a significant increase in cooperation between the Academy research institutes and the universities, to the point that reference could even be made to 'an emerging coherent research system integrating in a natural manner university education and basic research' (Provazník et al. 1998:30). By contrast, the Academy's

involvement in solving the problems of industry remained very poor. In spite of an increase in the number of mission-oriented projects carried out by the Academy, 'industry did not consolidate the research results sufficiently to absorb and utilise them in business' (Provazník et al. 1998:30).

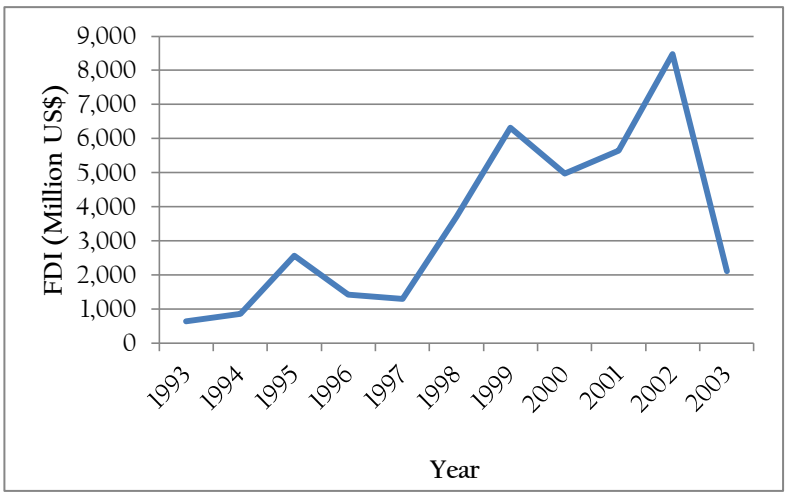
In terms of university research, one of the goals for the transformation of the Czech university sector was to improve both the quantity and quality of its research. Having been significantly eroded during the communist period, university research began to witness an improvement during the transition period with research accounting for from one third of a university teacher's time to as much as 50-70% in top-level university research centres by the late 1990s (Provazník et al. 1998:31). In spite of this positive development, there were a number of factors which constrained universities and prevented them from making even greater improvement in their research capacities. These included a shortage of funding, a heavy teaching commitment and the fact that, in some cases, laboratory and computing equipment remained significantly inferior to that in the Academy research institutes. Another issue noted by Müller (2004:815) was 'the decline in the number of students wanting to take science and engineering and the high demand for education in other subjects (such as business, economics, law, humanities and arts)'. Although, cooperation during this period with the Academies increased, links between universities and industry witnessed something of a decline with contract research stagnating or decreasing (Provazník et al. 1998:31).

Perhaps the greatest transformation, however, took place within the previously overstaffed and inefficient industrial sector, the majority of this change happening as result of privatisation and the corresponding alteration in the sources of funding for industrial research. In 1991, industrial research institutes were transformed into state limited companies and subsequently, after two waves of voucher privatisation, the majority were transformed into joint stock companies. In terms of their funding, already by 1996, 90% of their funding came from private funds which marked a hugely significant break from the reliance on state funding characteristic of the communist period. The number of employees in the industrial science sector decreased considerably, indeed by 1996 it had dropped to about one third of the 1990 figure (Müller 2004:202). Privatisation led to a decrease in research activities or even the closure of entire research branches, which was largely blamed on a lack of demand for R&D from industry. A negative outcome of the significant decline in R&D was that it

led to the 'total disappearance of industrial R&D potential in some fields and branches' (Müller 2004:204). A more positive development, however, was the growing awareness by researchers of the economic, commercial and financial aspects of their research. In other words, the gap which used to separate the researcher from the user or customer of the research results, typical of the communist period, began to be bridged (Provazník et al. 1998:34).

In a discussion on the development of the Czech NSI, Lengyel & Cadil (2009) have identified two distinct periods in the 1990s. They argue that in 'the first half of the decade, government efforts focused on 'research' with an emphasis on re-structuring the relationship between public research institutes and increasing the R&D capacities of universities' (Lengyel & Cadil 2009:180). During this period there was minimal government financial support for business innovation. In the second half of the decade, the Czech government reoriented its effort by increasing public funding for industrial R&D and introducing a new set of incentives to attract more FDI in response to, amongst other reasons, persistent difficulties in restructuring domestic firms, underfunding of industrial R&D and relatively low levels of FDI. With regard to domestic industrial research, this existed mainly in the larger enterprises as SMEs, by comparison, had 'no interest in promoting research, even if they actively utilized the professional expertise of the individual scientists and engineers' (Müller 1995:813). In terms of FDI, towards the end of the 1990s, the Czech Republic was receiving considerably higher amounts of FDI than it had at the start of the decade (see Figure 2). It is claimed (Benacek 2010:24) that, in spite of the economic slump, 1997-1999 was a highly successful period for the development of industrial policies in which CzechInvest – established in 1992 as the Investment and Business development Agency – played a significant role. The Czech economy gradually earned credibility among foreign investors and the investment incentives offered by CzechInvest encouraged a boom in foreign investment. In terms of innovation, this was particularly significant as '[i]nvestors realized, once they could handle simple projects in the Czech Republic, that there was state support for much more sophisticated ventures' (Benacek 2010:24).

Figure 2: Inward Foreign Direct Investment (FDI) to the Czech Republic 1993-2003 (Million US$)



(Source: OECD 2013)

FDI has clearly played a vital role in the economic development strategy of the Czech Republic and 'R&D expenditures of foreign-owned firms have become an important factor of the innovation system development since the beginning for the 1990s' (Lengyel 2012:78). However, the long-term effect of FDI has become a considerably contentious issue. Whilst, on the one hand, in some cases the outcome has been positive, for example, the acquisition of the Czech automotive manufacturer Škoda by the German group Volkswagen led to an expansion and internationalisation of local clusters of car part suppliers. On the other, it has been argued (Kosová 2010) that there are instances where local firms have been 'crowded out' by the presence of MNEs. This has led to the suggestion of a 'dual economy' in which indigenous businesses struggle to compete with the standards of foreign companies (Aide à la Décision Economique 1999). In addition, spillovers have been found to have been limited to vertical linkages, whereby the technology is absorbed by local clients or suppliers and technological benefit is gained only by upstream and downstream industries (Javorcik 2004; Stancik 2007). Conversely, horizontal spillover, the spillover of technology to domestic competitors within the same industry, has been found to be negligible, or, completely non-existent.

In an analysis of Central and Eastern countries, Kadeřábková (2006) has noted that, whilst some notable catch-up did occur during the 1990s, there was a critical

weakness regarding the particular method of catch-up. According to her analysis, the 'development of technology and skill-intensive industries in these countries has been, in fact, mostly based on the qualitatively less demanding segments like assembly operations with overall low R&D intensity and a high share of blue-collar workers' (Kadeřábková 2006:145). Statistics (Kadeřábková 2006:153-154) suggest that there was at this time a notable discrepancy between the education level of the workforce, in which the group with medium formal education prevailed, and the skill level of the occupations available, which were predominantly low-skill occupations. This would suggest that a significant number of employees were overqualified for the job which they were performing and that their skill capability was not being fully utilised. Kadeřábková (2006:145-146) argues that the problem with a catch-up based on low skill intensity industries is that it results in a lack of demand for highly skilled workers, which in turn reduces the incentive to invest in education and skills development. These countries can essentially become locked in a cycle of low skills, low technology intensity and weak innovative potential. Although the previously mentioned introduction of new technology and machinery has aided a technology catch-up, mastering the use of this equipment does not necessarily require a higher level of skill. Consequently, skills catch-up, a vital factor for improving innovative capacity, was considerably slower than technology catch-up during the transition period.

Perhaps one of the most detrimental and long-term effects during the transition period was caused by the prevalence of corruption and the erosion of trust. Although the issue of corruption had deep roots from the communist era, the transition setting facilitated corruption due to three factors: '(i) the rewriting of an unprecedented volume of laws, regulations and policies; (ii) the extraordinary redistribution of wealth from the state to the private sector; and (iii) the virtual absence of institutions either within or external to the public sector that could effectively check the abuse of public office during the transition in many countries' (Anderson et al. 2000:25). Corruption was a major issue which severely affected most Central and Eastern European countries during this timeframe as identified in a number of studies (Lízal and Kocenda 2001; Wallace & Latcheva 2006). In the Czech Republic, for example, in 1994 the head of the Czech privatisation agency was caught taking a bribe equivalent to around US$300,000 in connection to the sale of a dairy (Holmes 1999). Corruption actually showed little improvement during the transition period, in fact it has even been suggested that a

decline took place (Jordan 2002). The Social Democrat-led government elected in 1998 was done so on the basis of an anticorruption platform centring on a 'Clean Hands' campaign. The credibility of this programme, however, has been questioned as both the Social Democrat Party and its main opposition, the Civic Democrat Party, came under investigation for use of illegal funds, misuse of economic information and tax evasion (Lízal & Kocenda 2001).

Ongoing issues of corruption at this time did little to improve trust which, as already discussed, was an inimical legacy of the communist period. The lack of trust observed during the transition period affected both (a) businesses and the public sector and (b) universities and businesses. Deterioration in the relationship between the former developed as a result of the weak law enforcement which was characteristic of the 1990s. 'During this period, large quantities of privatized property were defrauded, often with the tacit consent of the privatizing authorities, to the extent that entrepreneurs began to mistrust the motivation for any public intervention' (Blažek & Uhlíř 2007:879). Similar damage was done to the relationship between academics and businesses with many academics feeling mistrust towards entrepreneurs and a negative attitude toward collaboration with the business sector (Kadlec & Blažek 2015). (The issue of trust in the Czech NSI is discussed in more detail below.)

With regard to the development of any systematic science and technology or innovation policies, during this time period the Czech Republic did not produce any overarching innovation strategy or policy. Whilst there are difficulties in ascertaining exactly who or what the obstruction may have been, there are some general points which would undoubtedly have had an impact. Firstly, the Czech Republic witnessed a severe recession and a considerable lack of funds during the transition period. As a result, sufficient funding was simply not available for long term policies, such as innovation policy, which require either substantial investment projects, generous subsidies or both. Much of the attention of the Czech government initially had to be on short term policies including managing the growing rate of unemployment. Secondly, in some cases 'a lack of knowledge about up-to-date policy principles and methods also poses a significant problem, and hence prevents the introduction of them' (Havas 1999:8). The transition was accompanied by huge systemic upheaval and there is inevitably a time lag between the introduction of a new system, the actors learning the new 'ways of doing things' and their understanding of how to adapt these new tools to

their specific situation. Thirdly, innovative activity was seen as the responsibility of the enterprise sector and the government actively refrained from extensive involvement (Rammer et al. 2007:5). Finally, ideological differences did not simply disappear and, in some situations, continued to hinder agreement and progress on a new way forward.

By the end of the transition period, the Czech research system had evidently witnessed a huge transformation. The Academy research institutes were stripped of their previously privileged position and university research began to see a revival. A new funding system was introduced which rewarded scientific achievements and promoted public competition. After privatisation, the industrial research sector was substantially reduced and the role of FDI both in terms of economic development and technology catch-up became increasingly important. Legacies from the communist period, nonetheless, continued to affect the development of the Czech research system during this timeframe. Notably, lack of trust continued to play a significant role, the negative view of central planning resulted in a reluctance on the part of government to play any significant role in the restructuring of the Czech research system and the division between the research and industry persisted due to the lack of cooperation between the public and private sectors.

Post-accession to the EU

During the transition period, the Czech Government had focused its attention on the tasks of ensuring economic stability and transitioning to a liberal market economy and, as such, innovation had received very little political attention. In fact, innovation had primarily been seen as a responsibility of the business sector and, as discussed, the government had been cautious about the extent of its involvement. Consequently, it was not until 2004, and largely driven by the preparations for EU membership, that the Czech Republic produced its first document specifically dedicated to the task of promoting the Czech NSI, the 'National Innovation Strategy of the Czech Republic' (Government of the Czech Republic 2004). This marked a significant development as it was a clear attempt to recognise the importance of innovation for long-term economic development and to classify innovation as a top government priority. Moreover, the Strategy distinctly linked the role of innovation to achieving the ultimate goal of 'the sustainable development of our society' (Government

of the Czech Republic 2004:21). In order to improve the Czech NSI, the Strategy identified the need for conceptual and system changes relating to legislature, organisation, finance and politics which were seen as necessary to create an environment which would be more conducive to innovation.

In addition to drawing attention to the importance of innovation, the Strategy aimed to 'create conditions and lay the foundations for the formulation of the Czech Republic's innovation policy' (Government of the Czech Republic 2004:2). Indeed, the following year, 2005, the country introduced its first national innovation policy, the 'National Innovation Policy of the Czech Republic 2005-2010' (Government of the Czech Republic 2005), which had been coordinated by the then Deputy Prime Minister for Research, Development and Human Resources together with the Ministry for Education, Youth and Sport (MEYS) and the Ministry for Industry and Trade (MIT). The Policy is clearly linked to the EU's vision of innovation and it cites the use of a number of EU documents (Government of the Czech Republic 2005:11-12) in the preparation of the Policy. Furthermore, it uses the European Innovation Scoreboard, in which the performance of the Czech Republic is directly compared with other EU Member States, as a key source for identifying the weaknesses within the Czech NSI.

Due to ongoing problems within the Czech NSI, in 2008 the Czech Government approved the 'Reform of the Research, Development and Innovation System in the Czech Republic' (Government of the Czech Republic 2008). The vision of this Reform was to 'create an innovative environment through reforming the system of research, development and innovation in the Czech Republic in order to be held true that 'science makes knowledge from money, innovation makes money from knowledge" (Government of the Czech Republic 2008:1). There were several factors which had contributed to the decision to undertake this Reform, including (a) the low contribution of research, development and innovation to both economy and society, (b) the failing of the system to support research and innovation (including its inability to make use of the opportunities offered by EU funding in this area) and (c) the continued atomisation and fragmentation of the Czech research system. The Reform focused on reforming the governance of research and innovation and the responsibilities of the main players. This resulted in a much more centralised system both in terms of governance and funding. (These new responsibilities are detailed in Table 7).

Table 7: Division of responsibilities within the Czech NSI

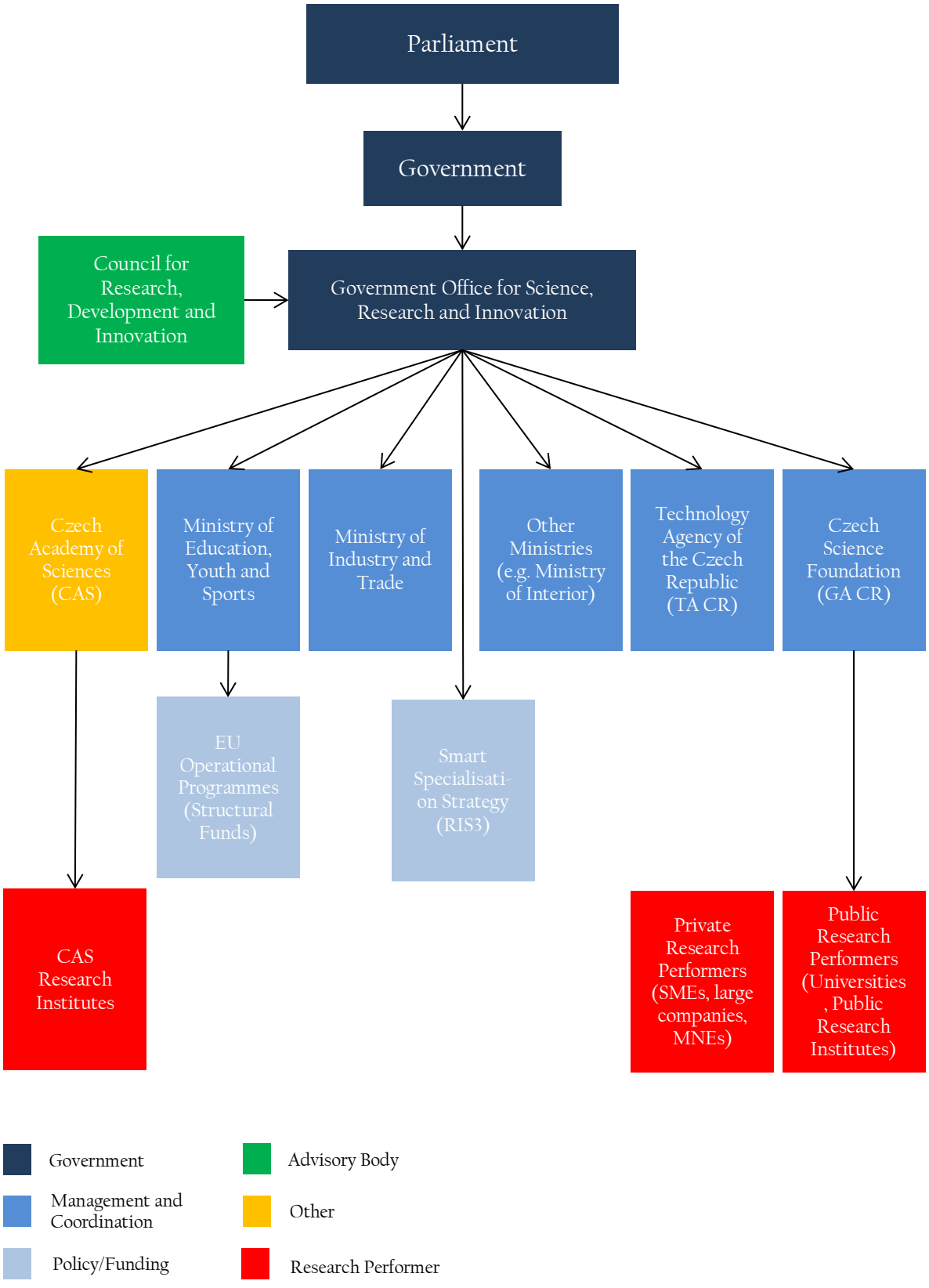
Council for Research, Development and Innovation (CRDI) – An expert and advisory government body for research and innovation policy.
Ministry of Education, Youth and Sports (MEYS) – The central administrative authority for R&D programmes in the public sector, particularly institutional funding for public universities. MEYS coordinates the EU Structural Funds through the Operational Programme Research and Development for Innovation and the Operational Programme Education for Competitiveness.
Ministry of Industry and Trade (MIT) – Responsible for policies in the domain of business R&D and innovation. MIT coordinates the EU Structural Funds through Operational Programme Enterprise and Innovation.
Technology Agency of the Czech Republic (TA CR) – Founded in 2009, TA CR provides competitive funding for applied research and experimental development.
Czech Science Foundation (GA CR) – Provides funding for competitive grants in basic research.
Czech Academy of Sciences (CAS) – Consists of 54 formally independent public research institutes. CAS is a major funding provider and performer within the public research sector.

(Source: Srholec 2013 6:7)

A particularly significant outcome of the Reform was that, since 2010, the Council for Research, Development and Innovation (CRDI) has become the sole coordinating body within the field and the main government advisory body for innovation policy in the Czech Republic. The CRDI is composed of leading experts within the field and is headed by a member of government which, at the time of conducting the fieldwork for this research, was the Deputy Prime Minister for Science, Research and Innovation, Pavel Bělobrádek, who was supported by the Section for Science, Research and Innovation at the Office of the Government. In interviews (Academic 2, 2016; Government Official 1, 2016; Government Official 5, 2016) it became

evident that there is considerable tension between industrialists, businessmen and academics within the CRDI as to how the funds should be allocated. In fact, an international audit of research, development and innovation in the Czech Republic in 2011 (Arnold 2011) found the newly expanded role of the CRDI and its extensive responsibilities – which include strategy development, monitoring, evaluation and decision-making on budget allocations – to have had negative ramifications. The CRDI has, in effect, been made into a quasi-Science Ministry but it is neither properly linked to the government nor the democratic process and, furthermore, lacks the human resources to be able to carry out all of these tasks. In addition, the increased role of the CRDI has led to a weakening in the capacities and authority of the Ministries, namely MEYS and MIT. The international audit concludes that rather than improve coordination within the system, the new role of the CRDI is in fact weakening the overall functioning of the governance structure for innovation in the Czech Republic. (The current structure of the Czech NSI is shown in Figure 3 below.)

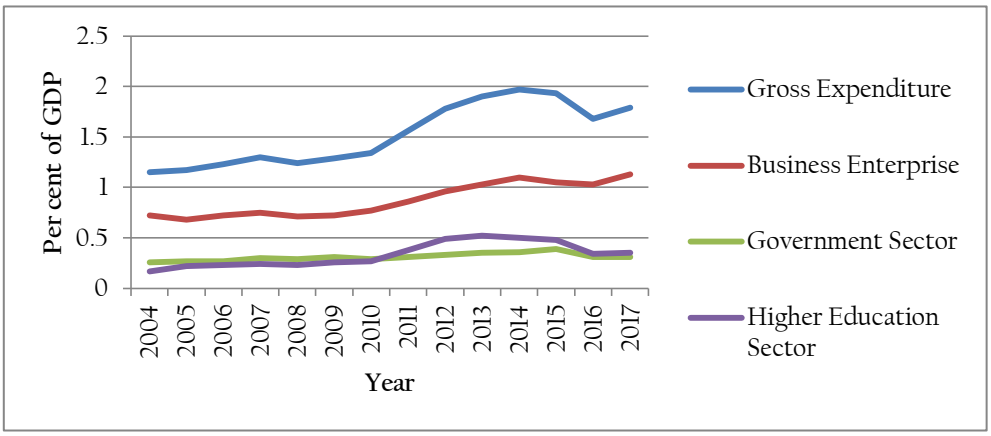
Figure 3: Governance structure of innovation in the Czech Republic



(Author's own diagram.)

In terms of the funding for research and innovation, the Czech Republic has witnessed a steady increased in the funding of R&D (see Figure 4). This increase in R&D expenditure has largely been driven by the availability of EU Structural Funds as well as an increase in business expenditure on R&D (both are discussed below). R&D expenditure in the higher education sector has increased notably and has even overtaken R&D in the government sector. In fact, whilst Academy research has remained fairly constant, the research being carried out in higher education has increased to such an extent that the universities have now overtaken the Academy in terms of the volume of research and publications (Arnold 2011). Notwithstanding the improvements in university research, the historically weak links between public research and industry remain a considerable problem within the Czech NSI (Shrolec & Sanchez-Martinez 2017). The reform carried out in 2008 sought to simplify the funding system and provide more results-based support in accordance with a 'Performance Based Research Funding' system. This so-called 'Evaluation Method' means that institutional funding is reallocated on an annual basis depending on the outputs from the previous five years. The Evaluation Method used by the Czech Republic has been strongly criticised for being too simplistic, stimulating opportunist behaviour and creating unstable funding conditions (Arnold 2011). Attempts have since been made to improve the evaluation system by including peer reviews as well as quantitative data. The success of this new method, however, is much debated (Shrolec & Sanchez-Martinez 2017).

Figure 4: Funding of R&D in the Czech Republic by sector of performance 2004-2017 (%GDP)



(Source: Eurostat 2018c)

With regard to more recent developments in the Czech Republic, the most notable is the introduction of the 'National Smart Specialisation Strategy of the Czech Republic (National RIS3 Strategy)' in 2016 (Government of the Czech Republic 2016). Smart Specialisation, it is claimed, 'is currently probably the largest innovation experiment in the world' (Radosevic & Stancova 2018:263) and has become a focus of the EU in recent years. The development of a 'Research and Innovation Strategy for Smart Specialisation (RIS3)' is presently a prerequisite to receive funding from the European Regional Development Fund (ERDF). The EU argues that linking the Smart Specialisation Strategy to the provision of funding will help to ensure a more efficient use of Structural Funds (European Commission 2014c). For the 2014-2020 period, the Czech Republic has been granted a total of €24.2 billion in European Structural and Investment Funds (ESI) with the largest portion of the funding, €12.16 billion coming from the ERDF. It is expected that these funds will assist in boosting research and innovation in the Czech Republic and included in its targets are the provision of 3,510 new full-time research employees and support for 260 enterprises to introduce new products to the market (European Commission 2016b). Given that the ERDF contributes over half of the total receipts of Structural Funds in the Czech Republic, this has presented a considerable incentive for the Czech Republic to produce an RIS3 Strategy.

Initiated in 2013 and coordinated by MEYS, the Czech Republic's initial RIS3 Strategy was approved by Government in December 2014. According to an academic (Academic 2, 2016) with in-depth knowledge of the situation, MEYS had been keen to take a lead in the development of the RIS3 Strategy in an attempt to assert its position due to ongoing competition between itself and MIT. Whilst MEYS played a key role in the development of the RIS3, the management of this Strategy was then transferred to the Section for Science, Research and Innovation at the Office of the Government from the beginning of January 2015. The initial RIS3 Strategy was assessed as not eligible by the European Commission which 'applied complaints to the National RIS3 Strategy mostly in relation to the monitoring of objectives, interconnection of public budgets and the institutional arrangements' (Government of the Czech Republic 2015:35). An updated National RIS3 Strategy was submitted to and accepted by the EU in 2016.

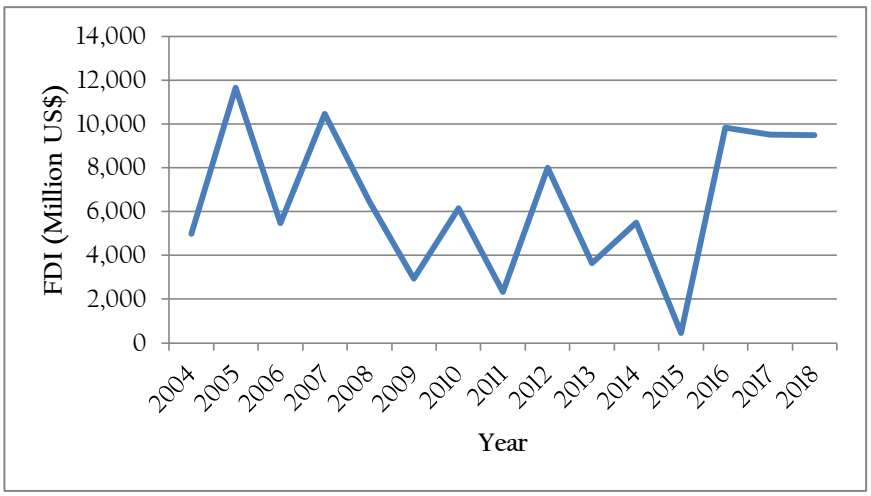
In short, the period since EU accession has been one of significant change in terms of innovation policy and governance structure in the Czech Republic. With

regard to the former, preparing for EU membership prompted the Czech Republic to produce, firstly, a national innovation strategy and, subsequently, a national innovation policy. The Reform in 2008 replaced the previously highly decentralised governance system with one which was much more centralised and with a significant amount of power in the hands of the CRDI. The channels of research funding, which had previously been delivered through numerous funding bodies, were also simplified with MEYS, MIT, CAS, GA CR and the newly established TA CR assuming responsibility for the distribution of funding. University research has continued to increase as has business R&D, thanks in a large part to the increase in R&D funding from foreign companies. In fact, as will be highlighted in the following section, it is the influx of FDI that has had one of the most significant recent effects on the development on the Czech NSI.

The role of FDI

The previous section highlighted the important role played by FDI in the development of the Czech economy since the transition period. According to the United Nations Conference on Trade and Development (United Nations Conference on Trade and Development 2018), inward FDI stock as a percentage of GDP in the Czech Republic increased from just 12.3% of GDP in 1995 to 78.3% in 2017. As can be seen in Figure 5, FDI has fluctuated slightly during the timeframe since EU accession and a decrease in FDI after the financial and economic crises of 2007-2008 can be observed. It is, however, not possible to ascertain from these data whether the crises were the direct cause of the decrease in investment from foreign companies. Interview participants (Government Official 4, 2016; Government Official 5, 2016; Investment Specialist 2016; Research Institute Specialist 3b, 2016) repeatedly claimed that the crises hit the Czech Republic later than in Western European countries and had a much less substantial impact. Nonetheless, a thorough investigation would be required to examine this matter further.

Figure 5: Inward Foreign Direct Investment (FDI) to the Czech Republic 2004-2018 (Million US$)



(Source: OECD 2019)

Drawn by the presence of skilled labour, inexpensive labour costs and its geographical advantage of being located at the heart of Central Europe, the Czech Republic has become an attractive choice for foreign investors. In fact, it has even been claimed (KPMG 2017) that the Czech Republic clearly stands out as the regional champion in terms of inflow of FDI. Although FDI initially comprised of mainly assembly-based work, especially in the automotive and electronics industry, the MNEs have over time diversified to include other sectors such as information technology, software development and shared-service centres (Guimon 2013:2). For example, a report by the Association of Business Services in the Czech Republic (ABSL) claims that the shared-services sector witnessed an impressive 16% increase in employment growth in 2016 and that the Czech Republic now 'has one of the highest density of business service centres in the world' (ABSL 2017:9). According to the study conducted by ABSL (ABSL 2017:9), although the prevalence of home-grown service centres is rapidly increasing, 79% of the shared service centres are currently still foreign owned.

In interviews (Government Official 1 2016; Investment Specialist 2016), a key factor identified as enabling the Czech Republic to attract some of these more sophisticated investors was its accession to the EU, as complying with EU laws and regulations provided investors with more confidence about the security of their investment. This was described as a 'breakthrough point' as it was at this time that

innovation policy became more visible which, coupled with a greater focus on intensifying the investments in more knowledge intensive activities, presented the Czech Republic as an attractive location for conducting more complex activities, including those relating to R&D. Although interview participants (Government Official 4 2016; Government Official 5 2016; Investment Specialist 2016; Research Institute Specialist 3b 2016) claimed that the financial and economic crises had a slightly later and much lesser impact in the Czech Republic than in other Western European countries, it was noted that companies, both national and foreign-owned, do appear to be investing more in R&D since the crises. The data in Table 8 would appear to support this observation as by 2015 both private national enterprises and private foreign-controlled enterprises were investing sizeably more in R&D than they had prior to the crises.

There are two points which are especially striking about the data in Table 8. Firstly, the increase in Business Expenditure on R&D in the Czech Republic from private foreign-controlled enterprises has been particularly substantial. Although, in 2005, private national companies and private foreign-controlled companies were spending a similar amount on R&D, a sizeable gap has now developed with foreign-controlled companies in 2015 spending significantly more than their national counterparts. This would suggest that the role of MNEs, and the dependence of the Czech NSI on their contribution towards R&D expenditure, has become considerably greater. The gradual increase in R&D spending by foreign companies could be accounted for by the introduction of an R&D tax allowance in 2005. In fact, between 2005 and 2016 the share of tax incentives in total government support more than doubled, from 20% in 2005 to 44% in 2016 (OECD 2019b). The second noticeable observation is that Business Expenditure on R&D in public enterprises has actually significantly decreased with a fall from 12% in 2005 to just 4% in 2015. What this could suggest is that rather than witnessing an improvement in public and private collaboration, the Czech Republic has actually witnessed a decline in this area. In fact, these data indicate that fragmentation within the Czech NSI, a legacy of the communist period in which the public and private sectors were strongly separated, is potentially becoming more exacerbated. Further analysis (below) provides some possible explanations for this observation.

Table 8: Business Expenditure on R&D in the Czech Republic 2005-2015 (CZK Million)

Year	2005	2006	2007	2008	2009	2010
Business Enterprise (Total)	**22,186**	**25,375**	**28,831**	**28,728**	**28,126**	**30,013**
Public Enterprises (% of total)	2,673 (12%)	2,305 (9%)	2,975 (10%)	2,267 (8%)	2,121 (8%)	2,092 (7%)
Private National Enterprises (% of total)	9,559 (43%)	10,352 (41%)	11,170 (39%)	9,789 (34%)	10,139 (36%)	12,931 (43%)
Private Foreign-Controlled Enterprises (% of total)	9,954 (45%)	12,719 (50%)	14,686 (51%)	16,673 (58%)	15,865 (56%)	14,989 (50%)

2011	2012	2013	2014	2015	2016	2017
34,148	**38,228**	**41,513**	**46,981**	**48,148**	**48,980**	**56,810**
1,969 (6%)	1,767 (5%)	1,927 (5%)	2,095 (5%)	2,114 (4%)	1,900 (4%)	2,448 (4%)
14,389 (42%)	16,129 (42%)	16,519 (40%)	18,055 (38%)	17,326 (36%)	15,674 (32%)	17,495 (31%)
17,790 (52%)	20,331 (53%)	23,067 (55%)	26,831 (57%)	28,707 (60%)	31,406 (64%)	36,867 (65%)

(Source: Czech Statistical Office 2018)

It has been argued (Blažek & Uhlíř 2007) that the gradual change in the nature of investors in the Czech Republic had a significant impact on the overall design of Czech development policy. In order to attract, and then retain, FDI in more advanced technological fields, it was necessary for the Czech Republic to take measures to ensure that local companies could meet the supply needs of these MNEs. In other words, 'the arrival of more sophisticated investors shifted the support requirements away from 'the

traditional "hard" instruments such as provision of infrastructure in industrial zones to "soft" measures such as development of local subcontracting networks, development of clusters and thematic networks, support for collaborative links with universities and research centres, as well as support for local start-ups and innovative companies through business incubators' (Blažek & Uhlíř 2007:877). These, so-called, 'soft measures' are consistent with some of the elements required for a successful NSI (discussed in Chapter 2) and represent a more innovation-driven approach towards policy-making.

The investment and business development agency, CzechInvest, has played a key role in not only attracting FDI but also subsequently supporting the needs of the investors. For example, using funding from the EU, CzechInvest has since 2000 been running a 'Supplier Development Programme' which aims 'to improve the ability of Czech suppliers to compete, to secure good local sources for current investors operating on the domestic market and to increase the attractiveness of the Czech Republic for new investors' (CzechInvest 2009:4). In order to achieve this, the Programme undertook several steps including, firstly, compiling a database of Czech manufacturers which was made available to foreign investors. Starting initially with the electronics industry, it has since been expanded and now includes automotive, aerospace, electronics and electrical engineering, information and communication technology (ICT), healthcare and pharmaceuticals. Secondly, after identifying key suppliers, the Programme sought to promote linkages between MNEs and local firms by providing Czech companies with technical assistance and training support. This allowed the Czech companies to gain the information and skills which are necessary in order for them to meet the needs of the MNEs. By improving the standard of domestic suppliers and encouraging collaborative relationships between the domestic companies and MNEs, this, in turn, allowed the Czech Republic to not only attract FDI but also to retain it in the country (Guimon 2013:3-4).

In terms of, for example, the ICT sector, many major IT companies have now set up offices in the Czech Republic including, Microsoft, Skype, NetSuite, SAP, Tieto, SolarWinds, Red Hat and IBM. These companies are not just manufacturing in the Czech Republic but are also carrying out some R&D. IBM, for example, was carrying out research on speech recognition technology from as early as the 1990s. Red Hat, a leading software company, set up an office in Brno, South Moravia in 2006 which has

gradually expanded and now represents one of the company's main development centres. With regard to other industries, in the aerospace industry, GE Aviation has expanded its domestic R&D activities and is expected to increase its Czech engineering team to over 500 employees. Its Czech activities now cover areas in material engineering, strength testing and reliability engineering and in 2017 it conducted tests on a new state-of-the art engine as part of the fulfilment of an investment contract the company had earlier concluded with the Czech government (CzechInvest 2018). Also in 2017, the technology and engineering company Siemens announced that that it planned to significantly expand its R&D activities in the Czech Republic with the creation of a new development centre for electric motors and generators in Ostrava, Moravia-Silesia.

Whilst these examples do show some positive developments with regard to foreign-controlled companies investing more in R&D in the Czech Republic, there are two important points related to FDI which require highlighting. Firstly, expert interviews (Government Official 5 2016; Investment Specialist 2016; Research Institute Specialist 3b 2016) and supplementary evidence (Arnold 2011; Shrolec & Sanchez-Martinez 2017) suggest that, despite the fact that the amount foreign-controlled companies are investing in R&D is gradually increasing, the Czech Republic currently still remains largely dependent on assembly-based FDI. Although the Czech Republic has a high-share of the workforce employed in medium and high-tech manufacturing industries, especially the automotive and chemical industries, government documents repeatedly note that the Czech Republic hosts the low-value end of these industries which carry out little R&D (Government of the Czech Republic 2016a; Government of the Czech Republic 2016b). In fact, in terms of Business Expenditure on R&D as a whole, at 1.05% of GDP in 2015 the Czech Republic is still considerably behind the EU average of 1.31% of GDP and much further behind some of the top innovation performers such as Sweden (2.28%) and Germany (2%) (Eurostat 2018a).

The second point relates to where this R&D expenditure is being spent both in terms of the type of company and the stage of the value chain. In terms of the former, a higher proportion of the R&D performed by businesses in the Czech Republic is being carried out in small and medium sized enterprises, rather than large enterprises, than is typically observed in countries with a strong innovation performance. In 2015, only 55.5% of Business Expenditure on R&D was accounted for by large companies with

more than 500 employees (Eurostat 2018b). It is suggested (Arnold 2011:10) that this figure for heavily industrialised, innovation-driven countries is between 70% and 84%. The percentage for the Czech Republic is clearly significantly lower than this, highlighting a stark contrast between itself and the more industrialised countries which are strongly driven by innovation. Concerning the stage of the value chain at which foreign-controlled companies are investing in R&D, it has been noted that although 'foreign multinationals do increasingly perform R&D in the Czech Republic, this tends to relate to the late stages of value chains, so the locally performed R&D tends more towards experimental development than research' (Arnold 2011:10). This finding is also supported in a recent Research and Innovation Observatory report (Shrolec & Sanchez-Martinez 2017). In other words, whilst, at first glance the increase in Business Expenditure on R&D from foreign-controlled companies seems a positive development, deeper analysis suggests that the situation in the Czech Republic is more complex and that some areas of concern remain.

With regard to the impact of FDI on the Czech NSI, therefore, a nuanced picture is beginning to emerge. The direct impact of the steady increase in R&D spending by foreign-controlled enterprises on the research capacity and innovation performance of Czech NSI remains uncertain. Neither has this trend yet reversed the dominance of lower value added assembly-based manufacturing. Although interview participants (Government Official 5 2016; Investment Specialist 2016; Research Institute Specialist 3b 2016) expressed confidence that the Czech Republic is beginning to establish itself as a good location for more complex forms of R&D, at present there are insufficient data to support this assertion. Perhaps the most significant influences of these MNEs on the Czech NSI have been (1) changing the forms of support away from hard measures towards soft measures (as discussed above), (2) facilitating the integration of the Czech Republic into international networks, (3) encouraging the development of local suppliers, especially through the schemes such as those provided by CzechInvest and (4) engaging in various forms of education and training. With regard to the latter, in 2000, for example, Škoda founded the first company university in the Czech Republic, The Škoda Auto University. In addition to a variety of Bachelor and Masters Degrees as well as an MBA qualification (with plans to attain accreditation for Doctoral Degrees in the future), the University also has also

demonstrated a strong research capacity. For example, according to its database, the University produced 445 publications in 2017 (Škoda Auto University 2018).

Whilst these observations would suggest that, overall, the presence of MNEs has had a positive effect on the Czech NSI, there have also been some negative consequences, particularly for local firms. According to a World Bank Survey, 29% of local firms reported losing market share as a result of FDI inflow and around 6-10% claimed to have lost employees to multinationals (Javorcik & Kaminski 2008). (Competition for labour was a concern frequently highlighted during interviews for this research and is discussed in more detail below). Nonetheless, it is argued that these problems have been 'less acute than the direct and indirect positive effects of inward FDI, as evidenced by the country's fast pace of industrial upgrading and economic growth' (Guimon 2013:6). It is clear from the discussion in this chapter so far that since EU accession, FDI has continued to play an ever greater role in the Czech NSI and that MNEs have now become dominant actors within the Czech system. Together with the increase in government attention being afforded to innovation (as discussed previously), this has been a period of considerable change for the Czech NSI. Whether this development has led to any significant improvement in the Czech Republic's overall innovation performance will be considered in the following section.

Innovation performance of the Czech Republic

In spite of the ongoing problems within the Czech NSI, the Czech Government has continued to produce a number of ambitious innovation-related targets. For example, the 'Back to the Top: Strategy for International Competitiveness (2012-2020)' (Government of the Czech Republic 2012a), aims to place the Czech Republic among the world's elite top 20 most competitive nations by 2020. It includes 'more than forty key measures and several hundred sub-measures that should create friendly conditions for creative business, innovation, and growth' (Government of the Czech Republic 2012:4). The Minister of Industry and Trade at the time, Martin Koucerek, claimed that the Strategy marked a turning point for the Czech Republic as it offered concrete objectives and an implementation plan as opposed to simply identifying weaknesses and problems which, he argues, has been the tendency in previous strategies (Vlček 2011). Whilst, on the one hand, according to the Global Competitiveness Report

(World Economic Forum 2012; World Economic Forum 2017) the Czech Republic has shown signs of improvement and has increased its overall ranking from 39th in 2012 to 31st in 2017, this, on the other hand, is still lower than its ranking in 2006 in which it was placed 29th (World Economic Forum 2006).

Nonetheless, whilst the recent improvement in the Czech Republic's ranking may suggest that some progress has taken place, improving the innovation environment in the Czech Republic is facing various challenges and frustration with the slow speed of progress was repeatedly expressed in expert interviews conducted during the course this research (Academic 2 2016; Business Leader 2 2016; Government Official 1 2016; Government Official 2 2016). According to the European Innovation Scoreboard (EIS), the Czech Republic has for some time been classified as a Moderate Innovator, a term which is used to define countries whose performance is between 50% and 90% of the EU average. However, although the Czech Republic's ranking has improved (see Table 9), its summary index score has actually steadily decreased which contrasts with an overall increase for the EU 28. In fact, according to the 2017 Scoreboard (European Commission 2017a), the Czech Republic's performance has declined by 3.5% relative to that of the EU average in 2010.

Table 9: The Czech Republic's overall innovation ranking in the European Innovation Scoreboard (EIS) 2007-2017

Year	Ranking
2017	13th (Moderate Innovator)
2016	16th (Moderate Innovator)
2015	14th (Moderate Innovator)
2014	16th (Moderate Innovator)
2013	18th (Moderate Innovator)
2011	17th (Moderate Innovator)
2010	17th (Moderate Innovator)
2009	15th (Moderate Innovator)
2008	15th (Moderate Innovator)
2007	Moderate Innovator

(Source: European Commission 2007-European Commission 2017a)

Based on the dimensions of the Scoreboard (European Commission 2017a:44), areas in which the Czech Republic shows relative strengths are in 'Firm investments', 'Employment impacts' and 'Sales impacts'. The dimensions in which the Czech Republic is notably weak are 'Intellectual assets', 'Linkages' and 'Innovators'. Areas in which the Czech Republic has shown significant improvement, and has either reached the EU average or is moving closer, are 'Human resources' (especially the number of people with a tertiary degree), 'Attractive research systems' (owing to a significant increase in international co-publications) and an 'Innovation-friendly environment'. On the other hand, the Czech Republic has witnessed a very significant decrease in its score for 'Finance and support' (due to a sizeable decrease in venture capital expenditures) and also in the 'Innovators' dimension (owing to a decrease in the number of SMEs producing innovations). In other words, although some areas of improvement can be observed, there are still many areas in which the Czech Republic continues to lag significantly behind the EU and even some in which the Czech Republic has witnessed a clear decrease in its performance.

The data from the Scoreboards suggest that in spite of the presence of MNEs, greater investment in R&D from foreign-controlled companies and national companies, as well as government attempts to support and develop the Czech NSI through ongoing policy measures, this has not yet resulted in a significant improvement in the Czech Republic's innovation performance. In fact, in comparison with other EU countries, the Czech Republic's performance has actually declined in recent years. Not only is the current trajectory concerning for the Czech Republic but it also weakens the ability of the EU to reach its goal of becoming the most competitive knowledge-based economy in the world. The following section looks at the steps the EU has taken to try and influence the development of the Czech NSI and identifies a number of mediating factors which are preventing the process of Europeanisation.

5.2) The Europeanisation of the Czech NSI

With regard to the EU, exactly how significant the EU's influence has been in terms of its longevity, depth and how positive it has been is highly debated (Suurna & Kattel 2010). Interviews with various actors within the Czech NSI and additional data gathered for this study suggest that there are a number of embedded national

characteristics for which the EU's innovation policy and directives are a poor fit and which are preventing the EU from being able to influence the Czech NSI more significantly. As a result, this is limiting the EU's ability to assist the Czech Republic in producing a greater improvement in its innovation performance. The following sections look firstly at how the EU has tried to influence the Czech NSI and the outcomes that can be observed. The final section identifies a number of national specificities which have resulted from the Czech Republic's historical legacies and its development strategy. This section looks at how these national specificities are mediating the process of Europeanisation and impeding the Czech Republic from achieving the EU's ambitious innovation-related goals. The results indicate that in order for the EU to increase its impact, greater attention needs to be paid towards the role of historical and developmental legacies.

The EU's Innovation Policy and the Czech NSI

Chapter 4 traced the development of the EU's involvement in the Czech Republic from the beginning of its transition period and drew particular attention to the use of conditionality in order to encourage Europeanisation. After the Czech Republic officially became an EU Member State, the introduction of the Structural Funds represented an important tool with which the EU could assert its influence. With regard to innovation, Suurna and Kattel (2010) claim that the Structural Funds had a considerable impact on innovation policy in many Central and Eastern European countries in terms of both content and implementation. They suggest that three similarities in the innovation policies of all Central and Eastern European countries can be identified. Firstly, these policies were formulated to a great extent as a result of EU pressure, secondly, innovation policy plans were often short term and, thirdly, the policy mix strongly reflected the priorities and objectives as defined in the EU programmes for R&D and innovation. This latter point is particularly significant as it resulted in a tendency in many of the emerging innovation policies to focus on high-technology sectors, the commercialisation of university research and the introduction of technology parks to promote start-ups. These, and other similar initiatives encouraged by the EU, had the effect of promoting a 'linear model' of innovation by emphasising the science and technology component of the innovation environment.

Preparing for EU membership, and the need to comply with the EU's heavily innovation-driven Lisbon agenda, was fundamental in raising political awareness about the importance of innovation for economic growth. As noted in the National Innovation Strategy of the Czech Republic in 2004, at this point it became clear that '[t]he Czech Republic will not be able to avoid handling issues of innovation, especially in connection with its accession to the EU' (Government of the Czech Republic 2004:2). The EU's vision for innovation features in every innovation policy document drafted since EU accession. For example, the 'National Research, Development and Innovation Policy of the Czech Republic 2009-2015' attempted to reflect 'European documents setting out the EU's current orientation and strategy for RDI [Research, Development and Innovation] and the building of a knowledge society' (Government of the Czech Republic 2009:7). Included in the EU documents guiding this Policy is the revised Lisbon Strategy entitled 'Working together for growth and jobs: A new start for the Lisbon Strategy' (European Commission 2005). This EU communication, however, is a very vague document in which grand ideas and ambitious targets are stated without any clear advice as to how they can be achieved. Indeed, the extent to which it offers the Czech Republic, a country which at this point had minimal experience with devising innovation policies, any practical and implementable guidance is highly questionable.

Regarding the influence of the EU, therefore, a mixed picture is beginning to emerge. Accession to the EU can clearly be seen to have an impact in three respects. Firstly, as noted by Blažek & Uhlíř (2000), pressure to comply with the aims of the EU's innovation agenda drew attention to the importance of innovation, and an accompanying long-term strategy, and returned the topic of innovation to the forefront of political discussion, where it had for some time been absent. Indeed, it was only on acceding to the EU that the Czech Republic began to concentrate more governmental effort towards the task of promoting innovation as a source of economic growth. This can be seen by the introduction of the Czech Republic's first national innovation strategy in 2004 (Government of the Czech Republic 2004) and subsequent policy in 2005 (Government of the Czech Republic 2005), as well as the ongoing commitment to innovation policy since then (Government of the Czech Republic 2009a; Government of the Czech Republic 2016b; Government of the Czech Republic 2016a).

Secondly, in terms of the organisation of the Czech NSI, Radosevic & Lepori (2009) claim that Europeanisation had an impact on R&D systems of Central and Eastern European countries in a number of ways. With regard to the decision-making system, for example, Radosevic and Lepori suggest that Europeanisation in Central and Eastern Europe has been characterised by a decentralisation of the decision-making system. Whilst this was initially accurate for the Czech Republic, the reform in 2008 did represent an attempt to reverse this trend and to recentralise the decision-making process albeit, as discussed below, with questionable results. Another characteristic of the Europeanisation of R&D systems, as claimed by Radosevic and Lepori, was that the management of R&D was externalised into agencies. This process had already begun to take place in the Czech Republic at the beginning of the transition period with the establishment of GA CR in 1992 and continued post-EU accession with the establishment of TA CR in 2009. Additionally, this was accompanied by a move towards an increase in competition-based funding and a reduction in the previously dominant institutional funding. This has certainly been the case for the Czech Republic which, following the 2008 Reform saw an increase in the share of project funding from 44% in 2009 to 51% in 2014 (Shrolec & Sanchez-Martinez 2017:7). Following Radosevic and Lepori's argument, therefore, the Europeanisation has indeed played a role in influencing the reorganisation of management and funding within the Czech NSI.

The third influence of EU accession on the Czech NSI was in helping to increase the attractiveness of the Czech Republic as a location for foreign investors. In the 5 years after EU accession, the Czech Republic witnessed a 42% rise in FDI, from US$27,543 million in 1999-2003 to US$38,989 million in 2004-2008 (OECD 2013). Whilst the Czech Republic was already an attractive location for foreign investment due to its location, quality labour force and labour costs, EU Membership, as noted by an investment specialist with expert knowledge of FDI (Investment Specialist 2016), helped to market the Czech Republic as a more secure location for investment. In instances where investors have been satisfied with the output of their investment, this has, to a certain extent, aided the Czech Republic in attracting more sophisticated forms of FDI, and not just the assembly-based FDI which was initially heavily dominant (Kadeřábková 2006). In turn, this led the Czech Republic to redirect its policy and support towards measures which would improve the local supply network,

such as the previously discussed efforts of CzechInvest, in order to accommodate the requirements of these new investors. In effect, therefore, it could be suggested that, in addition to the direct influence of EU accession on policy awareness and system reconfiguration, the EU also had an indirect influence (via the MNEs) on policy design in the Czech Republic.

However, in terms of the ongoing influence of the EU, this research suggests that this experience has been much less significant. Although the policy documents produced by the Czech Republic supposedly reflect the EU's priorities for innovation, the innovation performance data from Section 5.1 do not suggest that this had led to a measurable improvement in the Czech Republic's innovation capacity. This raises an interesting paradox in which, on the one hand, the Czech Republic appears to be following the EU's vision for a successful innovation performer yet, on the other hand, this is failing to produce the desired results. This research suggests that the EU's inability to exert more notable influence is principally due to a poor fit between the EU's innovation policy and goals and the Czech national institutions, both formal and informal. The historical overview of the Czech NSI has identified a number of specific features embedded in the Czech NSI, which have created path dependent responses. What this research indicates is that these legacies – which relate to the Czech Republic's history and economic development stage – are mediating the process of Europeanisation and preventing the Czech Republic from closer convergence with the EU's innovation goals. The principal legacies which have come to light during the course of the research relate to a reliance on FDI for economic development, lack of policy coordination, lack of trust, lack of entrepreneurialism and division between the university and private sector. This is not to suggest that this is an exhaustive list of the historical legacies affecting the Czech NSI, indeed future research may be able to elaborate further.

Area of misfit 1: Dependency on foreign companies

The Czech Republic, as discussed in Chapter 2, has been characterised as a Dependent Market Economy (DME) due to the high importance of foreign capital to the country's economic structure and development. In fact, according to an OECD report published in 2017 (OECD 2017a), inward investment in the Czech Republic

supported over one quarter of all private sector jobs and, moreover, it accounted for 42% of the private sector's value added. In terms of the Czech NSI, a similar picture of dependency is beginning to emerge. The expenditure of foreign-controlled companies on R&D has increased considerably and, in 2015, foreign companies contributed 60% of the total Business Expenditure on R&D (Czech Statistical Office 2018). In spite of the fact that, as previously discussed, there are signs this investment is being made at the later stages of the value chain and therefore its contribution is more experimental than research-based, MNEs have clearly become instrumental players in the Czech NSI. In other words, from a historical institutionalist viewpoint, it can be seen that a new path dependency, the dependence on foreign investors, has developed. In fact, the dependency on FDI can itself be traced back to communist legacies as economic weakness, particularly in the private sector, and inefficiencies were exposed during the transition period. The inherited weak private sector, together with the lack of public funds, necessitated the reliance on FDI for economic development and job creation.

From the perspective of the Czech Republic, there are several potential weaknesses associated with its dependency on foreign investors. Firstly, there is the possibility that the companies may, at some point, choose to move their operations elsewhere, especially to a location with lower wage costs. Whilst the average cost of labour in the Czech Republic remains lower than in Western European countries, Czech labour cost has steadily been increasing. In fact, between 2005 and 2017, the average annual wage in the Czech Republic rose by 24% from €20,415 to €25,372 (OECD 2018a). Given that a considerable part of the Czech Republic's current competitive advantage is based on low labour costs, this could potentially come under threat from countries further eastward where the labour cost remains, by comparison, significantly lower. Indeed, whilst none of the companies interviewed for this research were planning to do this, the director of one company (Business Leader 1 2016) did discuss having been encouraged to outsource to countries such as Romania and Moldova where they would be able to benefit from lower labour costs. As the majority of Business Expenditure on R&D is invested by foreign-controlled enterprises, any such decision to relocate their activities and investment could have very negative consequences for the Czech NSI.

The second point relating to the Czech dependency on foreign companies concerns its impact on the development of the NSI. A government official (Government

Official 4 2016) with expertise in the field of innovation noted that MNEs have become so powerful that it is difficult for the government to influence their activities in order to better integrate them into the Czech NSI. It has been argued (Radosevic & Stankova 2018) that because FDI has often been directed to areas which are unrelated to domestic innovation capacities, this is resulting in a structurally weak innovation environment. In fact, what appears to have happened in the Czech Republic is that a dual innovation system has developed consisting of, on the one hand, FDI-centred innovation and, on the other, R&D-based innovation. What makes these systems distinct is that 'FDI-oriented innovation systems are largely downstream or production oriented, while R&D-based clusters of new technology-based firms are upstream-oriented providers of knowledge-intensive services for local firms' (Radosevic & Stankova 2018:266). As a result of the poor integration between the systems, this dualistic pattern is leading to a key structural weakness within the Czech NSI.

Finally, due to the fact that FDI has principally been in low positions of the value chain using less-skilled labour, in some cases there has, as a result, been a 'deskilling of the workforce due to the predominant use of less-skilled workers for routine tasks with minimal knowledge requirements' (Government of the Czech Republic 2016a:17). Indeed, according to an OECD survey (OECD 2018c), by far the majority of jobs in 2012 required only low or medium qualifications, 16.3% and 59.8% respectively, with just 21.5% of jobs requiring a high qualification. A highly-skilled workforce, however, is an essential component of a successful NSI so the Czech Republic's current trajectory, which has resulted from its dependency on FDI, is an area of notable concern. In summary, although the influx of FDI has played an important role in developing the Czech economy, it has also created a situation in which (a) the Czech Republic is vulnerable due to its dependency on FDI, (b) the existence of a dual innovation system is weakening the innovation environment and (c) the country lacks the high-skilled jobs which are necessary for developing the Czech NSI, improving its innovation performance and ensuring long-term economic growth.

This path dependency, the dependence of the Czech NSI on foreign firms, has created a very specific economic structure in the Czech Republic and one which, in terms of innovation policy, requires a policy approach that addresses the resulting challenges. This issue, however, is not emphasised in the EU's innovation policy which raises questions about its appropriateness of fit for a DME, such as the Czech Republic.

For example, a recent study of the EU's latest policy approach the Smart Specialisation Strategy, by Radosevic & Stankova (2018) identified a number of weaknesses specific to countries with a similar economic structure to the Czech Republic. Their study notes that Central and Eastern European Member States require endogenous knowledge and technology building to be coupled with international knowledge and production networks. 'Yet, internationalisation does not seem to be a crucial component in the design and development of Research and Innovation Strategies for Smart Specialisation (RIS3), which are at odds with the strong dependence of the EU New Member States (EU-13) on FDI and global value chains' (Radosevic & Stankova 2018:263). Even though the EU guidelines for Smart Specialisation Strategies (European Commission 2012) do include an internationalisation element, this focuses mainly around upstream activities, mainly R&D activities, rather than downstream activities related to global value chains. Nonetheless, the core part of the Czech Republic's technology upgrading is the transition from production to technology capability rather than innovation activities related to R&D (Radosevic & Stankova 2018).

Radosevic & Stankova (2018) argue that although the Smart Specialisation Strategy approach offers many opportunities, in order for it to produce the desired outcomes in countries with a high FDI dependency, there needs to be greater emphasis on internationalisation in terms of learning from MNEs and using this knowledge to leverage local capabilities. As a DME with a weak institutional set-up, integrating FDI to produce positive long-term outcomes is a considerable challenge for the Czech NSI at present and one which requires strong policy action. The EU's Smart Specialisation Strategy approach, in its current format, fails to sufficiently recognise or accommodate one of the main characteristics of the Czech political economic structure, namely its dependence on FDI. Whilst the EU's Smart Specialisation Strategy approach may be very effective in countries with more developed innovation systems and different politico-economic structures, such as the German-style Coordinated Market Economy (CME), experts interviewed throughout the course of this research (Academic 2 2016; Government Official 1 2016; Research Institute Specialist 1 2016; Research Institute Specialist 3a 2016) argued that it does not currently respond to the specific needs of a DME, such as the Czech Republic.

Area of misfit 2: Public management of NSI

Path dependent historical legacies have had a significant effect on the capacity of the state to manage and develop the Czech NSI, a problem which relates to (a) the management and funding of the Czech NSI and (b) policy-making expertise. With regard to the former, having inherited a highly centralised and compartmentalised governance system from the communist period, the Czech Government was reluctant to play a significant role during the post-Soviet transition period and instead the Czech research system underwent a strong decentralisation process. The absence of an overseeing body has, since then, led to issues of fragmentation in the state administration of research and innovation, as has been noted by external actors and foreign evaluators (Arnold 2011; OECD 2016c) and has even been recognised in recent Czech policy documents (Government of the Czech Republic 2016b). Despite attempts to recentralise, to a certain extent, the governance structure during the 2008 Reform, problems relating to innovation governance in the Czech Republic remain a major concern and one which was frequently highlighted during interviews (Government Official 1 2016; Government Official 2 2016; Policy Analyst 2016; Research Institute Specialist 3b 2016). In fact, the 2017 RIO Report (Shrolec & Sanchez-Martinez 2017) claimed that fragmentation and lack of coordination, was one of the main challenges for Czech innovation policy-making.

Although, due to the way in which innovation overlaps various policy areas, it is not unusual for several ministries to be involved in overseeing innovation-related policies, the issue of fragmentation does nonetheless seem to be particularly problematic in the Czech Republic. A concise explanation of the problem is that:

> '[t]he system of management and financing of research, development and innovation is fragmented, insufficiently strategy-driven and its coordination mechanisms are missing or function poorly, which hampers effective cooperation between individual members of the system' (Government of the Czech Republic 2016b:5).

This report links the issue of fragmentation to the unclear definition of the powers of individual administrative authorities and a tendency towards departmentalism. The situation is compounded by a lack of ministerial cooperation or collaboration due to considerable tension and competition between the ministries. In the words of an

interview participant with in-depth knowledge of the situation, 'the system is very fragmented in the sense that everyone is in competition with everybody else' (Academic 2 2016). The lack of inter-ministerial cooperation in the Czech Republic was even emphasised in a report on sustainable governance in 2017 (Guasti et al. 2017). Interviews (Government Official 1 2016; Academic 2 2016) suggest that there are several personality clashes and that a toxic environment is being created which is not conducive to enabling cooperation between actors within the Czech NSI.

At the time of conducting the field work for this research, the Section of the Deputy Prime Minister for Science, Research and Innovation was considered the main overseeing body for innovation policy in the Czech Republic but MEYS and MIT also were also playing key roles. However, interviews (Academic 1 2016; Government Official 1 2016; Research Institute Specialist 3a 2016) suggested that it was not entirely clear who, in practice, was responsible and for which tasks. Prior to the introduction of the Section of the Deputy Prime Minister for Science, Research and Innovation, the main actors were MEYS and MIT, and MIT, in fact, still manages the Operation Programmes of the EU Structural Funds. This has resulted in overlapping roles (with similar programmes being managed by more than one group), coordination problems and also fragmentation of funding. A report carried out by TA CR on the innovation capacity of the Czech Republic, entitled the INKA project, also noted that 'there are more and more voices asking for streamlining the system of management of the research and innovation policy, including a clear definition of specific research priorities' (Technology Agency of the Czech Republic 2016:23).

The Czech Government has itself noted that the 'shortcomings in the system of management of RDI are reflected, *inter alia*, in the increasing fragmentation and poor strategic orientation of the system of RDI funding' (Government of the Czech Republic 2016:23). A report by the OECD in 2016 drew particular attention to the issue of the fragmented governance of the Czech NSI. Firstly, with regard to management and funding, the report notes that, even after the 2008 Reform, there remain eleven ministries and bodies involved in funding research and innovation through seven types of financial support. The considerable number of bodies involved, in addition to there being initiatives at industry and regional levels, creates a fragmented system of support. In terms of public funding for R&D, there is considerable fragmentation in R&D between the universities and the Academy research institutes which is exacerbated by

the need to compete for research and institutional funding. In addition, whilst university funding is allocated though MEYS, the Academy has its own budget chapter. Secondly, regarding the innovation strategies themselves, there 'are also overlaps between the different strategies (Innovation, SMEs and Exports) and the programmes put in place for their implementation' (OECD 2016:36).This is, at least in part, driven by the fact that the public bodies involved each have their own specialisation along with a limited number of available financial instruments.

The initial origin of the fragmented governance system can be traced back to the transition period in which the government was initially reluctant to play a leading role in the development of the Czech NSI. This was due to the negative perception of centralisation, itself a communist legacy, and consequently the governance of research and innovation became highly decentralised and, as it lacked an overall coordinating body, also fragmented. It is unclear why, despite attempts in the 2008 Reform to recentralise the governance of innovation, the fragmentation has remained a problem. An explanation for this could be provided by the role of agency and the preference of actors to retain legacies which are perceived to be in their best interest. An example of this has been provided by Radosevic and Lepori (2009) who, in a discussion on the reforming of the Academy systems in Central and Eastern European countries, argue that the path dependency inherent in keeping or reforming the Academies together with real political power of incumbents has limited the rate at which new incentives can induce reform. The issue of rivalry between actors within the governance system was repeatedly identified in interviews and, based on this, it could be suggested that actors are disincentivised to break with the current 'ways of doing things'. This situation is conceivably exacerbated by issues related to lack of trust, discussed in the following section.

Problems with the fragmentation of the governance structure could offer some explanation for one of the repeated concerns in interviews, namely the lack of policy implementation and the existence of an implementation gap. An international report also found that, whilst many strategic documents have been produced in the Czech Republic, only a small proportion of these documents, such as tertiary education reform, have been successfully implemented in practice (Szpor et al. 2014:31). In particular, interviews with experts highlighted worries that the fragmentation of the governance structure is affecting the implementation of the Czech Smart Specialisation

Strategy which, was already being seen as 'dead and buried' (Academic 2 2016). In the case of the Smart Specialisation Strategy, the implementation gap may have been exacerbated by problems relating to ownership. Whilst MEYS produced the document, the Section for Science, Research and Innovation at the Office of the Government then became technically responsible for its management. However, the National Innovation Platforms, which bring together representatives of business and the public sector in order to facilitate debate, are managed by MIT. This clearly leads to problems of fragmentation and causes confusion and ambiguity about who is actually responsible for delivering the Smart Specialisation Strategy in the Czech Republic. An academic with comprehensive knowledge of the Smart Specialisation Strategy (Academic 2 2016) expressed doubts about whether, without a clear owner of the Strategy, the necessary commitment, in terms of time and resources, for fulfilling the strategy will actually be made.

In terms of policy-making expertise, the highly centralised nature of research and innovation policy-making decisions during the communist period meant that, on returning to a liberal market economy, the Czech Republic possessed very little policy-making capacity within this field. The challenge of developing this policy expertise was made even greater by the lack of attractiveness historically associated with public sector professions, which is again a legacy of the communist period. Due to the huge responsibility and political pressure but poor remuneration, public administration is not seen as a particularly attractive career option and a high turnover of staff in this sector has, in reality, been problematic in many post-Soviet states (Liebert et al. 2017). In the Czech Republic, this issue was even more acute due to a lack of legislation providing civil servants with decent provisions. In fact, the Czech Republic was actually the last EU Member State not to have specific regulation of the Civil Service. The new Civil Service Act, which replaced an Act that was passed in 2002 but failed to become legally effective, only came into force on 1st January 2015 after the EU threatened stop the payment of Structural Funds. In other words, while the unattractiveness of public administration may have been a communist legacy, it was subsequently exacerbated by the lack of action aimed at improving the situation. The high turnover of employees of public administration has led to a number of problems including those of building the capacity necessary for the implementation and evaluation of research and innovation strategies (Srholec & Szkuta 2016:9).

Not only has the high turnover rate has also had an impact on the ability of the Czech Republic to build its policy-making knowledge and expertise, but it has also affected its capacity to distribute EU Structural Funds in a way which would maximise the investment. An expert interview participant (Academic 2 2016) described how the fluctuation of staff dealing with Structural Funds has led to a situation in which relatively inexperienced recent graduates have been given the responsibly of designing the calls for proposals. The quality of the calls published is particularly important because they 'are the most important mechanism of implementation of the Structural Funds because there you decide what will be submitted and what will be supported' (Academic 2 2016). The issue with the situation which has developed in the Czech Republic is that the civil servants designing these calls lack the experience and contextual knowledge which are required in order to develop calls of real strategic benefit and long-term feasibility. If the calls for proposals are weak, the benefit of the investment, in terms of improving the Czech Republic's innovation performance and developing the Czech NSI, will be more limited.

Furthermore, due to the need to spend the money within three years from the commitment of the funding, the construction of buildings, such as technology centres or science parks, proved an effective way for the Czech Republic, a country inexperienced at dealing with Structural Funds, to spend sizeable sums of money in a relatively short period of time. However, many of these technology centres or science parks have since failed or have not been able to reach initial expectations. In fact, it was noted repeatedly in interviews (Academic 2 2016; Government Official 1 2016; Government Official 5 2016; Research Institute Specialist 3a 2016) that the EU had perhaps been too generous and that less spending would arguably have been more helpful. Whilst research on the effectiveness of Structural Funds is conflicting, it has been suggested that, firstly, regions with poor governance systems are unable to make effective use of Structural Funds and, secondly, that Structural Funds have a maximum point after which returns begin to decline and additional funds do not lead to higher growth (Becker 2012). These findings would suggest that in the case of the Czech Republic, therefore, the previously highlighted weaknesses with the governance structure for innovation in the Czech Republic could be an impediment to the effective use Structural Funds in this policy area. As the phasing out period of the Structural Funds approaches, there is recognition in the Czech Republic that, without these

subsidies, even more projects will not be able to survive on the competitive open market.

With regard to the EU's latest innovation policy approach, interviews (Government Official 1 2016; Government Official 2 2016; Academic 2 2016) conducted for this research highlighted a number of potential issues about how well it fits the Czech Republic given its current problems of fragmentation and limited policy-making experience. As discussed in Chapter 4, since the initial Lisbon strategy, the first significant attempt by the EU to promote and encourage innovation, the EU's approach towards innovation policy has changed considerably. Whilst the EU's earlier innovation policy attempts were criticised for being too linear and one-size fits all (Reid 2011), interview participants (Government Official 1 2016; Government Official 3 2016; Policy Analyst 2016) were also apprehensive about the more recent direction of the EU's innovation policy. Of particular concern was the perceived lack of clarity in the EU's current approach towards innovation policy with one participant, who had been heavily involved in regional policy-making decisions, noting that 'it seemed much clearer what the Commission wanted in the late 1990s than what it wants nowadays' (Government Official 1 2016).

The EU's most recent innovation policy approach, and especially the Smart Specialisation Strategy, allow for considerable room for the strategies to be tailored according to the national environment. However, given that innovation is still a relatively new policy area in the Czech Republic and that the country is in the process of gaining policy-making experience within this domain, it does raise questions about how well this type of policy approach currently fits the Czech needs and capacities. In other words, whilst the present direction of the EU's innovation policy allows for much more flexibility and, in doing so, may overcome some of the criticisms of earlier policies, the experience in the Czech Republic suggests that it is at risk of becoming too broad and unclear for policy-makers. Moreover, due to the fragmentation of the governance structure, the Czech Republic lacks the leadership which is necessary for successful policy implementation. In short, the attempts of the EU to influence innovation policy in the Czech Republic are being mediated by the weak public management of the NSI, which, in turn, is reducing the Czech Republic's ability to both formulate and implement an effective national innovation policy.

Area of misfit 3: Lack of trust and collaboration

It is, however, not just problems of fragmentation that are affecting the effectiveness of governance in the Czech Republic but also issues relating to a lack of trust. According to the World Economic Forum's Global Competitiveness Report (World Economic Forum 2017), although the level of 'trust in politicians' has improved slightly, at 89th (out of 137 countries) in 2017, the Czech Republic still ranks very low for this dimension. In fact, an international audit identifies the lack of trust in the Czech Republic as the most significant factor currently preventing progress within the Czech NSI. The main conclusion of the report is that 'the low overall levels of trust, and in particular distrust of government, is a major obstacle to the further development of an NRIS [National Research and Innovation System] that has many of the ingredients needed for success and that given its endowments and circumstances ought to be able to develop rapidly' (Arnold 2011:53). Interviews (Academic 1 2016; Business Leader 3 2016; Government Official 1 2016; Research Institute Specialist 3b 2016) suggested that, whilst distrust in government is particularly high, it is not confined to government and actually exists between the academic and business sectors as well. The prevalence of mistrust between business partners, for example, has been highlighted in a study by Blažek & Uhlíř (2007) as has the distrust between academia and business in a study by Kadlec and Blažek (2015). An OECD report (OECD 2017b) looking at a range of general well-being dimensions classifies the Czech Republic as being in the bottom-performing tier for the 'trust in others' dimension.

There are several causes of this lack of trust which can be identified. Firstly, and most significantly, the lack of trust has been demonstrated to be a direct path dependent legacy of the communist period (Bowser 2002). The pervasive nature of the Soviet dictatorship, its longevity and a generally negative attitude towards public organisation had a very damaging impact on the public trust towards politicians and one which still affects Czech society today. The initial post-communist years did little to improve this situation and trust from businesses towards the public sector (as discussed in Section 5.1) was considerably damaged by the lack of law enforcement during the transition period and the defrauding of privatised property. Indeed, a study of former communist countries has recognised that corruption 'significantly lowers the public trust in state institutions and erodes the foundations of civil society' (Bowser 2002:93). In 2017, the Czech Republic was ranked 42nd according to Transparency

International's Corruption Perception Index (Transparency International 2017). Although this does represent an improvement from previous years, in which it ranked 47th, the report notes that corruption is still considered to be widespread by a majority of the public in the Czech Republic. With regard more specifically to trust within the Czech NSI, the government has itself recognised that trust towards the public sector has in more recent years been weakened by 'the negative experience with the real-life implementation of existing strategies, which has been caused by the inadequate capacity and quality of the public administration office responsible for implementing R&D policy' (Government of the Czech Republic 2016a:66). Again this demonstrates a situation in which the problem of the lack of trust has historical origins but has since been reinforced by a number of factors which are hindering improvement.

In terms of the lack of trust between the academic and business sector, a study conducted by Kadlec and Blažek (2015:336) noted the existence of a 'strong and enduring distrust between academics and private firms that severely hinders cooperation'. Indeed, an interview with an academic (Academic 2 2016) drew attention to the fact that a negative stigma still remains attached to the idea of academics collaborating with the private sector as they are perceived to be neglecting their academic duty. Kadlec and Blažek (2015) argue that this attitude can be traced back to the transition period during which time a number of researchers left the public sector to find more lucrative work in the private sector. This has created a situation in which working for the private sector is seen to be driven by financial motivation and 'could even be construed as a betrayal of academic values and an outright abuse of public funds' (Kadlec & Blažek 2015:333). The negative perception of the business sector from academics could provide some explanation for the ongoing problem of limited linkages between the public and private sectors which has been a focus of Czech innovation policy for considerable time (Government of the Czech Republic 2005).

Regarding the EU, the lack of trust within the Czech NSI has two important ramifications. Firstly, the lack of trust prevents policy-making in the way promoted by the EU, and especially its Smart Specialisation Strategy approach. The EU claims that '[t]hrough its partnership and bottom-up approach, smart specialisation brings together local authorities, academia, business spheres and the civil society, working for the implementation of long-term growth strategies supported by EU funds' (European Commission 2017:1). The Entrepreneurial Discovery Process (EDP) which is seen as a

key feature of Smart Specialisation Strategies is supposed to encourage interaction between actors from different sectors in order to identify potential opportunities which then form the basis for policy-making decisions. However, in a country in which lack of trust is prevalent, it is very difficult to encourage collaboration and cooperation between the different sectors. As noted by an expert interview participant, 'how can you ensure an Entrepreneurial Discovery Process within such an atmosphere?' (Academic 2 2016). Again, this highlights the poor fit of the EU's Innovation Policy for the Czech Republic and raises serious questions about the ability of the EU to influence the Czech NSI using this strategic approach.

The second impact of the lack of trust relates to the EU's Structural Funds and how successful they have been as an EU policy tool with which to encourage Europeanisation. An interview with a regional policy-maker (Government Official 1 2016) suggested that the lack of a collaborative culture in the Czech Republic was negatively affecting the ability of the Czech Republic to realise the full investment potential of the Structural Funds. In order for the funding to be well utilised in the long-term, it requires the relevant local actors to 'buy into' and contribute collectively towards the particular project being undertaken. However, as the Czech Republic lacks a collaborative culture, interview participants (Government Official 1 2016; Government Official 6 2016) suggested that there has been insufficient commitment from the local actors and that this is restricting the success of projects. It was noted that collaboration between relevant actors does take place whilst funding is available, yet once the funding is exhausted, this collaboration is rarely ongoing. It was indicated that without greater collaboration and commitment from local actors, the long-term success of projects funded by Structural Funds will continue to be notably limited.

In short, the lack of trust is a major obstacle to the ability of the EU to influence the Czech NSI. The collaborative style policy-making approach promoted by the EU requires significant interaction and cooperation between actors within the Czech NSI, something which is currently limited in the Czech Republic due to a lack of trust between the various actors. Although the EU's Structural Funds appear to be able to supply an incentive for some collaboration, interview evidence from this research suggests this is only temporary in nature as it often does not continue after the funded period. In other words, the Structural Funds are unable to offer a long-term solution or overcome the Czech Republic's longstanding issues of fragmentation and lack of

cooperation. The effectiveness of the EU's innovation policy approach and the use of Structural Funds as a policy tool with which the EU can influence the Czech NSI, therefore, can be seen to be being impeded by the historical legacies still affecting the Czech Republic.

Area of misfit 4: Lack of innovative entrepreneurialism

A further impediment to implementing the EDP concept advocated by the EU in the Czech Republic relates to a lack of innovative entrepreneurialism. Similarly to the lack of trust, the roots of the lack of innovative entrepreneurialism in the Czech Republic can be traced back to its communist past during which time the Czech Republic, as previously discussed, had very limited private business activity. Concern about the lack of innovative SMEs in the Czech Republic has been recognised in a recent Research and Innovation Observatory report (Shrolec & Sanchez-Martinez 2017). This has often been attributed to a lack of finance available to start-ups which does, indeed, seem to have been problematic. When conducting interviews for this research, the CEO of a now very successful IT company explained that they had had to take out a personal loan with an extremely high interest rate as, at this time, there was no other funding available for what was classified as a high-risk enterprise. The funding situation is gradually improving and there are now several public and private funding options. For example, there are currently a considerable number of angel investors, affluent individuals who provide capital for small businesses with growth potential, operating in the Czech Republic.

However, insufficient start-up finance is perhaps not the only factor contributing to the lack of innovative Czech SMEs. In fact, the cultural perception of entrepreneurs is arguably a more concerning problem. It was noted in interviews (Government Official 5 2016; Research Institute Specialist 3a 2016) that, owing to the Czech Republic's Soviet history, businessmen are traditionally perceived as 'thieves' and receive a lower level of societal recognition. Further evidence for this is provided by 'The Global Entrepreneurship Monitor', a global study carried out by a consortium of universities which, using surveys and interviews, aims to analyse entrepreneurship in over 100 countries. The study provides data on various factors including the number of 18-64 year olds who believe successful entrepreneurs receive high status in their

country. According to the study, only 47.8% of the Czech population in 2013 agreed that a high status is attached to entrepreneurship. Not only is this a comparatively low percentage (for example, the global average is 72.92%) but it even represents a slight decrease from the previous study in 2011 in which the percentage agreeing with this statement was 48.7% (Global Entrepreneurship Monitor 2018).

One of the ongoing problems with a complete absence of private enterprise for over 40 years is that the Czech Republic still suffers from a shortage of entrepreneurial role models who can help inspire and offer advice to budding entrepreneurs. Combined with the cultural perception of entrepreneurs it is perhaps not surprising that local SMEs have been slow to develop in the Czech Republic. Interviews (Business Leader 2 2016; Research Institute Specialist 3b 2016) suggested that the situation is changing and there are now an increasing number of successful Czech entrepreneurs, however, a shift in attitudinal perception of course takes time. Without a change in the attitude towards entrepreneurship it could be argued that making more finance available will not, in itself, be sufficient to solve the problem of a lack of SMEs in the Czech Republic.

In terms of the impact of FDI on domestic entrepreneurialism, research has shown mixed results. On the one hand, foreign companies provide knowledge and superior technology that can spillover into the local economy and benefit domestic companies (Barrios et al. 2005; Javorcik 2004; Markusen & Venables 1999). On the other hand, FDI can lead to greater competition to the disadvantage of domestic companies and increase the barrier to entry which can potentially prohibit local companies from entering the market (Aitken at al. 1997; Kathuria 2000). A study in the Czech Republic in 2008 (Kosová & Ayyagari 2008), suggested that FDI can have a positive impact on domestic entry, particularly in terms of vertical spillovers, however, this varies by industry – for example, service industries may benefit whilst manufacturing industries do not experience any positive entry spilllovers – and also by the country of origin of FDI. On the other hand, a large study by the Institute of Labor Economics (IZA) in 2013 used data gathered over 10 years from 70 countries, both developed and developing, to investigate the effect of FDI, measured by mergers and acquisitions, on domestic entrepreneurial entry. This study found that FDI has a 'negative and significant effect on domestic entrepreneurship at the aggregate level' (Danakol et al. 2013:22), citing competition as the principal source of this crowding out effect. A second, alternative, explanation is provided by the tendency of foreign

companies to add competitive pressures to labour markets 'with the potential to change the entrepreneurial landscape in the local economy' (Danakol et al. 2013:23).

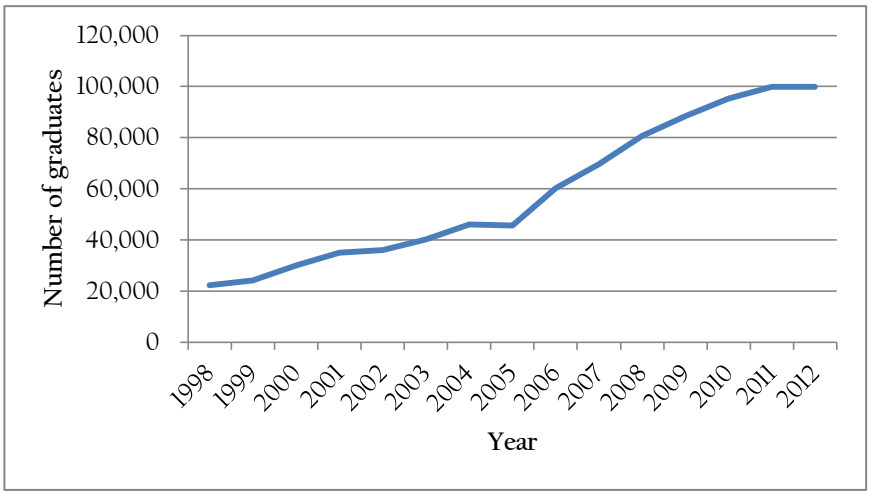
As a DME, the Czech Republic relies heavily on investment from foreign companies but interviews undertaken as part of this research, repeatedly indicated that this is leading to considerable competition in the labour market. As a result, domestic Czech companies claim they are losing out as they are unable to compete with the wages and prestige offered by MNEs (Business Leader 2 2016; Business Leader 3 2016). Furthermore, as many well-educated Czechs are attracted to work in the large, well-known foreign controlled companies the space for the establishment of new innovative Czech companies has been reduced. In other words, as a result of the availability of jobs with foreign companies, the opportunity cost of entrepreneurship compared to employment becomes greater and, thus, entrepreneurship becomes a less attractive career option (Danakol et al. 2013). 'This results in a situation where a class of talented people with the prerequisites for an entrepreneurial career are employed in middle and upper management of foreign companies rather than becoming entrepreneurs' (Government of the Czech Republic 2016a:17). This is seen as a mechanism of negative spillover from FDI to domestic entrepreneurship. The problem with this is that, without targeted policy action, it may prevent the ability of the Czech Republic to develop its own endogenous companies which are needed to help develop the Czech NSI and improve the Czech innovation performance

Ongoing concerns about the lack of innovative entrepreneurialism highlight a circumstance in which a historical cultural trait, the low perception of entrepreneurs, is being aggravated by current conditions, the dependency on foreign companies. This is creating a situation in which the ability of the Czech Republic to develop its own innovative entrepreneurs, the people who are able to make the greatest difference in developing the Czech NSI, is being hindered. This, in turn, prevents the Czech Republic from reaching the innovation goals and following the EDP as set out by the EU. Whilst increasing the funding available to potential entrepreneurs is clearly important, this will not be able to solve the problem unless well-educated, talented people view entrepreneurship as an attractive career option. Given the attractiveness of working for globally renowned foreign companies, encouraging individuals to pursue the potentially more risky option of entrepreneurship is a considerable challenge for the Czech Republic.

Area of misfit 5: Education system and skilled labour

Since publishing its first innovation policy in 2005, the Czech Republic has been aware of the need to develop its workforce and to provide human resources for innovation. Indeed, the country appears to have shown some progress in this respect and following the introduction of per capita payments for students in 2000/2001, universities were motivated to increase their intake of students leading to a notable surge in the number of secondary school students entering into university (Figure 6). Whilst this is generally a positive development it should, however, be noted that by far the highest percentage of the students in 2012 were studying social sciences, business and law, 36% in total. The number of students studying STEM subjects, those which are most important to developing and improving the performance of the Czech NSI, was much lower. For example, the percentage of students studying science (including mathematic and computing) and engineering, manufacturing and construction was just 10% and 13% respectively (OECD 2016).

Figure 6: Number of graduates in the Czech Republic 1998-2012



(Source: OECD 2018b)

Recognising the need to continue improving and expanding the workforce of the Czech Republic, one of the objectives identified in the Czech Republic's Smart Specialisation Strategy is to create a system for attracting and adapting people to the Czech Republic. As a way of achieving this, the document suggests (a) encouraging

foreign students to study at Czech universities (by promoting Czech universities abroad, the introduction of English as a second official language at universities, the introduction of compulsory subjects in English, the purchase of foreign literature for libraries) and (b) encouraging highly qualified foreigners (especially in technical professions) to work in the Czech Republic. Although, in theory, this could offer some solution to the Czech Republic's labour problem, the challenge of achieving this is considerable. Given that according to QS World University Rankings (QS 2018), in 2018 the Czech Republic has no universities in the top 100 and only 2 in the top 500, it may be difficult for the Czech Republic, in practice, to attract the top students, those who could potentially make the biggest contribution to the development of the Czech NSI. Furthermore, in order for these students to contribute to the Czech NSI, the Czech Republic would need to retain them in the country after the completion of their studies. However, given that wages are significantly lower in the Czech Republic and, as previously discussed, only a small percentage of jobs in the Czech Republic require a high qualification, the Czech Republic may not possess the conditions which would attract these students to remain in the country.

Whilst the general trajectory in graduate numbers would suggest a positive development, interview participants (Academic 1 2016; Government Official 1 2016; Government Official 5 2016) expressed frequent concerns about the quality of the tertiary education and the standard of the students now graduating from these universities. Indeed, an EU report states that '[p]articipation in tertiary education has rapidly increased but concerns have emerged over its quality and labour-market relevance' (European Commission 2015:22). This was also noted in a study carried out by TA CR which, after interviewing a large number of companies based in the Czech Republic, concluded that the 'main changes required in the education system relate to changes of funding from quantity to quality, a systematic cultivation of creativity, technical competences and skills for the 21st century in combination with an emphasis on practical development' (Technology Agency of the Czech Republic 2016:23). In other words, although the number of graduates may have increased, the decline in quality and their lack of research experience may limit the potentially positive impact on the Czech NSI.

A factor which could offer some explanation for the Czech Republic's inability to produce graduates with the relevant skills, especially research skills, could be

provided by considering the historical legacies and how they have shaped path dependency within the tertiary education system. As previously discussed, during the communist period, the research system was highly compartmentalised and there was very little link between universities and the industrial sector. Public-private collaboration remains a significant problem in the Czech Republic which is certainly not helped by the aforementioned reluctance from the academic sector to collaborate with the business sector. This has a negative impact as not only does it prevent the academic sector from contributing knowledge to the business sector which may, in turn, help develop and improve the performance of the Czech NSI, but it also prevents the academic sector from engaging with the business sector and gaining a better understanding of the needs of businesses in the Czech Republic. With this information, the academic sector could better tailor its syllabuses to specifically meet the requirements of the business sector. In this respect, it could be suggested that the lack of trust and collaboration between the sectors is contributing to weaknesses within the Czech tertiary education system.

The lack of knowledge transfer within the Czech Republic is further exacerbated by the stasis of the academic sector itself. Interviews with academics (Academic 1 2016, Academic 2 2016) noted that there is a lack of inter-university mobility with many academics undertaking their studies and entire academic career at the same university. Again this prevents knowledge exchange within the academic sector which, in turn, limits the Czech Republic's ability to embrace new theories and concepts which could help to develop academic knowledge and improve teaching quality. The lack of knowledge transfer, both between universities and industry and between universities, has created a path dependency which continues to limit the contribution that the academic sector is presently able to make towards developing the Czech NSI and improving its innovation performance. This concerns not only academic research itself but the ability of the academic sector to produce students with the necessary skills to contribute to the development of the Czech NSI.As education is a national policy area, and one in which the EU has limited authority, the EU is very limited in its ability to influence the Czech education system. This is a critical weakness in the EU's capacity to influence the development of the Czech NSI.

Conclusion

The past 40 years have been a period of dramatic change for the Czech NSI. Having inherited a highly compartmentalised Soviet-influenced research system, the Czech Republic embarked on reorganising the structure, governance and funding of research and innovation. FDI has played a significant role in shaping the development of the Czech economic structure and is increasingly important to the Czech Republic's innovation capacity. Nonetheless, as this chapter has highlighted, the impact of FDI is very complex and there are some concerns regarding the Czech Republic's dependence on foreign companies. The EU, at least in the period leading up to accession, had a considerable impact on the Czech research and innovation system, particularly in terms of drawing political attention to the importance of innovation and an accompanying innovation policy, promoting the decentralisation of the system and enabling the country to attract even more FDI, including that of more sophisticated investors. However, since EU accession, in spite of being heavily influenced by the EU's vision for innovation success, the Czech Republic is failing to achieve a corresponding improvement in its innovation performance. In drawing attention to this incongruity, five areas of misfit have been highlighted which are impeding the EU's attempts to influence the development of the Czech NSI. As a result of historical legacies and economic structure, the Czech Republic has developed a number of embedded national traits for which the EU's innovation policy is a poor fit. This chapter has also indicated that there remain a number of problems within the Czech NSI and unless the Czech Republic is able to overcome these issues, they could become serious impediments to improving the Czech innovation performance.

6) Hungary

Introduction

In the initial years following the fall of communism, Hungary showed much early potential and there were high expectations, not least within Hungary, for strong economic growth in the future. Unfortunately, 30 years later, Hungary has experienced several severe recessions and has not been able to live up to much of its earlier promise. In terms of R&D and innovation, Hungary has encountered notable difficulty in translating its exceptional scientific record (Hungary has produced numerous Nobel Prize winning scientists), into a strong innovation performance. With regard to the influence of the EU, this research suggests that, similarly to the Czech Republic, Hungary has developed a number of national specificities, related to both historical legacies and economic structure, which are preventing the EU from having a greater influence on the Hungarian NSI. Similarly to the format in Chapter 5, this chapter begins by looking at the development of the Hungarian NSI during three timeframes: (1) pre-1989, (2) the transition period and (3) post-accession to the EU. This section also considers the role of FDI and assesses whether any clear progress in the Hungary's innovation performance can be identified since becoming an EU Member State. The second part of this chapter considers the role of the EU in influencing the development of the Hungarian NSI and identifies a number of impediments which are currently being faced.

6.1) Development of the Hungarian NSI

Pre 1989

Formally, and more so initially, the institutional structure of the Hungarian science and research system was based on the Soviet model, the key elements of which were described in Chapter 5. During the early period in which Hungary formed part of the Soviet bloc, both social and economic activities became highly centralised and a rigid division of responsibilities was imposed on science and research organisations. Comparable with the Czech Republic, three functionally separate sectors were established – (1) academies, (2) universities and (3) an industrial or 'branch' sector. The

Hungarian Academy of Sciences (HAS) – which had been established in 1825 by a wealthy aristocrat, István Széchenyi – was exclusively assigned to carry out basic research whilst the industrial institutes, supervised by branch ministries, performed applied research. Universities were expected to perform the sole role of teaching institutions and, as such, were not provided with public resources in order to conduct research projects. Following the Soviet model, each sector was functionally separate from the other and, consequently, '[h]orizontal links among academia and industry were also cut off' (Havas 1995:194).

However, as noted by Mosoni Fried (2004:235), it is perhaps no coincidence that as the Hungarian scientific community was accustomed to relative autonomy, 'Hungary never accepted the orthodox model of Soviet S&T and always tried to move away from its very strict management system'. In fact, especially after the 1956 Hungarian Revolution, Hungary's system increasingly diverged from the model promoted by the Soviet Union in a number of ways. For example, from the 1960s, HAS research institutes began to carry out some applied research and teaching and, conversely, research, although weakened, was never entirely neglected by Hungarian universities which had long and highly respected research records. A 1965 legal provision actually made scientific research at universities obligatory, leading to a 'revival of former science schools with beneficial effects' (Pungor & Nyiri, 1993:28). Nonetheless, although the scope of activities carried out by universities and HAS research institutes was broader than the standard Soviet model – breaking the strict demarcation of labour – there remained a lack of significant cooperation between these sectors (Havas 1995). In fact, Pungor & Nyiri (1993) describe the relationship between the major R&D players as 'feudalistic', characterised by hierarchical relations in which privileges and social positions were closely connected.

In terms of the management of the research and innovation system in Hungary, during the 1960s, a move towards decentralisation occurred. R&D policy-making was placed under the jurisdiction of the Science Policy Committee, HAS became responsible for basic science and the National Committee of Technological Development, set up in 1964, was placed in charge of technology. It is worth noting that HAS – which acted as (1) a society of scholars, (2) the government agency responsible for basic science and (3) an institution for financing research – occupied a particularly influential and privileged position within the Hungarian research system, similar to the Czechoslovak

Academy of Sciences discussed in Chapter 5. Regarding funding, in comparison to other Central and Eastern European countries, R&D was gradually administered in a less centralised manner. For example, the introduction of a multi-channel funding system in the 1980s significantly supported the decentralisation movement. In fact, the Hungarian National Scientific Research Fund (OTKA) which was established in 1986, represented 'the first transparent system in a planned economy providing subsidies for basic research' (Mosoni Fried 2004:235). In addition, Hungary also had a well-established patent regulation system in place long before the transition period.

With regard to the business sector, in-house research witnessed a significant decline during this period as companies typically relied on Academy or industrial research institutes for their development needs. 'Quite often the companies performed very little research activity of their own, and their technological development activity consisted mostly of adapting foreign results' (Pungor & Nyiri 1993:29). Towards the end of the communist period, however, some in-house research was taking place and the business sector actually provided the majority of funding for R&D activities, which did, to an extent, encourage the linking of R&D activities to economic objectives. According to an OECD report, over half of Hungary's R&D expenditure came from companies with another 25% from the Central Technology Research Fund (KUFMA), a fund which was supported by a 4.5% levy on enterprise profits (OECD 1993). Thanks to the contribution of private funding, during the 1980s, Hungary was able to maintain R&D expenditures at around 2.4% of GDP, a figure which compared relatively favourably with OECD countries of a similar size. However, as discussed below, the collapse of the COMECON markets greatly hindered Hungary's ability to sustain private funding levels post-1989.

In terms of the standard of the research institutes and their output, there was considerable variation in the quality of the research equipment used in the R&D organisations. Whilst some were quite poorly equipped, the equipment in others actually met international standards (Pungor & Nyiri, 1993). Nonetheless, on the whole, Hungary's research output was quite favourable and the country was not only seen as 'a technological leader in trade within the CMEA group, but Hungarian technological development was also important in exports to the West, notably in pharmaceuticals' (OECD 1993:120). This was no doubt assisted by the fact that, since the 1960s, Hungarian researchers were even comparatively free to develop international

relationships. In fact, as cooperation with Western partners was given increasing priority during the 1980s, by 1986 there were more than 2,000 industrial contract relations registered between Hungary and Western partners (Pungor & Nyiri, 1993:29). In short, through decentralisation, greater flexibility and increased business relationships with Western countries, by the time of transition, Hungary had for some time been moving away from the promoted Soviet model.

Overall, Hungary's experience contrasted with the Czech Republic in two particularly significant aspects. Firstly, following the Hungarian Revolution, from the 1960s onwards Hungary followed a much less rigid and centralised form of communism. This so-called Goulash Communism was far less authoritarian than other Communist regimes and Hungarians, including scientists, had more freedom than their counterparts in the Soviet bloc. Secondly, whereas the Czech Republic retained a fairly orthodox version of the Soviet economic system until the collapse of the Soviet Union, political liberalisation in Hungary actually began earlier in the 1980s when the waning power of the Soviet Union became clear and, after 1987, an opposition party to the ruling Communist party even began to work openly. This political transition was accompanied by an economic transition which had been necessitated by the economic crisis of the mid 1980s, during which time the economy grew ever closer to collapse. As a consequence, Hungary chose to introduce some aspects of a liberal market economy and partially open the Hungarian economy to the Western world. For example, Hungary joined the IMF and the World Bank in 1982. Furthermore, Hanson & Pavitt (1987) note that a number of venture capital organisations, known as Innovation Funds, had been set up by the mid-1980s. Whilst these changes to the economic set-up did mean that, by the time of transition to a full market economy, Hungary was in many ways better prepared than the Czech Republic, it also resulted in high levels of foreign debt, rising government debt and moderate to high inflation (European Commission 2014).

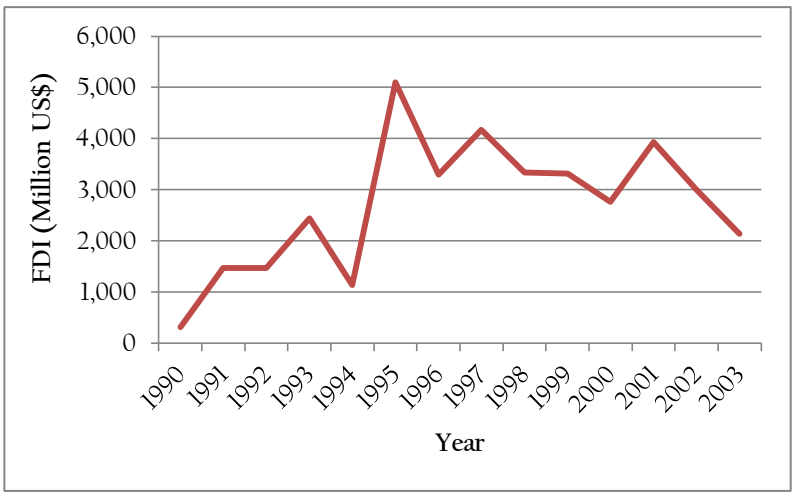
Transition Period

Due to the fact that, by the end of the 1980s Hungary already had a partially liberalised economy with some private sector companies, the worrying level of foreign debt notwithstanding, Hungary chose to introduce reforms on a more gradual basis

between 1991 and 1993. The transition to a market economy progressed in a smooth, organic manner without any true revolution such as the Velvet Revolution which took place in the Czech Republic in 1989. An interview with an expert with extensive knowledge of the history of the Hungarian NSI suggested that Hungary is, in fact, now paying a high price for this seemingly seamless transition. This was attributed to a lack of catharsis as there was 'no real recognition by the layman that something important had happened' (Government Official 6 2017). Moreover, Hungary lacked perhaps not only the recognition of change but also the public's sense of ownership in the creation of a new and different system.

At the beginning of the transition period, FDI began to flow quickly into Hungary whose markets, having already undergone some liberalisation before the fall of the Soviet Union, afforded Hungary first-mover advantage (see Figure 7). Support from foreign investors diminished slightly in the second half of the decade as the Hungarian economy went through a significant period of vulnerability and instability. Similarly to the Czech Republic, the rapid infiltration of MNEs into the Hungarian system is claimed to have resulted in a 'dual economy' (Aide à la Décision Economique 1999). Whilst, on the one hand, Hungary 'has large, often foreign-owned companies, which are well integrated in international production, distribution and, in some cases, R&D(...)On the other, there is a large sector of domestic firms, notably small and medium-sized enterprises (SMEs) characterised by low productivity and insufficient innovation capabilities, which typically operate in local markets with relatively unsophisticated demand' (OECD 2008:10). In fact, Havas (2002) has even indicated that the catch-up provided by the new technologies brought in by foreign investors during the early 1990s actually created a misconception, masking the need to focus on developing indigenous R&D and misleading the focus of policy-makers away from innovation-oriented policies. Furthermore, whilst foreign investors transferred new technology to Hungary, the majority proved to be uninterested in domestic R&D (Mosoni-Fried 2004).

Figure 7: Inward Foreign Direct Investment (FDI) to Hungary 1993-2003 (Million US$)



(Source: OECD 2013)

In terms of innovation, this was a period of considerable change for Hungary. Firstly, the loss of the COMECON markets and the fall in GDP at the beginning of the transition period led to a dramatic decrease in the amount of both public and business investment in R&D, with many formerly state-owned enterprises either going out of business or redirecting their funds away from R&D and towards projects which would result in more short-term profitability. During this period, 'nearly all specialised state financed R&D programmes were abandoned and the previously dominant top-down funding system for R&D was by and large replaced by a bottom-up approach and by application for support for individual projects by research institutes and companies' (OECD 2008:156). Public support was provided via institutional financing and competitive project financing through the previously discussed OTKA fund as well as the newly introduced Competitive R&D Grant for Higher Education (FKFP) and the Research Fund of the Hungarian Academy of Sciences (AKP). By the mid-1990s, economic instability led to further substantial reductions in public spending, including for R&D, as the government introduced its fiscal stabilisation programme, the 'Bokros package' (OECD 2008).

With regard to research activities, the position of universities within the Hungarian NSI was notably strengthened during the transition period. In fact, universities became the largest and even most active part of the Hungarian scientific

community, with up to 60% of human resources affiliated to higher education institutions (Mosoni-Fried 2004:243). HAS also enjoyed relative stability and actually became a 'public body', or public law association, that was completely independent of the government. As noted by Mosoni-Fried (2004:244) the '[s]kilful manoeuvring by HAS presidents successfully repulsed political attacks and secured a peaceful transition for scientists involved in basic research'. Applied research, on the other hand, became a weak link in the Hungarian research system. The only organisation established was the Zoltán Bay Foundation for Applied Research which had been modelled on the German Frauenhofer Institutes. Lack of resources, however, limited the growth of the new applied research foundation and, as a result, only three institutes – biotechnology, logistics and material sciences – could be established during this time period.

The total number of R&D personnel fell by almost half between 1988 and 2000, from 45,069 to 23,534 (Havas 2002). To a considerable extent this can be accounted for by the decline in industrial and in-house R&D. Despite the Hungarian Government's attempt to preserve industrial research institutes, notably the 1995 Act on the Sales of Company Assets in State Ownership, the lack of both capital and markets for their products or services led to most eventually being shut down (Mosoni-Fried 2004). Additionally, in-house R&D was severely weakened due to income losses and privatisation activities which took place at the beginning of the transition period. Company R&D units were either closed or disappeared as a result of the loss of markets for Hungarian products and companies consequently being forced to declare bankruptcy. Whether ownership fell to domestic or foreign owners, after privatisation most in-house R&D capacities were either discontinued or, at the very least, significantly reduced. The total number of company R&D units fell by more than a quarter between 1988 and 1990, from 235 to 174. Although the number of company R&D units did significantly increase during the latter half of the 1990s, reaching 478 in 2000, the number of researchers in 2000 totalled only 3,901 which represented less than half the 8,504 researchers employed in company R&D units in 1988 (Mossoni-Fried 2004:247).

In terms of government efforts, the beginning of the transition period was dominated by the tremendous task of political and economic transformation – not just macroeconomic stabilisation but also introducing fundamental organisational and institutional changes – which was both financially demanding and also required huge

political and intellectual input. As Hungary grappled with these challenges, limited resources meant that science and innovation received very little attention during this initial time period. By the end of the 1990s, however, innovation and R&D had begun to return to the political agenda leading to some significant changes in government policy. These included the formulation of the Széchenyi Plan (Hungary's first National Development Plan), changes in the institutional setting for R&D policy and the creation of a new research funding system. As noted by Mosoni-Fried (2004:241), the 'end of the transition period saw a shift away from laissez-faire policy and the decentralisation of decision- and policy-making toward an active S&T policy based on the concentration of political power and financial resources in public-sector R&D'. The Széchenyi Plan was particularly notable as, through identifying innovation as a priority area, it was Hungary's first attempt at an innovation strategy with a long-term view. The objectives at this point were 'to strengthen information and knowledge flows, to facilitate the acquisition of knowledge and skills by domestic human resources, to channel foreign direct investment (FDI) to high-technology sectors and to accelerate the computerisation of the economy' (OECD 2008:157).

As part of the Széchenyi Plan, the Hungarian Government also launched a number of national research and development programmes which included the 'Science and Technology Policy 2000' (Government of Hungary 2000). However, in 2002, only a few years after the introduction of the Széchenyi Plan, facing another period of financial instability, the newly elected government cut back on some of the activities set out in the original plan in an attempt to make savings on public spending. In fact, from the outset it appears that innovation and R&D have received little public spending protection during times of financial difficulty (Havas 2002). Additionally, there was also considerable fluctuation in terms of the policy advisory bodies and the government authority responsible for overseeing this policy area (Havas 2002; Mosoni-Fried 2004). This finally culminated in the introduction of the National Office of Research and Technology (NORT) in 2004. In other words, whilst this can in some respects be seen as a period in which considerable development in terms of governmental support for innovation and R&D took place, the process was in many respects also chaotic and inconsistent.

Although Hungary had entered the transition period considerably ahead of other Central and Eastern European countries, including the Czech Republic, largely

due to the fact that Hungary had already begun adopting elements of a market economy before the official collapse of the Soviet Union, by the beginning of the 2000s Hungary appears to have encountered a number of issues which have 'hampered the transformation of the R&D sector in the transition period' (Mosoni-Fried 2004:235). For example, whilst some positive developments occurred, such as the increase in university research, other areas, such as industrial and applied research, were severely weakened. Furthermore, the number of researchers fell considerably and, with regard to Gross Domestic Expenditure on R&D, this decreased from 1.46 of GDP in 1988 to just 0.65% in 1996 and remained below 1% until after Hungary's accession to the EU (OECD 2016b). It is also important to note that, although the formal institutional structure was significantly overhauled and increasingly resembled that of a Western – rather than Soviet – model, the legacy of the planning period still had a non-negligible impact on informal institutions such as managers behaviour and policy-makers thoughts. Indeed, as noted by Havas (2002: 381) '[t]hese experiences, expectations, attitudes and behavioural norms – together with the inherited economic problems; of course – constitute a relatively controversial legacy for the transition process' (Havas 2002:381).

Post-accession to the EU

Hungary's accession to the EU resulted in a notable shift in terms of the development of innovation-related policies in Hungary. Following the introduction of the Széchenyi Plan (Government of Hungary 2000b) and the Science and Technology Policy 2000 (Government of Hungary 2000a), in 2007 the Mid-Term Science, Technology and Innovation (STI) Policy Strategy (Government of Hungary 2007) was approved. After several unsuccessful attempts by the National Office for Research and Technology and HAS to compile a strategy, the STI Strategy was eventually drafted jointly by the Ministry of Economy and Transport, the Ministry of Education and Culture and HAS with an almost two year delay (Havas 2011:3-4). The aim of this STI Strategy was, by 2013, to make Hungary a country in which 'knowledge and innovation are the driving engines of the economy and companies appear on the global market with competitive products and services' (Government of Hungary 2007:3). In order to achieve this, the Strategy identifies several strategic goals related to strengthening

companies' research, technological development and innovation (RTDI) activities, building internationally competitive RTDI capacities and centres, strengthening knowledge to support the competitiveness of the society and improving the RTDI capacities of the regions.

In addition to identifying the main strengths and weaknesses of the Hungarian NSI, the Strategy sets out several extremely ambitious targets to be reached by 2010 and 2013 respectively. For example, the first objective of the Strategy is that Gross Expenditure on R&D should reach 1.4% of GDP in 2010 and 1.8% of GDP in 2013. Although the Gross Expenditure did witness some increase, having started at 0.96% of GDP in 2007 and rising to 1.14% in 2010 and 1.39% in 2013 (Eurostat 2018e), the total amount being spent on R&D was still considerably below the target set out in the Strategy. In fact, according to subsequent statistics, instead of showing a slow but continual upward trajectory, Gross Expenditure on R&D in 2016 had even decreased to just 1.21% of GDP. Moreover, in terms of Government Expenditure on R&D, this increased only minimally during the period covered by the Strategy from 0.42% of GDP in 2007, to 0.45% in 2010 and 0.5% in 2013. In another example of overly optimistic target setting, the Strategy also stated that Hungary's Summary Innovation Index according to the European Innovation Scoreboard should reach the EU average by 2013. However, according to the Scoreboard not only did Hungary fail to meet the EU average in 2013, it even showed a decline in its performance (European Commission 2013).

The STI Strategy has since been succeeded by the latest policy; the National Research and Development and Innovation Strategy (2013-2020) (Ministry for National Economy 2013) which was developed by the Ministry for National Economy (ME). The vision of this latest Strategy is that:

> 'By 2020 the key participants of the national innovation system will be significantly reinforced through the active support of RDI policy and will become equal partners in global innovation processes in Hungary. They will then be able to invigorate the national innovation system as a whole, due to the follow-through effects, and thus contribute significantly to enhancing the competitiveness of the Hungarian economy together with transforming it to a sustainable knowledge economy' (Ministry for National Economy 2013:28).

This most recent Strategy is complex with a number of ambitious, quantified targets, such as supporting the integration of 300 'gazelles' (high-growth companies) into the global market, funding 1,000 innovative start-ups and over 80 proposed objectives. There is already concern, however, that Hungary has not made sufficient progress at developing policy actions to meet these objectives and that those which have been developed are poorly aligned with the National Development Strategy (European Commission 2016:24-25). The implementation of this Strategy may be further compromised by the fact that (a) it was designed by ME and this Ministry is no longer responsible for innovation policy in Hungary and (b) the Secretary of State in charge of developing this Strategy is no longer a member of the government.

This, however, is not the only innovation-related strategy which is currently being pursued in Hungary. In fact, innovation has received increasing policy attention and Hungary now has a considerable number of strategies in which innovation plays a key role. Of particular interest to this research is the Research and Innovation Strategy for Smart Specialisation (RIS3) which, as discussed in Chapter 4, has become a prerequisite to receive funding from the European Regional Development Fund (ERDF). For the 2014-2020 funding period, Hungary has been allocated €25 billion in European Structural and Investment Funds (ESI) of which €10.76 billion is funded via the ERDF. Hungary's RIS3 was drafted in 2014 by the recently established National Research, Development and Innovation Office (NRDIO). The scope of the Strategy is vast and has been described by the EU as 'very broad and almost all-encompassing' (European Commission 2016c:25). According to the RIS3, 'Hungary plans to become a knowledge economy by the end of the decade, where internationally competitive knowledge bases and intensive knowledge flows are created and, thus, the use of knowledge becomes more effective' (Government of Hungary 2004:46). A clear attempt has been made to meet the criteria set by the EU through mention of stimulating the 'Entrepreneurial Discovery Process' and discussion on encouraging stakeholder involvement and joint management.

The Smart Specialisation approach, it was claimed by the EU (European Commission 2014:3), would improve evidence-based policy making and encourage stakeholders to unite under a shared vision. Whilst the rationale for requesting all Member States to produce this document is understandable, interview participants (Government Official 6 2016; Government Official 12 2017) questioned the effectiveness

of using obligatory methods to encourage collaborative thinking. In the case of Hungary, due to the restructuring of the governance system for innovation and the establishment of a new office, the RIS3 had to be drafted in a very short period of time, roughly 6 months. This meant that, in order to ensure that the Strategy was completed in time, some of the exercises which had initially been planned, such as focus groups with relevant actors, had to be abandoned (Government Official 6 2016). Expert interviews conducted for this research suggested that developing the RIS3 had had to contend with a number of methodological problems which will likely have a strong adverse effect on its impact. (For further discussion, see below.)

An interview with a government official with expert knowledge of policy-making in Hungary (Government Official 12 2017) indicated that the preparation of the Smart Specialisation Strategy had essentially resulted in a tick box exercise which had to be completed in order to access the Structural Funds. Although the Strategy was adopted by the Commission on certain conditions, it is doubtful whether these conditions are being met (Government Official 6 2016) and the EU's ability to monitor Hungary's progress in this area seems limited. Furthermore, the Smart Specialisation Strategy is poorly aligned with other innovation-related strategies, which further highlights the lack of strategic thinking discussed earlier. A report by the EU found that the 'R&I Strategy, developed by the Ministry for National Economy, does not seem to directly guide the current activities of the NRDIO, which offered a different set of priorities and approaches in the Smart Specialisation Strategy' (European Commission 2016b:30). Given all the problems encountered in the development of Hungary's Smart Specialisation Strategy and the lack of alignment with other national strategies, interview participants (Government Official 6 2016; Government Official 12 2017) were very dubious about the Strategy having any significant impact.

With regard to governance, the governance structure for innovation in Hungary has consistently been plagued by upheaval which has caused much disruption including delays in developing and processing calls for projects and confusion amongst the various stakeholders. For example, towards the end of the 2000s Hungary attempted to overhaul the governance structure for innovation which included the abolition of the highest level coordinating body in the field, the Science and Technology Policy Council, in 2009. Although the overhaul could not be fully implemented due to the political turmoil at the time, following the resignation of then Prime Minister,

Ferenc Gyurcsány, in April 2009 and the subsequent formation of a new government, two important changes did take place. Firstly, a new policy coordination body, the Research and Science Policy Council, was established as a replacement for the previous Science and Technology Policy Council. This Council held its first and only meeting in April 2010 before yet more organisational changes to the governance structure took place after the general elections held in 2010. Secondly, the position of a minister without a portfolio – the government minister who had until then been responsible for overseeing and coordination research and development, technological innovation and science – was dissolved and the Minister for National Development and Economy took over the responsibilities of the Minister without a portfolio.

In 2010, after just over one year, the Research and Science Policy Council was disbanded and, in its place, the National Research, Innovation and Policy Council was created by government decree. This Council was chaired by one of the Deputy Prime Ministers, co-chaired by the President of HAS and consisted of the Minister for Economy, the Minister for Natural Resources and the Minister for National Development. Yet again, this Council was dissolved and in September 2013 was replaced by the Council for Science Policy and Innovation. The composition of this new Council was similar to that of the previous Council with the exception of being chaired by the Prime Minister instead of a Deputy Prime Minister. As of 2014, however, the Council had not even held its inaugural meeting and has since been replaced by the National Science Policy and Innovation Board. In principal, this Board remains the main body responsible to Parliament, however, there is no record of it actually having had a meeting (European Commission 2016c:21). Meetings with the International Scientific Advisory Board, which was established to gain strategic advice from foreign experts, have also been infrequent.

More recently, in January 2015, following the approval of the new Law LXXVI (25th November 2014) on Scientific Research, Development and Innovation, the governance structure for innovation in Hungary underwent yet more change with the establishment of NRDIO. This new office integrated the activities of the previous office, the National Innovation Office (NIH), together with the various ministerial departments with responsibility for innovation. Under the leadership of Prof Jósef Pálinkás, former President of HAS, the Office occupies a central position in the research and innovation system different from that of most countries due to its lack of

ministerial accountability. Rather than delivering policy on behalf of a ministry, the President of NRDIO is subordinate to the Prime Minister's Office and reports directly to Parliament.

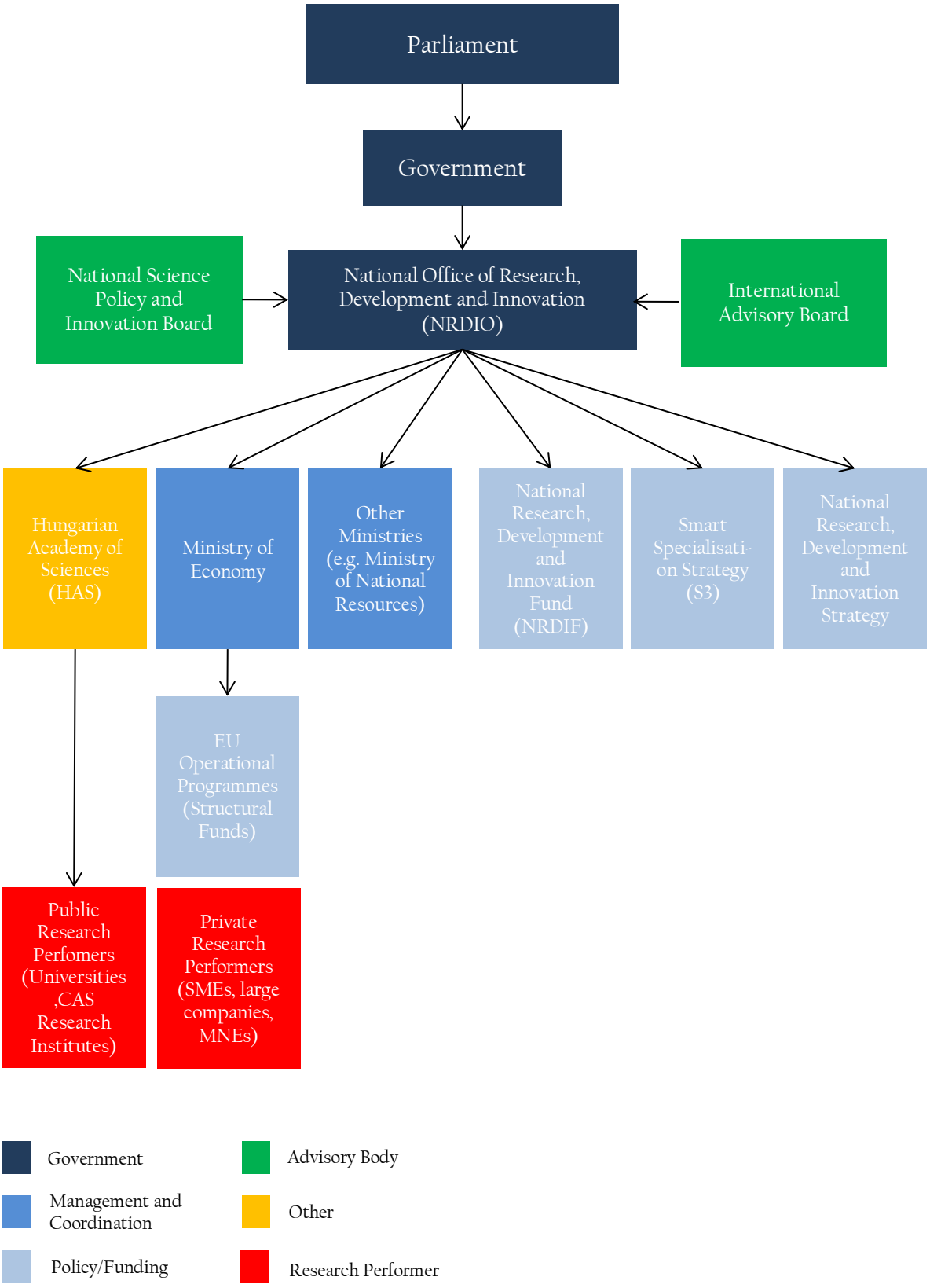
The two main missions of NRDIO are: (1) RDI policy-making, implementation and integration into the economy and (2) allocation and management of RDI funding. By fulfilling both the role of research and innovation policy-maker and research and innovation funder, NRDIO has enormous responsibility within the system. As has been noted, '[i]n an international comparison, the Hungarian approach seems exceptional because of the scope of vertical and horizontal integration of responsibilities within NRDIO' (European Commission 2016c:20). Horizontally, NRDIO is responsible for science and innovation funding and vertically, 'it integrates almost all political responsibilities and the accompanying accountability for designing, implementing, evaluating and reforming the support measures' (European Commission 2016c:20). In addition to the establishment of NRDIO, 2015 also witnessed the creation of the National Research, Development and Innovation Fund which integrated the two previous funds, the Hungarian Scientific Research Fund and the Research and Technological Innovation Fund. For the implementation of measures based on the EU's Structural Funds, however, the NRDIO is required to respond to ME which is in charge of managing the operational programmes for the 2014-2020 financial period.

Whilst the unique role and positioning of NRDIO could increase the efficiency and effectiveness of research and innovation governance, there are however several concerns about the amount of authority enjoyed by NRDIO. Firstly, NRDIO does not have a supervisory board 'or other forms of external control that would ensure the checks and balances appropriate in relation to the extensive responsibilities and budgets overseen by NRDIO' (European Commission 2016c:21). Furthermore, there is 'no evidence that meaningful external advice has largely supported the Office in performing its comprehensive functions' (Ibid). Although there are several advisory bodies, such as the International Advisory Board and the National Science Policy and Innovation Board already discussed, these meet only sporadically and appear to have minimal, if any, practical influence. The International Advisory Board does not have any decision-making or controlling powers and the role of National Science Policy and Innovation Board is just to provide advice, evaluate and make recommendations.

A Peer Review carried out by the EU suggests that with the establishment of NRDIO, there is a period of 'new beginning' in Hungary and that 'a long period of instability appears now to have come to an end' (European Commission 2016c:17). This idea, however, was met with a degree of caution in expert interviews (Government Official 6 2016; Government Official 11 2017) in which it was suggested that there is some scepticism about how successful the new office has been and questions about the certainty of its future were raised. Whether a true shift in the importance attached to innovation by the Hungarian government and a resolute commitment to its funding (which has traditionally wavered during periods of economic bust) has occurred, cannot yet be guaranteed. Given the number of times the governance system for innovation has been restructured in Hungary within the past two decades, it is still too soon to say whether the establishment of NRDIO represents just another restructuring exercise or something more permanent and significant. Furthermore, the establishment of NRDIO and, more specifically, its governance method, does somewhat seem to go against the current method being promoted by the EU. For example, the aim of the RIS3 approach was to encourage a more bottom-up approach to strategy development and management, yet the NRDIO represents a more centralised and top-down style of governance. In terms of the EU, therefore, there does seem to be something of a contradiction between the vision being encouraged by the EU and the direction actually taken in Hungary.

With regard to HAS which, as previously noted, wielded considerable influence and power during the communist period, the Academy and its 'academicians' –namely members of the Academy and scholars holding a science degree obtained or accredited in Hungary – continue to have considerable weight in the Hungarian research system. In recent years, HAS has essentially performed a dual role in which, on the one hand, it influences the political decision-making process and participates in the elaboration of national policies and strategies. On the other hand, HAS also manages its own research centres and laboratories, employing a substantial number of researchers and accounting for a considerable percentage of R&D expenditure (European Commission 2015:34). In addition to performing research in its own institutes, HAS also directs some funds to research groups in the higher education sectors and participates in education (especially doctoral training). The current governance structure of the Hungarian NSI is shown in Figure 8 below.

Figure 8: Governance structure of innovation in Hungary



(Author's own diagram.)

In summary, the period since EU accession has been a particularly chaotic one for innovation policy and governance in Hungary. This situation has been exacerbated by the considerable economic and political turmoil, including the resignation of the Prime Minister in 2009. Each restructuring of the governance system has resulted in a tendency to disregard the previous policy, start again and, in the words of a government official with considerable experience of innovation policy-making in Hungary, 'then fingers crossed' (Government Official 12 2017). The ongoing restructuring activities have caused much disruption to the Hungarian NSI and confusion for actors therein. Whilst a number of policies have been produced, the actual commitment of the Hungarian Government to fulfilling its obligations, notably its funding commitments (see below), has been dubious. Not only has innovation policy in Hungary lacked consistency of leadership but it has also lacked a clear strategic direction and one which is aligned with the overall economic development plan. At present, therefore, a realisable strategy with which to achieve the many ambitious innovation-related aims Hungary has set for itself, still remains undefined.

The role of FDI

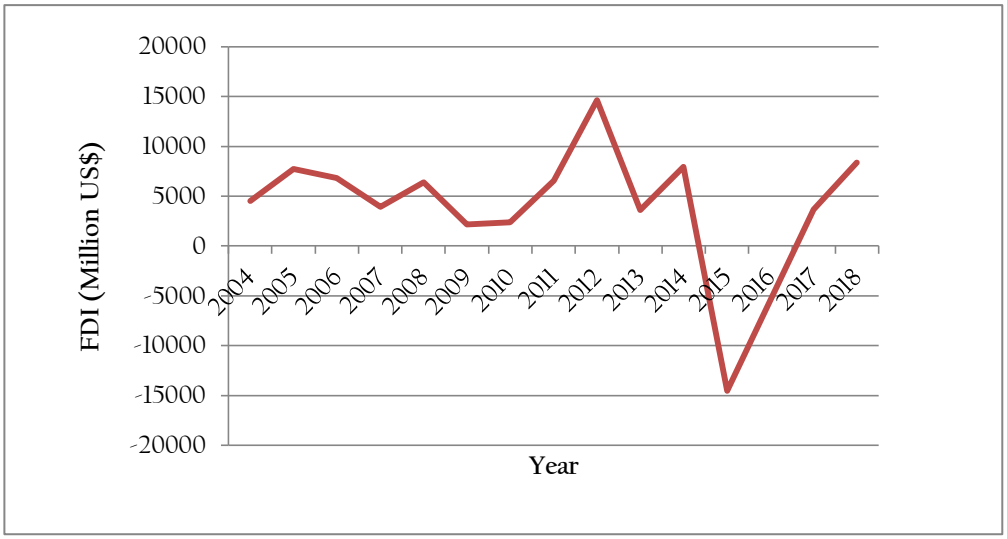
Foreign owned companies, attracted by the reasonably well-educated, cheap labour force, occupy a dominant position in Hungary. These MNEs have become key players in the Hungarian system and appear 'critical for the present economic development of Hungary' (European Commission 2016c:58). According to the United Nations Conference on Trade and Development (United Nations Conference on Trade and Development 2018), FDI as a percentage of GDP increased from 24.4% in 1995 to 74.5% in 2017. Hungary, which having already started to liberalise its economy before the fall of the Soviet Union, was able to attract FDI very quickly and, as such, became a frontrunner in the competition for FDI. However, it has been suggested than Hungary has since lost its early mover advantages as other Central and Eastern European countries have also begun offering attractive packages, including friendly business environments and lower labour costs, for foreign investors (Sass 2004). In fact, in both 2015 and 2016, divestments outpaced investments in Hungary resulting in a negative inflow of US$14,751 million and US$5,855 million respectively (United Nations

Conference on Trade and Development 2018)[2]. Furthermore, the number of Greenfield Investments in Hungary, investments in which a parent company builds its operations in a foreign country from the ground up, has fallen considerably, from 110 in 2016 to 83 in 2017 (United Nations Conference on Trade and Development 2018).

The fall in FDI has partly been blamed on the financial and economic crises which hit Hungary particularly hard and from which the country has since struggled to recover (Tarró & Krámli 2013). Indeed, the data in Figure 9 show a significant decline in FDI at the time of the crises. A study by Sass and Kalotay (2012), however, found that the financial and economic crises had had a dual effect and although negative in terms of the scaling back of FDI and a decline in the overall amount of FDI, the same period also witnessed the announcement of some large scale projects. These investments were particularly notable in the automotive industry with Daimler AG, Audi and General Motors/Opel all launching sizeable projects in Hungary. However, since the beginning of the 2010s, Hungary has been sending a mixed message to investors, especially to investors in certain service industries, by adopting policy measures including the introduction of windfall taxes, which were supposed to help Hungary recover from the crises by controlling the budget deficit. The main industries affected were banking, energy, retail and telecommunications. These measures 'could be interpreted as problematic for the fair and equitable treatment of foreign investors as the latter are overrepresented in the group of firms affected by the new taxes' (Sass & Kalotay 2012:8). Sass and Kalotay's study concludes that the windfall taxes had a negative impact on investor confidence which would be difficult to remedy and could cause long-term damage to Hungary's ability to attract FDI. Given Hungary's dependence on foreign-owned companies and investments, this represents a potentially concerning development and one which would benefit from ongoing monitoring.

[2] FDI figures dropped to negative levels in 2015 due to 'large reimbursements of intercompany loans and to large net disinvestments in equity recorded in the last quarter of 2015 (OECD 2016:6).

Figure 9: Inward Foreign Direct Investment (FDI) to Hungary 2004-2018 (Million US$)



(Source: OECD 2019)

The message for foreign investors may also have been further complicated by the establishment of the Hungarian Investment Promotion Agency (HIPA) which replaced ITD Hungary Zrt. Between 1993 and 2010, ITD Hungary Zrt had operated as the Government's investment and trade development agency and had overseen much of the success which Hungary had enjoyed as a frontrunner in FDI promotion. The new agency, HIPA, lacked experience, a problem which was further heightened by the decision to include in its staff only some of the former ITD employees. As a result, not only did investors have to adapt to this new team but the disturbance caused by the restructuring 'could well disrupt various services based on long-term stability such as after care' (Sass & Kalotay 2012:8). The establishment of HIPA coincided with a challenging time in Hungary due to the fact that, in 2010, the newly elected Government announced a number of constitutional changes which provoked international debate. Of particular concern was the fact that the new constitution weakened legal checks on the authority of the government, interfered with media freedom and undermined human rights protection in the county (Pogány 2013). In short, the beginning of the 2010s was a tumultuous time in Hungary and one which did not present a particularly favourable environment to foreign investors. This could, at least in part, explain the decrease in FDI which Hungary has witnessed.

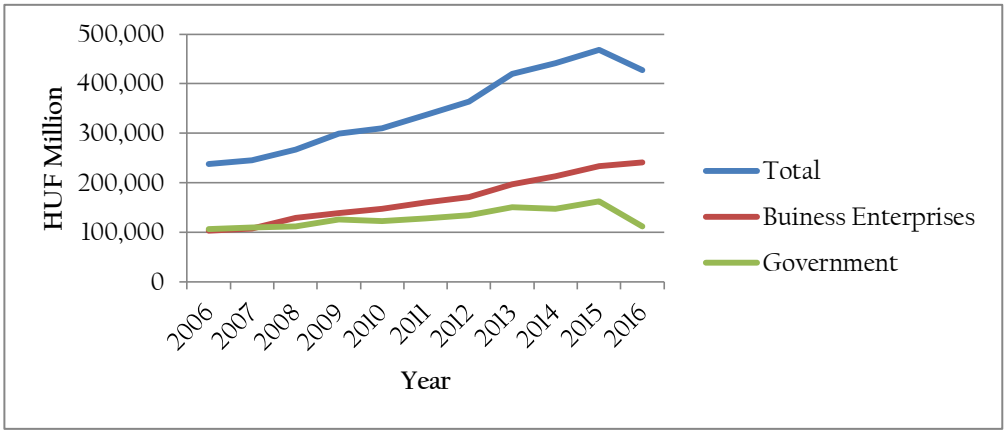
In spite of the recent downward trend, FDI stock, which in 2017 amounted to US$93,332 million, still remains very significant in Hungary. With 49% of FDI in 2017, the manufacturing sector is the main recipient of foreign funding (Hungarian Central Bank 2018). The biggest proportion of FDI in the manufacturing sector is spent on vehicle and other transport equipment (21%), followed by basic pharmaceutical products (19%) and computer, electronic and optical products (12%) (Ibid.). In terms of research and development, Hungary is also host to a number of major automotive R&D centres including well-known companies such as Bosch, Audi, Knorr-Bremse and Continental. More recently, Jaguar Land Rover announced plans to open a new technical engineering office in Budapest in 2019 with the creation of 100 new jobs. The Minister of Foreign Affairs and Trade in Hungary, Péter Szijjártó, claimed that the 'decision of the UK's largest automotive manufacturer to open a technical engineering office in Budapest reaffirms our foreign direct investment strategy and in particular our specific focus on high quality automotive-related growth' (Hungarian Investment Promotion Agency 2018b:4). HIPA claims to have recently shifted its emphasis away from 'made in Hungary' toward 'invented in Hungary' and is promoting a quality rather than quantity approach to its FDI promotion activities (Hungarian Investment Promotion Agency 2018a:4).

In terms of the impact of these foreign companies on the Hungarian NSI, however, expert interviews conducted during the course of this research (Academic 4 2016; Government Official 6 2016; Government Official 12 2017) suggested that foreign-owned MNEs are generally poorly integrated into the NSI and that MNEs typically work with suppliers from foreign countries. This was, in part, attributed to the fact that domestic Hungarian companies are often not sufficiently innovative and lack the ability to produce the goods required by MNEs. There are, however, examples of foreign companies which have integrated better into the Hungarian system and Suzuki, for instance, was highlighted during interviews as a 'good' example. Suzuki has been established in Hungary since 1992 and over time more and more innovation activities have been moved to Hungary. Nonetheless, it should be noted that, according to interview participants (Academic 4 2016; Government Official 6 2016), many of these innovation activities are confined to developing the production lines and not the product itself. Whilst there are some pockets of good practice, on the whole, the picture is not that favourable and there was frustration expressed (Academic 4 2016;

Government Official 6 2016) that the Hungarian Government is not doing more to incentivise MNEs to carry out more of their research activities in Hungary.

With regard to the R&D which is being carried out in Hungary at present, these activities are 'highly concentrated in a limited number of large companies (including multinational corporations)' (European Commission 2016c:57). Business Expenditure on R&D, as shown in Figure 10, has increased considerably in Hungary and in 2016 actually comprised more than half of the total R&D expenditure. This contrasts strongly with Government Expenditure on R&D which started at a similar level to Business Expenditure and after some increase, albeit not as significant as the increase in Business Expenditure on R&D, dropped notably in 2016. Whilst the increase in the level of Business Expenditure on R&D may at first glance appear impressive, some caution should be taken when reading these figures. Attention has been drawn to the fact that some irregularities appear to have taken place due to confusion and ambiguity surrounding the classification of R&D activities for tax incentive purposes. As a result, the 'actual Business Expenditure on Research and Development is likely to be much lower than officially reported due to the incorrect classification of other corporate investments as R&D by the reporting companies' (European Commission 2016c:58). This would also suggest that Hungary's Gross Expenditure on R&D is lower than recorded and that it is even further behind the target of 1.8% of GDP on R&D which Hungary has aims to achieve by the end of this decade (Ministry for National Economy 2013).

Figure 10: Total expenditure on R&D in Hungary by financial source 2006-2016 (HUF Million)



(Source: Hungarian Central Statistical Office (KSH) 2018b.)

In summary, the period since EU accession has been a tumultuous one for Hungary in terms of FDI. Hungary appears to have lost the advantage held over its Central and Eastern European counterparts at the start of the transition period and political decisions at the beginning of the 2010s created a particularly challenging environment for attracting FDI. Although HIPA has recently begun to focus more on the quality of FDI and to encourage a more innovation-driven approach towards FDI promotion, it is not yet clear how successful this approach will be. Indeed, there are a number of potential impediments to this development strategy including a lack of highly skilled employees and insufficient innovative firms (see below). Although Hungary has witnessed a sizeable increase in Business Expenditure on R&D, in terms of the size of company in which the Business Expenditure was invested, only 49.5% of the total Business Expenditure on R&D was invested in companies with 500 employees or more (Eurostat 2018a). As discussed in the previous chapter, this amount for heavily industrialised, innovation-driven countries is usually between 70% and 84%. Clearly Hungary is still considerably below this percentage at present.

Innovation performance of Hungary

In spite of the ongoing policy attention that innovation has received in Hungary and an overall increase in expenditure on R&D, particularly from the business sector, there has been a disappointing and paradoxical lack of improvement in Hungary's innovation performance (see Table 10). For example, according to the European Innovation Scoreboard (European Commission 2004; European Commission 2016a), Hungary remains considerably below the EU average and it has even been surpassed by Malta and Slovakia, countries which Hungary was ahead of in 2004. Even more concerning is the fact that according to the 2017 Scoreboard, Hungary's performance has actually 'declined by 3.5% relative to that of the EU in 2010' (European Commission 2017a:58)[3]. The World Economic Forum (2006; 2016) also shows a worrying trajectory in Hungary's 'Innovation' index which has declined from 2006 when Hungary was ranked 31st (out of 125) with a score of 3.82 (out of 7) to 80th (out of 128) with a score of 3.24 (again out of 7) in 2016. This raises serious questions about why, with such a number of strategies and policies being produced, Hungary's innovation performance is

[3] Incidentally, this was the same percentage of decline observed in the Czech Republic during this period.

not only failing to catch up with the performance of Western Member States but is even falling behind that of comparable Central and Eastern European neighbours.

Table 10: Hungary's overall innovation ranking in the European Innovation Scoreboard (EIS) 2007-2017

Year	Ranking
2017	23rd (Moderate Innovator)
2016	21st (Moderate Innovator)
2015	20th (Moderate Innovator)
2014	20th (Moderate Innovator)
2013	21st (Moderate Innovator)
2011	19th (Moderate Innovator)
2010	21st (Moderate Innovator)
2009	22nd (Moderate Innovator)
2008	21st (Catching-Up Country)
2007	Catching-Up Country

(Source: European Commission 2007-European Commission 2017a)

Based on the dimensions of the Scoreboard (European Commission 2017a:58), areas in which Hungary shows relative strengths are in 'Employment impacts', 'Sales impacts' and 'Innovation-friendly environment'. The dimensions in which Hungary is notably weak are 'Innovators', 'Finance and support' and 'Intellectual assets'. In fact, Hungary's score for the 'Innovators' dimension is particularly low and has even witnessed a sizeable decrease especially in the area of SMEs producing marketing or organisation innovations. By far the greatest decrease however, has been in the 'Linkages' dimension with a very sharp 70.4% decline in the private co-funding of R&D expenditure.

Considerable frustration was expressed during expert interviews conducted for this research (Government Official 11 2016, Government Official 12 2016, Government Official 13 2016) that the same problems are constantly recurring and that the government is not taking sufficient action in order to tackle these issues. Indeed, the weaknesses of the Hungarian system during the transition period as identified earlier,

such as chaotic governance of the innovation system, low level of innovation within SMEs and insufficient human resources, continue to be the main weaknesses identified in the Peer Review carried out by the EU (European Commission 2016b) and also throughout the course of this research. Whilst pockets of improvement can be noted, such as an increase in expenditure from the business sector on R&D, there are still critical issues which are preventing the development of the Hungarian NSI. Similarly to the Czech Republic, this research suggests that explanation for this can be provided by understanding the role of historical legacies in shaping present institutions, especially informal institutions or the accepted 'ways of doing things'.

With regard to the influence of the EU, although acceding to the EU appears to have resulted in formal institutional change and greater attention being paid towards innovation policy, this has not led to a comparative improvement in Hungary's innovation performance. As a result, Hungary's disappointing innovation performance weakens the ability of the EU to reach its goal of becoming the most competitive knowledge-based economy in the world. The following section looks at the steps the EU has taken to try and influence the development of the Hungarian NSI and identifies how a number of the institutional constraints, specifically informal institutions with historical origins and, in more recent years, those which have developed as a result of Hungary's dependence on FDI, are currently impeding the Europeanisation process.

6.2) The Europeanisation of the Hungarian NSI

As noted previously, innovation has been a key focus of the EU since the 1990s and, consequently, the EU has invested considerable effort into the task of improving the innovation performance of its Member States. However, much like the Czech Republic, this research suggests that there are various national characteristics, many of which have historical origins, for which the EU's policy is a poor fit and which are preventing the EU from being able to influence the Hungarian NSI more significantly. This study shows that there are a number of areas of misfit, most of which are similar to those of the Czech Republic, which are limiting the influence of the EU. In order to analyse this in more detail, the following sections look firstly at how the EU has tried to influence the Hungarian NSI and the outcomes that can be observed. Secondly, the

areas of misfit between the EU's innovation policy approach and the Hungarian NSI are identified and discussed.

The EU's Innovation Policy and the Hungarian NSI

The EU's involvement in assisting Hungary with its transition to a decentralised liberal democratic system began in 1989 through the 'Poland and Hungary: Assistance for Restructuring their Economies' (PHARE) programme. As noted in Chapter 4, PHARE was an EU initiative which provided grant finance to support countries to the stage where they were ready to assume the obligations of membership of the EU (European Parliament 1998). Hungary subsequently submitted its membership application to the EU on 31st March 1994 and in 2002, subject to a national referendum, Hungary was invited to join the EU. The referendum on Hungary's membership to the EU took place in 2003 and with a turnout of 45.6%, lower than had been anticipated, the proposal was approved by 83.8% of the voters. Finally, on 1st May 2004, together with the Czech Republic and eight other countries, Hungary became an EU Member State.

In terms of the impact of accession to the EU on the Hungarian NSI, one area of significant change was that, on becoming an EU Member State, a sizeable amount of funding became available to Hungary through the EU Structural and Cohesion Funds which emphasise R&D and innovation. During the period between 2004 and 2006, Structural Funds supported almost 20,000 projects in Hungary creating nearly 22,000 jobs and 47 Cohesion Fund projects were approved by the EU (European Commission 2009a). In other words, Structural Funds began to play an important role in supporting the public financing of innovation-related activities. However, as discussed in more detail below, there are various concerns about how effective this funding has been at achieving its aims in practice.

With regard to the policy documents that Hungary has produced since joining the EU, the documents repeatedly claim to be guided by the EU's innovation vision. For example, the Mid-Term Science and Technology Policy 2007-2013 references the strategic goals of the EU and notes that '[r]eaching Europe's common competitiveness goal demands a harmonized strategic approach in the whole of the EU and individual member countries' (Government of Hungary 2007:5). Some of the targets set out in the

policy are even based on the EU's main benchmarking tool, the European Innovation Scoreboard, such as the previously mentioned target that Hungary should reach the EU average for the Scoreboard's Summary Innovation Index by 2013. A similar observation can made of more recent strategies which, it is claimed, 'have been strongly driven and inspired by the EU context (e.g. the new Horizon 2020 and other policies adopted for the new programming period 2014-2020) and have a broad coverage of relevant R&I issues' (European Commission 2015:24). In terms, therefore, of meeting the EU criteria and appearing to comply with the EU's innovation policy approach, at a nominal level, Hungary can be seen to have done so.

However, Havas (2011) notes that, in practice, Hungary has adopted a 'special' way of planning in which policy-makers simply repeat the EU guidelines and submit the requested documents to Brussels to meet the formal requirements without any proper strategic thinking. A major repercussion of this is that innovation policy is not aligned with the national development strategy (a previously highlighted problem) and thus public funding, as well as EU resources, cannot be efficiently spent. Indeed, although Hungary generally appears to comply with the requirements of the EU, Szalavetz (2014) notes that what has actually taken place in Hungary is more akin to façade compliance and represents a considerable 'missed opportunity'. Stressing the role of agency, she argues that Hungary is an example in which 'rationalist adaption occurred (i.e. formalistic adaptation, driven by actors' opportunistic response to incentives) rather than sociological adaptation (driven by norms of appropriate behaviour and identification with the EU)' (Szalavetz 2014:46). This research concurs with these observations and finds that Hungary's inability to adapt to the EU's 'ways of doing things' can, at least in part, be explained by a poor fit between the EU's innovation policy and the Hungarian national institutions, both formal and informal institutions, which are strongly influenced by its path dependent historical legacies and economic structure. The following five areas of misfit are presented in support of this observation.

Area of misfit 1: Dependency on foreign companies

Similarly to the Czech Republic, the dependence on FDI was, at least during the transition period, necessitated by the weak economic conditions inherited from the

communist period. The recent slowdown in FDI notwithstanding, Hungary has been a major recipient of FDI and the reliance on foreign investment has become a path dependency for both the Hungarian economy and its NSI. Although, in terms of numbers, SMEs make up the majority of businesses in Hungary, the importance of large, typically foreign owned, companies is much higher than their number would suggest. In fact, in 2014, the share of foreign controlled enterprises in the total number of enterprises was three times higher than the EU average, 3.55% compared to 1.14% (Döry et al. 2018:5). The average share of these companies in total employment was 26.4% and, in some industries, particularly electricity, manufacturing and information and communication, the share of employment was even higher, 52.7%, 48.3%, and 39.3% respectively. As a result, the 'Hungarian economy still suffers from the duality of its economic structure where, in general, the few large, foreign-owned enterprises perform technology-intensive, export-oriented activities and the large number of smaller domestic owned enterprises struggle with inadequate capital, lack of technologies and low level networking' (Döry et al. 2018:5-6).

Hungary is undoubtedly very dependent on these foreign companies and being a Dependent Market Economy (DME) has created a particularly specific set of conditions in which MNEs have considerable influence over the Hungarian NSI. Not only are these foreign investors significant players in terms of their economic and innovation contribution but, and largely as a result of this, they also hold a considerable amount of political power. As noted in an interview with a government official with experience within this field of policy-making (Government Official 12 2017), the MNEs are easily able to contact the decision-makers and can, therefore, have a direct impact on the type of programmes being offered. One such example, which at the time of writing was still not officially documented, concerns pressure from MNES to initiate a programme that will support the process of exporting for large companies. In other words, foreign companies have become so powerful in Hungary that their influence even extends to policy-making decisions.

In addition, these MNEs also have significant power within the labour market as the kudos attached to working for these bigger, well-known companies makes them desirable to young graduates. Their advantage is further heightened by the fact that they are able to offer a higher wage with which smaller, national companies often struggle to compete. An interview with the CEO of a domestic company (Business

Leader 5 2016), for example, suggested that it would need government subsidies to be able to compete for labour with the MNEs. This presents a very challenging situation in Hungary as, in order for smaller, indigenous companies to improve their innovation capacity, they need to be able to attract the brightest and most capable employees. However, they are struggling to do this due to the fact that these sought-after employees are lured by the prestige and higher wages offered by the MNEs. Given that, as previously discussed, these foreign companies are generally poorly integrated into the national NSI and that by dominating the labour market they are making it more difficult for national firms to attract the brightest and most talented employees, this places Hungary in a very vulnerable position. Similarly to the Czech Republic, there is the potential that these companies may at some point move their activities to another location, leaving a sizeable hole in both the Hungarian economy and its NSI.

With regard to the EU, the reasons for which the EU's innovation policy and measurement methods are a poor fit are similar to those for the Czech Republic discussed in the previous chapter. In short, the EU's current policy approach, the Smart Specialisation Strategy, fails to sufficiently recognise or accommodate one of the main characteristics of the Hungarian political economic structure, namely its dependence on FDI. In its present format, the Smart Specialisation Strategy lacks emphasis on internationalisation in terms of learning from MNEs in order to improve local capacity, something which is vital to both improving and protecting the Hungarian NSI in the long-term. The nature of the Hungarian political economic structure requires a distinct policy approach that emphasises the role of MNEs for developing the Hungarian NSI. Due to the fact that this element is lacking within the EU's present innovation policy approach, the EU is unable to provide the guidance and assistance which are necessary for tackling the challenges currently facing the Hungarian NSI.

Area of misfit 2: Public management of NSI

A significant legacy of the collapse of the Soviet Union was that, on returning to a liberal market economy, Hungary inherited a research system which was, firstly, highly compartmentalised with a considerable amount of power wielded by HAS and, secondly, policy-makers had very little experience with designing innovation policy and had to develop this capacity from a low starting point. Developing a successive

governance structure for innovation has been hindered by the frequent restructuring exercises and interviews (Government Official 6 2016; Government Official 7 2016; Academic 5 2016) suggested that power struggles were preventing a more collaborative approach with HAS, in particular, resistant to change and reform. In addition, Hungary's ability to develop achievable and effective policies has likely been impeded by the lack of an evaluation culture which was frequently highlighted in interviews conducted for this research (Government Official 6 2016; Government Official 7 2016; Government Official 10 2016) as well as a number of external reports (European Commission 2016; OECD 2008). Not only has the lack of evaluation exercises limited Hungary's ability to understand the efficiency of the policies it has developed but it has also reduced the potential to learn from previous policy in order to inform subsequent policy decisions. Indeed, such a poor evaluation culture means that Hungarian policy-makers still have very limited information on what works, what does not and why. This could provide some explanation for the previously mentioned lack of strategic awareness in the innovation policies designed to date as well as concerns about an implementation gap (European Commission 2015c).

It was noted earlier that during the transition period, innovation-related activities received minimal attention as the Hungarian Government, as well as other governments throughout Central and Eastern Europe, managed the weak economic conditions which were a legacy of the communist period and focused on the tasks of overseeing the transition and establishing economic stability. The fact that, since EU accession, Hungary has devoted more attention towards the task of developing innovation policies, albeit with the weaknesses previously discussed, might suggest that innovation has now become a greater government priority. This in turn, would mark a notable departure from the status quo during the transition period. However, evidence uncovered during the course of this research raises doubts about this having occurred. Various expert interviews (Academic 3 2016; Academic 5 2016; Government Official 9 2016) suggested that innovation is still given insufficient attention by the Hungarian Government. Due to the fact that innovation is a long-term investment and one which is unlikely to produce immediate gains, it was noted that innovation in Hungary has continually been sidelined as attention has primarily focused on areas related to macroeconomic concerns. Some major economic challenges, especially after the financial and economic crises, have arguably reinforced this tendency. Difficulty

with long-term planning has been further exacerbated by, the previously discussed, institutional instability and frequent restructuring of the governance structure for innovation with each new institution and leader tending to forge a new direction.

An example of this can be seen in the government's commitment, or lack thereof, towards R&D funding. In fact, in terms of Government Expenditure on R&D, Hungary is one of the worst performers in Europe. Even more worrying is the fact that government spending has, in recent years significantly decreased from a peak of 0.5% in 2013 to just 0.32% in 2016 (Eurostat 2018e). This is very concerning for Hungary because '[t]he decline in the public intensity in R&D intensity combined with the intrinsic difficulties to sustain the past trend of increase in business R&D expenditure, raises difficulty in reaching the target set by the government in the National RDI Strategy 2013-2020 to increase the country's R&D expenditure to 1.8% of the GDP by 2020 and 3% by 2030' (European Commission 2015b:27). Indeed, with a Gross Expenditure on Research and Development of just 1.3% in 2017, Hungary still remains considerably behind this target.

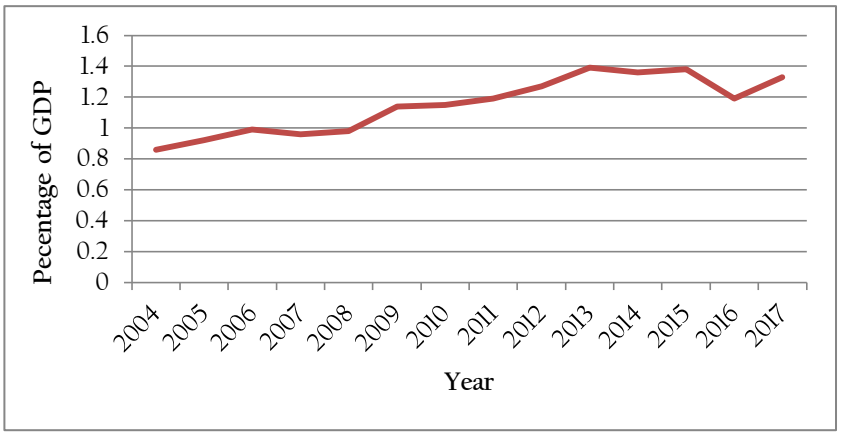
Perhaps even more striking is the fact that the Hungarian Government has repeatedly reneged on its agreed contribution towards innovation-related activities. For example, as previously discussed, the reorganisation of the governance structure for innovation at the beginning of 2015 was, accompanied by a restructuring of the funding system in which the two previous funds, the Research and Technological Innovation Fund and the Hungarian Scientific Research Fund, were amalgamated into the National Research, Development and Innovation Fund. The Research and Technological Fund part of the fund is comprised of an innovation levy (0.3% of the tax base) paid by large companies (more than 50 employees) – which is reduced if that particular company incurs R&D expenditures – and also a contribution paid by the central budget. The government, however, has consistently failed to match the amount of collective levies by additional funding (European Commission 2016c:64) and, as a result, the innovation levy has become yet another unwelcome tax burden for companies with very questionable benefit.

An interview with a government official (Government Official 6 2016) suggested that the Fund is currently being poorly and inconsistently managed with a tendency to produce an unsustainable and unrealistic number of calls whilst the Fund is healthy,

leading to an overstretching of the Fund and then a drastic reduction in the number of calls until the Fund is able to recover. For example, this happened in 2010 when the incoming Hungarian Government suspended all disbursements from the Research and Technological Innovation Fund and ceased accepting new project proposals. This practice has also been noted in a previous study (Szpor et al. 2014) which found that Hungary has traditionally opted for a boom and bust policy in which the budget deficit would soar before being followed by a number of austerity measures with innovation-related funding among the first 'victims' of the public spending cuts. The research by Szpor et al. (2014:11) goes on to note that the lack of commitment to the funding of innovation-related activities in Hungary 'clearly suggests that STI [Science, Technology and Innovation] policy is not perceived as a solution; but rather as a burden on the budget'. Unsurprisingly, interview participants (Government Official 6 2016; Government Official 10 2016; Government Official 12 2017) were very concerned about the long-term effects on the Hungarian economy of continuing with this short-sighted approach towards priority setting.

The lack of increase in government funding has, to a certain extent, been offset by an increase in funding from the EU and the increase in Business Expenditure on R&D. In fact, as shown in Figure 11, Gross Expenditure on R&D has witnessed a gradual increase. The decline in Government Expenditure on R&D means that, at present, Hungary is highly reliant on the contribution of EU funding to support the public funding of innovation. However, there are concerns that EU funds are essentially being used a substitute for national funding 'rather than ensuring complementarity between the two funding streams' (European Commission 2015:28). Even as a substitute, nonetheless, the effectiveness of the Structural Funds should be questioned. Indeed, interviews conducted for this research suggested that the system through which EU funding is distributed prevents it from having a more significant impact on the Hungarian NSI. Owing to the fact that Central Hungary is classified as a 'more developed region', it is eligible for a much smaller proportion of Structural Funds than the surrounding 'less developed regions'. It is important to note though that Hungary is a highly centralised country with an overwhelming majority of innovative firms located in Central Hungary (European Commission 2017b).

Figure 11: Gross expenditure on R&D in Hungary 2004-2017 (% GDP)



(Source: Eurostat 2018c)

Interview participants expressed much frustration with the EU's method for allocating funding as, although the rationale for investing in lesser developed regions is clear, the outcome is that a much smaller proportion of funding is available to the companies driving innovation in Hungry and that could use the funding more effectively, which are located in the central region. In other words, as noted by the EU itself, the 'differentiated eligibility for EU funding among the capital region and the rest of the regions creates complexities in ensuring the resources for the operations of the most important R&I [Research and Innovation] capacities of the country that are located in the capital region' (European Commission 2015:28). It was claimed by an interview participant who had been heavily involved in funding decisions in Hungary (Government Official 6 2016) that the small amount of national funds which are available have to be used to 'recover these holes' and to ensure that the companies most able to improve Hungary's innovation performance are able to receive the funding they require.

It is worth noting that the situation in Hungary is considerably different from that in the Czech Republic due to the fact that, in Hungary, the entire central region, which includes and surrounds Budapest, is considered more developed. In the Czech Republic, on the other hand, whilst Prague is classified as being more developed, the areas immediately surrounding Prague are not and are therefore eligible to receive a greater proportion of Structural Funds. One example of this in practice is the Extreme

Light Infrastructure (ELI) laser research centre which, in Hungary, has been set up in Szeged, a city roughly 170 km South-East of Budapest (the ELI research centre in the Czech Republic was set up roughly 20km from Prague). The increased geographic distance in Hungary makes it more difficult for linkages and collaboration to occur between the ELI research centre and the more innovative companies which are based in Central Hungary. This raises important questions about whether the EU's method for allocating funding is effective for a highly-centralised country such as Hungary.

In short, the lack of government commitment to the funding of innovation in Hungary would suggest that there is a clear inconsistency in terms the EU's vision for an innovation-driven economy and that of Hungary in which innovation is seen as something of a budgetary burden. For example, whilst the EU has substantially increased its budget for innovation, Hungary is actually showing the opposite trajectory and Government Expenditure on R&D has recently decreased. Although, on the one hand, the fact that Hungary has produced a number of innovation-related policies and strategies since its accession to the EU (see earlier section) would suggest that greater emphasis is now being placed on the role of innovation for economic growth, this, on the other hand, is somewhat contradicted by the lack of commitment towards government funding. Indeed, from this perspective, it could be suggested that the tendency to sideline innovation, as was done during the transition period, and focus primarily on macroeconomic policy has become a characteristic of the government's approach to policy prioritisation in Hungary. Moreover, the EU's Structural Funds are unable to effectively substitute the lack of public funding in Hungary as they are less available to companies in Central Hungary, the area with the greatest concentration of innovative enterprises. As a result, the dichotomy in terms of the EU's approach towards innovation and the one currently being pursued in Hungary is a major obstacle to the Europeanisation process.

Area of misfit 3: Lack of trust and collaboration

Stakeholder involvement has for some time been particularly problematic in Hungary due to reluctance on the part of some actors to collaborate and cooperate with one another. This could, in part, be explained by the fact that Hungary is both politically and geographically a highly centralised country. With the creation of the

new NRDIO office, innovation is now an even more centralised topic, with interviews suggesting that this new office has taken a particularly top-down approach and is less actively seeking the contribution of stakeholders. Another explanation for this lack of stakeholder involvement, and a problem which was repeatedly identified in interviews (Academic 3 2016; Government Official 6 2016; Government Official 10 2016; Government Official 12 2017) as well as other studies (European Commission 2015b; Havas 2011), is the lack of trust, or even distrust, between actors in the Hungarian NSI, particularly between government and companies and, to a certain extent, between the companies themselves. It was claimed by a government official (Government Official 12 2017) that this lack of trust is a path dependent trait inherited from the communist period and, indeed, it is argued that a number of Hungary's deficiencies 'pertain to a long-lasting institutional legacy and culture that did not place a strong emphasis on openness, collaboration and communication' (European Commission 2015:22). Given that the lack of trust has become so embedded in the Hungarian NSI, this is likely to be particularly difficult problem for Hungary to overcome.

The problem of lack of trust is being perpetuated by ongoing concerns relating to corruption and transparency. The issue of corruption is currently very problematic in Hungary as was highlighted in a number of interviews with business leaders who had experienced issues with corruption to the extent that, in some cases, it had discouraged them from continuing to expand their business profile in Hungary (Business Leader 3 2016; Business Leader 5 2016). Not only can corruption discourage investments from foreign companies but research also suggests that political corruption can impede firm innovation by reducing innovation incentives due to high extortion risk and by decreasing the threat of competition (Huang & Yuan 2019). According to Transparency International's Corruption Perception Index (Transparency International 2017), Hungary is ranked 66 out of 180 and has a transparency score of 45 (with 0 being highly corrupt and 100 being very clean). In fact, according to this measurement index, Hungary is one of the worst performing EU Member States (only Bulgaria, which is ranked 71st, is lower than Hungary).

In recent years, concerns about corruption and dedemocratisation in Hungary have been gaining momentum thanks, in large part, to negative tendencies affecting civil society and independent media enacted by the current Hungarian Government (Bogaards 2018). However, corruption is not a new issue in Hungary and, in fact, was

seen as a potential impediment to the establishment and of a well-functioning democracy during the transition period and sustainment thereafter (Rose 2001). The reasons for this concern were twofold. Firstly, corruption was increasingly being seen as a legacy of the communist period during which time bribes, kickbacks and payoffs were ubiquitous and corruption was even seen as 'normal in Communist regimes' (Rose et al. 1998:219). Holmes (1993:55) for example, notes that 'public ownership of the means of production and state involvement in virtually all areas of society, added to the relatively low level of answerability of public officials to the citizenry meant that communist states were among the most susceptible to the phenomenon of corruption'. Secondly, rather than breaking with this practice, on entering the transition period, the process of privatisation combined with weak formal intuitions created yet more opportunities for corruption to take place. This was confirmed in a report by the World Bank (World Bank 2000) which identified that corruption had played a part in numerous cases in transition countries where control of state assets was transferred through nontransparent means to those with political influence.

In terms of legacy, Sandholtz and Taagepera (2007:109) argue that not only did communism create the structural incentives for engaging in corrupt behaviours but that these 'became such a widespread fact of life that they became rooted in the culture in these societies – that is, the social norms and practices prevailing in communist societies'. Indeed, the ongoing issues of corruption during the transition period, indicate that the collapse of the communist regime was not sufficient to 'erase the cultural values and attitudes that tolerated, if not encourage, corrupt practices' (Sandholtz & Taagepera 2007:111). Explanation for this observation can be provided by a closer understanding of the role of formal and informal institutions and how they are both shaped by and shape behaviour. For example, North (1990) notes that whilst formal institutions can be changed relatively quickly, informal institutions require longer periods to establish change as actors adjust their behaviour to correspond to the advantages and costs of the new system. If, as in the case of corruption during the transition period in Hungary, actors continue to associate benefits with the original informal institutions, there will be a resistance to breaking with the past and, consequently, the path dependency will continue to exist.

The ongoing issue of the lack of accountability and the tendency for too much to be done behind closed doors was frequently reiterated in interviews (Government

Official 6 2016; Business Leader 5 2016; Academic 3 2016). The over-centralisation of the new system and the considerable power of just one actor, the President of NRDIO, were also recurrent concerns. In the words of one interview participant with expert knowledge of the Hungarian situation, 'because the resources are very finite they must be distributed carefully and it is much better if such a board discusses this than by various bargains, gives and takes behind the scene' (Academic 5 2016). There was, however, little confidence expressed that accountability and transparency would improve under the current regime. It was suggested in interviews with experts from within the field (Academic 3 2016; Government Official 6 2016) that much of the system is gripped by power games, impeding the vitally important progress and changes which need to be achieved.

With regard to the EU, the lack of trust and collaboration has two important implications. Firstly, the difficulties of ensuring stakeholder engagement caused by the lack of trust raises questions about the extent to which the latest innovation strategy, the Smart Specialisation Strategy, and its emphasis on a bottom-up approach to policy-making is realistically feasible in the current Hungarian environment. Given that the country lacks the necessary conditions, such as stakeholder involvement and a collaborative culture, the Hungarian experience casts strong doubt on the appropriateness of such a strategy for a country in which lack of trust is an embedded problem. Interview participants (Government Official 6 2016; Government Official 12 2017) claimed that the Smart Specialisation Strategy approach was better suited to developed countries with more advanced funding systems and more experience with stakeholder engagement. Indeed, it was already accepted, less than two years since the establishment of the Smart Specialisation Strategy, that it would be unlikely to have the impact that was hoped for and that 'after five years no one would have read this Strategy again' (Government Official 12 2017).

Secondly, in terms of the EU's Structural Funds, a number of concerns were expressed during interviews that the potential benefits of this funding are not being realised due to the inefficient use of this funding. One of the main issues relates to the problem of corruption which, according to various recent studies investigating the misuse of EU funds (Fazekas 2017; Transparency International Hungary 2015), is having particularly negative consequences in Hungary. For example, a study by Corruption Research Centre Budapest (Hajdu & Miklós 2017) on competition and

corruption risks in Hungarian public procurement found that EU-funded projects suffered more strongly from corruption than those funded from the national budget. The study concluded that 'EU funding has perverse effects in public procurement' (Hajdu & Miklós 2017:9-10) due to the fact that it has aided in reducing the intensity of competition as well as increasing both the level of corruption risk and the weight of price distortion. This raises serious questions about, firstly, the effectiveness of maintaining such a high level of EU funding to Hungary when, despite the national programmes being negotiated with Brussels, Hungary is unable to use the funding efficiently and instead 'it is practically stolen' (Academic 5 2016). Secondly, it also highlights limitations in the EU's current monitoring of the use of Structural Funds. Interviews conducted for this research (Academic 3 2016; Government Official 6 2016; Government Official 10) suggested that the EU's monitoring capacity was generally seen as weak and that reversing these trends in the misuse of funds will be extremely challenging.

The lack of trust in Hungary, which has historical origins and continues to be reinforced by ongoing issues of corruption, is a major obstacle to the EU's attempts to influence the development of the Hungarian NSI. In particular, the Smart Specialisation Strategy, which requires stakeholder involvement and actor collaboration, is especially difficult in Hungary, a highly-centralised country which lacks the open environment that is critical to this style of policy-making. Moreover, not only is the EU's innovation policy approach a poor fit for the Hungarian situation but the impact of the EU's main policy tool, the Structural Funds, is also highly questionable. In fact, the influx of EU funding has possibly even exacerbated the longstanding issues relating to corruption. This finding is very concerning because in addition to deepening Hungary's 'lack of trust' path dependency, it also prevents the EU funding from being used in a way which can maximise its benefit for the Hungarian NSI.

Area of misfit 4: Lack of innovative entrepreneurialism

An issue on which interview participants were unanimous concerns the lack of innovative activity amongst small and medium sized indigenous companies in Hungary. The number of SMEs (between 10 and 249 employees) classified as 'Innovative Enterprises' in 2014 was just 3,428 (compared to an EU average of 12,789) (Eurostat

2018c). As was noted in an interview with an academic (Academic 4 2016), Hungarian firms typically carry out little 'R&D' and tend to focus their activities on just 'D'. Based on the categories identified in Chapter 2, Hungarian companies typically follow a 'dependent' or 'traditional' strategy in which very little research is actually conducted by the companies themselves. Again, this is not a new problem for Hungary as the country's previous institutional structure and recent economic development strategy has for some time hindered industrial innovation. The tendency for companies to focus on development is a path dependent legacy of the communist era, in which the roles of research and development were clearly divided between the research institutes on the one hand and the companies on the other.

As discussed previously, during the communist period most industrial research was transferred to the industrial, or branch, institutes. Whilst this led to a sizeable growth in the number of research institutes engaged in industrial research, paradoxically, the benefits of this development to industry were limited. The reasons for this were, firstly, serious problems of technology transfer were caused by the fact that the institutes performing R&D were not directly attached to companies. Secondly, the average qualification of the industrial R&D's personnel was low, with only 4% holding a 'Candidate of Science' degree which is comparable to a PhD in 1991 (Biegelbauer 2019). Finally, as a result of the establishment of the branch institute system, in house R&D was severely neglected. Whilst there were pockets of success, especially in organic/inorganic chemicals and pharmaceuticals (Inzelt 1994), the institutional structure for industrial research, on the whole, was riddled with inefficiencies that restricted the innovation capacity of companies. These problems were exacerbated during the transition period for two reasons. Initially, the sudden loss of markets and exposure to greater competition meant that many companies either closed or were forced to focus their efforts on survival and away from investing in R&D. Subsequently, the privatisation process saw many companies being bought by foreign purchasers who chose to conduct R&D in the parent country and cease R&D activity in Hungary (Romijn 1998). Thus, for some time, Hungarian companies have endured a number of circumstances which have stifled research and innovation.

Whilst indicators of Hungary's innovation performance do suggest areas of improvement (European Commission 2016a), this is due predominantly to foreign or foreign dominated multinationals which, as already discussed, have a significant

presence in Hungary. The innovation performance of SMEs is, by contrast, much weaker suggesting, again, that Hungary's progress toward becoming an innovation-driven economy is very much dependent on foreign-controlled MNEs. The poor innovation performance amongst SMEs is even more puzzling considering the sizeable amount of public support for SMEs in Hungary (Table 11 below). As can be seen from these data, there is a clear incongruity between the percentages of SMEs receiving public support, nearly half, and those which are classified as innovative, which is considerably lower.

Table 11: Innovative firms in Hungary

Innovative firms (product/process or organisational/marketing)		
Total (as a percentage of all firms)	**SMEs (as a percentage of SMEs)**	**Large (as a percentage of large firms)**
31.3	29.9	65.5
Firms receiving public support		
45.6	47.2	35.1

(Source: OECD 2015b)

As show in Table 11, the difference between the percentage of innovative SMEs and innovative large firms is very significant in Hungary. A report undertaken by the EU suggested that these 'opposite trends of declining shares of innovative firms and increasing levels of business R&D expenditure(…)demonstrate a weak capacity of the R&D conducted in Hungarian firms to significantly contribute to innovation' (European Commission 2015:16). In interviews conducted for this research, two key factors were highlighted which could potentially provide some explanation for this observation; (1) insufficient human resources and (2) lack of targeted funding. In terms of human resources, this is a problem which has been made particularly acute due to the fact that, as discussed earlier, national Hungarian SMEs have to compete for labour with the large MNEs. This problem is further exacerbated by the inability of the

Hungarian tertiary education system to supply sufficient qualified labour available in the first place. (For a detailed discussion of this, see below.)

With regard to funding, given that SMEs are receiving considerable public support and yet failing to significantly improve their innovation performance, it could be suggested that, at present, the use of government subsidies is having an adverse effect. Hungary has directed a significant proportion of its public expenditure on R&D towards the business sector and expert interviews (Academic 4 2016; Academic 5 2016; Business Leader 5 2016) noted that the poor targeting of this funding was having a negative impact on encouraging an environment that would enable innovation in Hungary. Indeed, some companies are being deterred from applying for government funding due to the administrative burden and the perceived lack of transparency and clarity with which the funding is allocated. In addition to this, interviews also highlighted concerns with the reviewing bodies and the ability of those individuals to capture the innovative values of a new product or idea. It was indicated that there is little motivation for personnel with higher expertise to participate in reviewing bodies and that, therefore, these bodies are not best positioned to judge the potential benefits, or drawbacks, of a new direction. Based on this evidence, it would seem that a key element for improving the efficiency of public investment in R&D would be to make it more attractive for firms to apply by reducing the administrative burden, improving transparency of the application and review process and increasing the expertise of the reviewing panels.

In summary, Hungarian companies have for some time faced an environment which has made innovative activity more challenging. From the communist era, during which time the main role of firms was essentially seen as one of development and not related to the undertaking of research itself, to the transition period, in which the loss of income and privatisation led to the cessation of much company R&D activity. This section has shown that these intuitional legacies continue to restrict the role of national firms within the Hungarian NSI. The lack of innovative national companies has become a path dependency which is severely hindering the ability of Hungary to improve its NSI and to reach both its own national targets and the targets of the EU. It also represents a further impediment to the successful implementation of a Smart Specialisation Strategy, and more specifically the Entrepreneurial Discovery Process, which is a key feature of the EU's Smart Specialisation approach (similar to the

situation in the Czech Republic as discussed in Chapter 5). Yet, the experience of Hungary has also shown that a greater amount of financial investment is not necessarily a solution to this problem. Indeed, in order for funding to be effectively used not only must it be well targeted but other factors, such as the provision of qualified human resources, need to be provided. Creating the framework conditions which can encourage and support the establishment of innovative local companies in order to overcome this path dependent trait, is vital to improving the Hungarian NSI.

Area of misfit 5: Education system and skilled labour

On entering the transition period, not only did the Hungarian research system face the challenge of reinstating research at universities but also that of redesigning the teaching curriculum so that they were based on market needs and research interests and not on political planning as had been expected during the communist period. As was noted earlier, the lack of research being carried out in universities during the communist period meant that universities were poorly integrated into the innovation system which, in turn, resulted in a mismatch between university syllabuses and the skills required by the business sector. Interviews conducted for this research (Government Official 7 2016; Government Official 8 2016) indicated that this remains a major problem within the Hungarian tertiary education system and that graduates frequently require retraining when entering the workforce as they lack the knowledge and skills required by the company. As it is, however, common for students to work at a company whilst undertaking their studies, retraining in these instances is of course not necessary. Nonetheless, it does mean that the individual is often already committed to a particular company and will therefore not be available for other companies to compete for their employment. This would likely place companies who are not in a position to offer a position to an undergraduate student, such as SMEs with fewer resources, at a disadvantage.

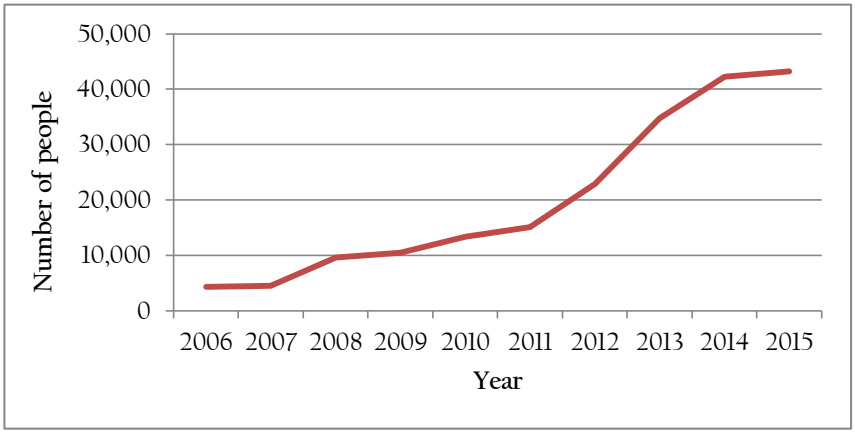
According to interviews with various expert participants (Academic 4 2016; Government Official 7 2016; Government Official 8 2016), students who work whilst undertaking their degree frequently drop out of degrees as there is a significant incongruity between the university teaching and the skills required by the company. With a dropout rate of 47% in 2011, Hungary is one of the worst performing OECD

countries in this area (OECD 2015a). Whilst this is not direct proof of a lack of fit between Hungarian university syllabuses and the skills and knowledge requirements of companies, a high dropout rate can 'indicate that the education system is not meeting students' needs' (OECD 2009:62). It is perhaps not surprising, therefore, that insufficient skilled labour was repeatedly mentioned as the main concern for the future of the Hungarian innovation system amongst interviewees (Academic 4 2016; Academic 5 2016; Government Official 6 2016; Government Official 7 2016; Government Official 8 2016; Government Official 10 2016; Government Official 12 2017). This issue is being further exacerbated by (1) the education system and (2) emigration. In terms on the former, problems within the Hungarian education system were frequently identified as one of the principal causes of this problem. The Hungarian education system was described as outdated and failing to equip students with the necessary skills before joining the labour market. In fact, the Hungarian approach towards education is considered content-centred with insufficient focus on knowledge application and problem solving (OECD 2017).

Perhaps the cause for greatest concern, however, is the apparent lack of priority given to education by the government. According to OECD data (OECD 2014), Hungary is one of the last OECD member countries in terms of education spending with only Columbia, Argentina and Chile spending less. This lack of spending is reflected in PISA statistics (PISA 2018) in which Hungary is in all areas – science, mathematics and reading skills in children aged 15 – slightly behind the OECD average with a decline in all three indicators since 2006. In terms of higher education, Hungary does not even rank in QS's 50 world's strongest higher education systems and has no universities in the top 500. This should be an area of considerable alarm because, as was repeatedly stated in interviews (Academic 4 2016; Academic 5 2016; Government Official 8 2016), human capital is vital for innovation. Or, in the words of an academic (Academic 5 2016), 'without people, there can be no innovation'. The insufficient investment in the education system highlights an earlier point related to the lack of commitment being made by the Hungarian Government towards prioritising and acting on the task of developing its NSI. One potentially positive development is the Higher Education Strategy which was approved by the government in 2016 as part of its Change of Pace in Higher Education initiative. It is still too soon, however, to assess the impact of this new strategy.

With regard to emigration, this and the accompanying brain drain, has for some time been a concern in Hungary, especially since joining the EU and accepting the EU's principle to allow free movement of labour. It was suggested in interviews (Business Leader 5 2016; Academic 5 2016) that this has become an even more problematic issue in Hungary owing to the considerable number of highly talented and well-educated people leaving due to political differences with the current government which came to power in 2010. Emigration statistics (Figure 12) do show that there has been a considerable rise in the number of people emigrating from Hungary since 2010 although, of course, it is not possible with these data alone to make a direct correlation between emigration and political dissatisfaction. Hungary's emigration problem is confounded by the fact that Hungary is not a particularly attractive opportunity to highly-skilled foreign workers owing in large part to the relatively low wages in comparison to, for example, Western European countries. The total number of foreign residents immigrating to Hungary in 2016 was 23,803 and the most significant number of foreign residents came from Romania (3,090), followed by Germany (2,282) and then China (1,461) (Hungarian Central Statistical Office 2018a). Furthermore, the involvement of foreign personnel in science and technology in Hungary remains low (European Commission 2016c:49).

Figure 12: Emigration from Hungary 2006-2015



(Source: Eurostat 2018a)

In an attempt to reverse some of the effects of brain drain, HAS launched the Momentum programme in 2009. The aims of the programme are 'to halt the emigration

of young researchers, provide a new supply of talented researcher, extend career possibilities and increase the competitiveness of MTA's research institutes and participating universities' (Hungarian Academy of Sciences (MTA) 2018). In order to achieve this, the programme offers young researchers grants to support their research projects and establish a research team. The Momentum programme has helped to establish more than 100 groups and interviews suggested that the programme was generally seen as having been very successful. Some of the concerns, however, include the fact that the salaries of principal investigators are still not internationally competitive, the future of the newly-established research team is uncertain after the funded period comes to an end and also it has resulted in some tensions between beneficiaries of the grant and those who were not able to benefit from such a funding opportunity (European Commission 2016c:50). The task of encouraging researchers living outside Hungary is particularly challenging considering that, according to a study by the OECD in 2016, only about 10% would consider returning to their home country. In short, whilst Momentum has not offered a complete solution to the problem of emigration of young research personnel, it has at least provided a certain amount of assistance.

The mismatch between university syllabuses and business needs, a legacy of the communist period, and Hungary's ability, or lack thereof, to provide a tertiary education which can equip sufficient students with the knowledge and skills needed for an innovation-driven workforce remains an area of major concern. This is particularly worrying as not only does it prevent the tertiary education system from producing graduates with the necessary skills but it could also limit the perceived value of gaining academic qualifications. Indeed, the sizeable university dropout rate in Hungary indicates that there is a serious problem with the tertiary education system. Given the increasing rate of emigration, the inability to attract skilled workers and the problems within the education system, the labour force shows signs of becoming an area of serious concern for Hungary. This would impact significantly on Hungary's ability to improve its NSI in the future and, in turn prevent greater improvement in its innovation performance. As noted in the previous chapter, the fact that the EU has limited authority or hard policy tools in the area of education policy significantly weakens the EU's capacity to influence the development of this aspect of Hungarian NSI.

Conclusion

At the beginning of the transition period, Hungary appeared to have the potential to be a star performer amongst Central and European countries. Almost three decades later, Hungary has not progressed as rapidly as had been hoped and, in fact, in recent years it has even shown a decline in some indicators. With regard to research and innovation, there has been a considerable lack of continuity in terms of its governance since the transition period and, whilst there is some hope expressed that the establishment of the National Research, Development and Innovation Office marks a new beginning, there is currently not sufficient evidence to support this assertion. In terms of the impact of the EU, similarly to the Czech Republic, there are a number of areas of misfit which are preventing the Europeanisation process. These areas of misfit are, in large part, the result of Hungary's path dependent historical legacies and economic structure. The experience of Hungary suggests that the EU's Innovation Policy and policy tools are a poor fit for these national specifics and this, in turn, is preventing the EU from influencing the Hungarian NSI more significantly.

7) Conclusion: Comparison of the Czech Republic and Hungary

Introduction

The Czech and Hungarian case studies presented in Chapters 5 and 6 have sought to shed light on the role played by Europeanisation in the development of these NSIs. The aim of this chapter is to draw together the information presented in this thesis in order to answer the research questions and hypotheses set out in the initial chapters. The first section of this chapter, therefore, highlights discussion from the previous chapters concerning the extent to which the EU can be considered to have influenced the Czech and Hungarian NSIs. Secondly, this chapter compares the Czech and Hungarian experiences in order to identify why, notwithstanding the various problems discussed in Chapter 5, the Czech Republic has shown greater improvement in its innovation performance than Hungary. Using this information, a number of policy implications are then highlighted which could assist the EU in its attempts to exert a more significant influence on the NSIs of its Member States. A fourth section looks at the contributions of this research to knowledge. Research limitations and potential options for further research are discussed in the final section.

7.1) The EU and the Czech and Hungarian NSIs

The preceding chapters have provided a detailed discussion about both the historical development and the current status of the Czech and Hungarian NSIs. By tracing the history of these NSIs, this research approach has helped identify a number of factors which explain the reasons for the current problems facing the Czech Republic and Hungary in terms of improving their innovation performance. It is important to note that as research and innovation were essentially sidelined in both countries during the transition period, the task of promoting innovation actually only began to receive any notable attention at the time of EU accession and, as such, is still a relatively new policy area. It is perhaps not surprising, therefore, that there has been considerable change and disruption to their innovation systems as these countries have sought to 'find their feet' in this new policy area, a challenge which has been made even more difficult by the lack of experienced policy-makers with expertise on this topic.

Nonetheless, despite both the Czech Republic and Hungary having a notable history of scientific success, since returning to a market economy these countries have encountered difficulties in improving their innovation performances. At present, a considerable disparity continues to exist between the Czech Republic and Hungary and their Western European counterparts, which is showing only minimal signs of diminution. This is partly due to the fact that, as already mentioned, during the transition period the topic of innovation received very little attention as governments focused on the task of completing the socio-economic transformation whilst trying to maintain economic stability. Indeed, a major way of achieving this was through attracting FDI which, after the financial challenges caused by the disbanding of the Comecon and the related loss of foreign markets, was an important method with which to encourage economic growth. However, even though in more recent years the topic of innovation has returned to the political agenda of both countries, this research has shown that the Czech Republic and Hungary are still facing a number of obstacles which are preventing them from improving their innovation performance more significantly.

Concerning the EU, since the introduction of the Lisbon Strategy in 2000 and, more recently, Horizon 2020 in 2014, the EU has been acutely aware of the need to promote innovation in order to ensure economic growth and solve societal challenges and, consequently, innovation has become an important EU topic. With this in mind, the main aim of this research was to investigate the extent to which Europeanisation is affecting the nature and development of national innovation policies in the Czech Republic and Hungary. In addition, this research has sought to identify the manner in which this process of Europeanisation is mediated by, firstly, national factors and, secondly, economic factors, specifically, in the case of these countries, the role of MNEs. The central argument of this thesis is that there are a number of areas of misfit, caused by the Czech and Hungarian path dependent historical legacies and economic structure, which are impeding the process of Europeanisation. The main factors, as discussed in Chapters 5 and 6, that are mediating the Europeanisation process are; (1) dependency on foreign companies, (2) public management of NSI, (3) lack of trust and collaboration, (4) lack of innovative entrepreneurialism and (5) education system and skilled labour. The following section will provide a brief summary of each area of misfit.

As noted in Chapter 2, the dependence of the Czech Republic and Hungary on foreign investment has created a specific type of political economic structure, namely that of a Dependent Market Economy (DME). In terms of innovation, this research has noted that foreign firms have also begun playing an increasing role in the NSIs of the Czech Republic and Hungary and now account for a sizeable share of their total R&D spending. As a result, the Czech Republic and Hungary have, to a large extent, developed Dependent National Systems of Innovation. This refers to the fact that both countries have developed systems in which their innovation capacity and performance is heavily reliant on not only the funding from but also the output of foreign companies. From a historical institutionalist viewpoint, therefore, the dependency on foreign firms has become a path dependent trait in both countries. However, with regard to the EU, this dependency on foreign firms is not addressed in the EU's innovation policy documents which focus on innovation from an upstream perspective (mainly R&D activities) rather than a downstream perspective (related to global value chains). By failing to recognise the importance of foreign firms to the Czech and Hungarian NSIs, the EU's innovation policy is not able to fit their specific needs.

In terms of the public management of the Czech and Hungarian NSIs, the historical legacies resulting from the collapse of the Soviet Union and the loss of the centralised system meant that on returning to a liberal market economy, these countries had (a) fragmented innovation systems due the inherited separation of research sectors and (b) limited policy making experience. This has led to problems of, firstly, policy design and realistic target setting and, secondly, policy implementation. The various governance restructuring exercises undertaken, which have been especially frequent in Hungary, have failed to solve the governance issues and the recurrent upheavals have created confusion and delay. As a result, although, as promoted by the EU, both countries have designed and regularly updated their national innovation policies, the inherited weaknesses within the public administration of the Czech and Hungarian NSI are limiting the practical impact of these policies. Indeed, given the current weaknesses within the Czech and Hungarian governance systems for innovation, the realistic expectations of what any innovation policy can presently deliver, are highly questionable.

Another inherited legacy of the communist period, and one which was exacerbated during the transition period, is the lack of trust and collaboration between

actors. Although the lack of trust has historical origins, it has been perpetuated by recent problems, especially those relating to corruption which has been problematic for both the Czech Republic and Hungary. In addition, the lack of experience of collaboration – as discussed, the Soviet system was highly compartmentalised – has resulted in a poor collaborative culture in both countries. With regard to the EU, this research has shown this to be impeding the influence of the EU in two important ways. Firstly, the success of the latest policy approach advocated by the EU, the Smart Specialisation Strategy, requires a high degree of cooperation between actors which is being prevented by the lack of trust and collaborative culture present in the Czech Republic and Hungary. Secondly, this research has also indicated that the lack of collaboration is preventing a more effective use of the EU's Structural Funds and, in fact, the high degree of corruption associated with Structural Funds is even exacerbating the problem of lack of trust.

A further impediment to the successful implementation of a Smart Specialisation Strategy, and more specifically the Entrepreneurial Discovery Process which is a key feature of the Smart Specialisation approach, in both the Czech Republic and Hungary is the lack of innovative entrepreneurialism. Again, this can be traced back to the legacies of the communist era in which, firstly, a very negative perception of entrepreneurs existed. Indeed, especially in the Czech Republic, this remains a problem and this research has suggested that in order to overcome the lack of SMEs, this will require an attitudinal shift in the way in which society perceives the role of entrepreneurs. This legacy has also led to a lack of role models for entrepreneurship as discussed in Chapter 5. Secondly, in terms of the innovative capacity of the Czech and Hungarian SMEs, the tendency for little R&D to be carried out within companies, as was the case during the communist period, remains a problem within both countries. In fact, at present, the lack of innovative SMEs is a major impediment to the EU's attempts to develop the Czech and Hungarian NSIs and improve their innovation performance.

A final legacy of the communist period that this research has identified as continuing to affect the development of the Czech and Hungarian NSIs is the poor integration of the tertiary education system. As noted in Chapters 5 and 6, during the communist era, the role of universities was essentially confined to that of a teaching institution and universities carried out very little research. Ongoing weaknesses within

the tertiary education system mean that Czech and Hungarian universities are failing to produce sufficient students with the necessary research skills and knowledge, yet it is this human capital which is vital to improving the innovation capacity of both countries. As education is a national policy area, and one in which the EU has limited authority, the EU is very limited in its ability to influence the Czech or Hungarian education system. This is a critical weakness in the EU's capacity to influence the development of the Czech and Hungarian NSIs.

In short, this research has shown how national factors related to path dependent historical legacies and economic structure are mediating the process of Europeanisation in both the Czech Republic and Hungary. The role of agency in maintaining path dependencies when individuals perceive a benefit in doing so has also been highlighted. In addition, it has been observed that, in some cases, there is an interaction between these factors which is further reinforcing the path dependent traits observed in the previous chapters. For example, the dominance of MNEs places considerable tension on the labour market with smaller local companies struggling to compete against the attractiveness of the high salaries and prestige of working for these globally renowned enterprises. As a result, many of the most talented employees are absorbed by the MNEs instead of working in smaller indigenous companies or even establishing their own companies, where they would make a more significant contribution to developing the Czech and Hungarian NSIs. Similarly, the lack of trust within the Czech Republic and Hungary prevents greater collaboration between actors which, in turn, exacerbates the already severe problems of fragmentation within the system. In other words, a vicious cycle develops in which one path dependency feeds into another creating an ever deeper embedded trait. This intertwining could potentially mean that the greater the importance of these factors becomes, the greater their mediating power on the Europeanisation process. This is, however, only an initial suggestion and would require further research to corroborate.

In terms of the hypotheses identified in Chapter 2, therefore, this research suggests that the role of the EU's Innovation Policy on influencing the Czech and Hungarian NSIs has been much less than expected (Hypothesis 1). It is important, however, to distinguish a difference between the impact of EU accession and that of the EU's ongoing influence. Whilst the latter has been less impressive, the former did actually have a notable influence. Indeed, during the pre-accession period and the very

initial period of EU membership, the impact of EU's innovation agenda on the Czech and Hungarian innovation systems was very significant, not only in terms of its direct impact but also its indirect impact. Directly, the application of conditionality to EU membership had a significant impact on the formal institutional transformation in both countries. Furthermore, with regards specifically to research and innovation, the Lisbon Agenda played a notable role in drawing political attention to the importance of innovation as a source of economic growth and as a tool with which to tackle the challenges currently facing society, such as environmental concerns and an ageing population. In other words, having spent most of the transition period in the background, the EU was instrumental in returning the topic of innovation back to the political agenda. As observed in Chapters 5 and 6, it is during this period that both countries began to pay more attention towards actually developing their innovation strategies and promoting a more innovation friendly environment. Nonetheless, although the EU drew attention to the need to produce innovation-related strategies, the actual implementation of these strategies has encountered a number of problems (discussed below). Therefore, although accession to the EU may have increased policy awareness, this has not necessarily been accompanied by a development in the Czech and Hungarian NSIs as a result of policy outcomes.

With regard to the indirect impact of the EU, accession to the EU also improved the perception of stability within these countries and, consequently, both the Czech Republic and Hungary, who were already benefiting from FDI, became even more attractive to foreign investors. These new investors came with certain requirements and meeting these needs required government and policy action (Hypothesis 3). Indeed, the Czech Republic and Hungary have become highly dependent on foreign investment for not only their economic development but also their innovation capacity and development of their NSIs. In other words, as previously mentioned, it could be suggested that the Czech Republic and Hungary have developed Dependent National Systems of Innovation. This is due to the fact that improvement in the Czech and Hungarian innovation performance has been largely driven by foreign companies whose investment in R&D now accounts for a considerable amount of business R&D expenditure in both countries and without these foreign companies, a sizeable hole would be left in their NSIs. Indeed, the impact of FDI on the Czech and Hungarian

NSIs has been so significant that what has in practice taken place is FDI-sation of these systems which has, in turn, limited the impact of Europeanisation.

Although EU accession had a notable impact, the ability of the EU to exert an ongoing influence has been much less significant. As discussed, a major reason for this is that there are several areas of misfit between the EU's innovation policy approach and the Czech and Hungarian national institutions, both formal and informal (Hypothesis 3). A clear example of this mismatch can be seen in the EU's latest approach towards innovation strategy, the Smart Specialisation Strategy, which has encountered a number of problems in the Czech Republic and Hungary. One of the major issues with the Smart Specialisation Strategy approach is that it requires cooperation and collaboration between actors from the various sectors. This is something which is currently extremely challenging in both countries due to the historical separation of the different sectors of the research system and also the problem of lack of trust, a legacy of the communist period which was exacerbated by corrupt activities during the transition period and continues to be an area of concern. In addition, the problems within the public management of the NSI, and the related issue of a policy implementation gap, raise serious doubts about how achievable the implementation of this ambitious and complex strategy approach is in either the Czech Republic or Hungary. As a result, the Smart Specialisation Strategy approach at a national level has essentially become an exercise which had to be completed in order to gain access to the EU's Structural Funds and its likely long-term impact currently appears limited. It should be noted, however, that this contradicts some findings for the regional Smart Specialisation approach across the EU which, it is claimed, 'was being viewed more positively and had become increasingly accepted by policy-makers' (McCann & Ortega-Argilés 2016:1417). Further research is required in this area in order to provide more conclusive evidence.

Another concern with the EU's latest policy approach is that this research suggests the EU's guidelines for innovation have become less clear, which is creating confusion for policy-makers who are struggling to understand exactly what the EU is requesting. The change in the EU's approach towards innovation policy could likely be an attempt to overcome some of the criticisms made of earlier EU policy attempts which were considered too rigid and 'one size fits all'. It may also be a somewhat inevitable result of the accession to the EU of new Member States with very different

innovation systems and challenges, which has led to the broadening of the guidelines in order that they provide relevance to both the older and newer EU Member States. The potential problem of expanding the guidelines in this respect though is that the policy becomes less specific which can cause the clarity of direction to become lost and thus reduce its capacity to influence the innovation strategies as intended. In other words, given that there is so much variation across Member States in terms of, for example, national institutional arrangements and political and economic structures, an attempt to develop a single policy approach which can respond to all these divergent needs may actually weaken the ability of the EU to exert influence.

However, it is not just problems with the policy approach which are limiting the EU's influence but also the effectiveness of the policy tools being used by the EU. The most notable of these is the Structural Funds which, this research suggests, are not working as efficiently at producing the desired outcomes as would be expected. One area of particular concern relates to the issues of misuse and corruption of Structural Funds, which is preventing the funding from reaching the location for which it is intended. Given that corruption was identified as a factor which has contributed to the lack of trust within both countries, it could be suggested that by supplying so much funding, the EU is actually exacerbating this problem. This also raises questions about the monitoring procedures currently being used by the EU and the ability of the EU to ensure that the funding is being used in the manner envisioned. A considerable amount of research has indicated that, by providing additional public resources, EU funds have contributed to problems of corruption in Central and Eastern European countries and has identified a need for the EU to improve its monitoring and controlling framework (Fazekas 2017; Fazekas et al. 2014; OECD 2019; Transparency International Hungary 2015). This is a serious concern across the EU as it has been estimated that 'from detected cases alone, over EUR390 million every year are stolen from the Structural Funds' (OECD 2019:4). Additionally, another major issue is to ensure that the investments are spent in a way that is likely to produce tangible outcomes and is not invested primarily in physical infrastructure which is poorly connected to the local environments and which, therefore, fails to produce any significant benefit. Given that the Structural Funds are the principal tool with which the EU can exert influence, tackling some of the current weaknesses of the funding system could bring about considerable results.

Finally, a major weakness of the EU's current innovation approach for the Czech Republic and Hungary is that is still focuses only innovation mainly from an upstream perspective, i.e. driven by R&D, rather than a downstream method of innovation, i.e. downloading knowledge and skills from MNEs in order to develop local competencies. This latter method for NSI development is largely missing from EU policy documents. In fact, it does not feature in either the Smart Specialisation Strategy (European Commission 2012) guidance or the Peer Review recently conducted of the Hungarian NSI (European Commission 2016). As DMEs, however, this aspect of innovation is vital to both countries studied in this research. The fact that the EU failed to include this in the Peer Review does represent something of a missed opportunity (see discussion below). It also indicates that insufficient emphasis is currently being placed on the role of economic structure in influencing the development of innovation systems. In the Czech Republic and Hungary, the poor integration of foreign companies into their NSIs is resulting in a dualistic system which is weakening the overall innovation environment. Unless this addressed, this could present a major impediment to more rapid and significant improvement in their innovation performances.

7.2) Similarities and differences between the Czech Republic and Hungary

By comparing the Czech and Hungarian NSIs, various similarities and differences can be observed which may provide some information as to why (a) both countries have struggled to improve their innovation performance more significantly and (b) the Czech Republic is beginning to show better innovation potential despite having entered the transition period in a weaker position than Hungary. The main similarities which can be observed concern the dependence of both countries on FDI, changes in public funding for R&D, the organisation of the governance structure for innovation and problems relating to an implementation gap. In terms of differences, these include contrasting innovation performance in SMEs, labour force development and political commitment. These are discussed in more detail in the following sections.

Czech and Hungarian similarities

Perhaps one of the most significant similarities is the dependence of both countries on large, foreign-owned companies. This is hardly a new observation, indeed the existence of a dual economy has for some time been acknowledged (Aide à la Décision Economique 1999). However, as previously noted, it is not just economically that the Czech Republic and Hungary depend on these MNES as they are also amongst the most active and important actors within the Czech and Hungarian NSIs. These companies, consequently, have significant power and influence within the national landscapes. This creates a very challenging situation in which the Czech and Hungarian national governments need to find a balance between responding to the wants and needs of foreign-owned MNEs, on which the countries are heavily dependent, whilst also cultivating an environment in which domestic companies can thrive. Although there are some instances of good connections between foreign and domestic companies, the linkages between foreign and domestic companies are generally poor and foreign companies typically represent more of a challenge to domestic companies rather than offering consistently positive spillover benefits.

A serious concern with the dependence that the Czech Republic and Hungary have developed on these foreign-owned MNEs is that they may at any moment decide to relocate their activities to another country which offers some competitive advantage, such as even lower wage costs, with which the Czech Republic or Hungary cannot compete. As the innovation capacity and performance of the Czech Republic and Hungary rely so heavily on these companies, any potential relocation could have profound effects on their NSIs. The competitive advantage of the Czech Republic and Hungary has depended until now on the availability of a reasonably well-educated, cheap labour force and maintaining this has several negative consequences. Firstly, if the average salaries in the Czech Republic and Hungary remain lower than in, for example, other Western EU Member States, capable and talented people, those who are best positioned to develop the Czech and Hungarian NSIs, will continue to be attracted to the better paying work opportunities being offered abroad. Secondly, the need to provide only a reasonably well-educated labour force, many of whom are retrained by the MNEs anyway, also reduces the incentives for these countries to invest more in improving and upgrading their education systems, yet the provision of a highly skilled labour force is vital to a strong and successful NSI.

This creates something of a paradoxical situation for the Czech Republic and Hungary as maintaining the competitive advantage on which they have so far relied for their economic development, is also, in many respects, impeding their development. Retaining their current competitive advantage, in other words, could be detrimental to the development and improvement of their NSIs. This research suggests that although there is considerable awareness of this problem, there is no consensus as to how it can be solved. Clearly this is an exceptionally complex issue and one which will require ongoing monitoring by both countries. Although interviews conducted during the course of this project seem to suggest that there is a growing confidence in the Czech Republic that the country is beginning to establish a competitive advantage based on the quality of the labour force and not just the lower price of its labour force, more research, and perhaps some more time, will be needed for this assertion to be confirmed.

With regard to the second similarity, public funding for innovation-related activities is an area in which both the Czech Republic and Hungary have witnessed significant improvement, largely thanks to the EU's Structural Funds. Indeed, this research would suggest that access to finance has become much less problematic for companies and entrepreneurs than it was previously. Whilst this is largely a positive trend, the experience of Hungary and the inefficient use of its public funding does highlight the importance of ensuring that the funds are properly targeted and that the results are carefully monitored. Ensuring that companies are able to access finance is clearly imperative to developing the Czech and Hungarian NSIs. However, problems within both countries, especially Hungary, mean that this funding is not always producing the outcomes that would be expected. Without resolving some of the issues currently facing these countries, such as the public management of their NSIs and lack of trust, the setting of targets which aim to increase public funding for R&D, as advocated by the EU, may not result in the intended benefit to the Czech and Hungarian NSIs.

In terms of the governance structure for innovation, both the Czech Republic and Hungary inherited very fragmented innovation systems after the collapse of the Soviet Union, in which the roles of universities, research institutes and companies were highly compartmentalised and involved little collaboration or overlap. In order to improve this situation, at least at a governmental level, both countries have attempted

to merge innovation-related tasks under the jurisdiction of specifically created authorities, the Government Office for Science Research and Innovation in the Czech Republic and the National Research, Development and Innovation Office (NRDIO) in Hungary. Whilst, on the one hand, this does suggest that a strong political commitment is being made towards promoting and supporting innovation, whether these new authorities will be able to overcome the fragmentation issues and have more long-term impact remains unclear. The NRDIO, which is responsible for both policy and funding, represents a particularly centralised approach to solving the problem. This, it would seem, goes against much of the EU's efforts to encourage a more bottom-up and region-specific approach towards innovation strategy.

Although the rationale for restructuring the governance systems for innovation in both countries is clear, one of the problems with any restructuring exercise is that it causes a considerable amount of disruption and requires a significant amount of time for adjustment to take place. This has been particularly notable in Hungary where, as noted throughout this thesis, restructuring has been a frequent event. In the case of the latest restructuring exercises in both countries, it has also meant that some strategies have been lost, becoming, in effect, collateral damage. For example, as noted in Chapter 5, the Czech Smart Specialisation Strategy was developed by the Ministry of Education, Youth and Sports but the management of the Strategy was subsequently transferred to the Section for Science, Research and Innovation upon the latter's creation in 2015. This has led to a situation in which actors within the NSI are unclear as to who is actually responsible for or willing to implement the Strategy. Similarly, in Hungary, the Ministry for National Economy developed the national innovation strategy, 'Investment in the Future: National Research and Development and Innovation Strategy (2013-2020)'. Yet NRDIO, which following the restructuring took charge of policy-making in this area, produced a Smart Specialisation Strategy which showed very little convergence with the innovation strategy prepared by the Ministry for Economy. If the new authority is reluctant to adopt and implement the strategies developed by the previous authority, not only is the original strategy never fully realised but neither can its results be evaluated in order for lessons to be learnt which can inform future strategy and policy decisions. In other words, restructuring has a number of consequences which can result in a temporary delay in the development of the NSI.

Finally, another problem which currently seems to be affecting both countries is that of an implementation gap. Indeed, especially since becoming EU Member States, it could hardly be said that there has been a lack of documented strategies. Yet, the implementation of these strategies and their ability to overcome the problems currently facing the Czech Republic and Hungary has been relatively weak. One explanation for this lies with the fact that both countries have struggled to overcome their lack of experience within this policy area. Inexperienced policy-makers have simply not had the expertise to construct strategies with feasible targets, good implementation prospects and realistic timeframes. This problem was, until recently, particularly acute in the Czech Republic which witnessed a high turnover of public servants. The specificities of the Czech and Hungarian situations also mean that best-practice transfer is not always possible or, indeed, effective. Furthermore, the lack of evaluation exercises has meant that learning opportunities have often been missed. Although experience with policy-making is gradually developing, implementation issues which are preventing more significant strategy outcomes currently remain in both countries.

The lack of successful strategy implementation in both countries may go some way to explaining why there has not been more impactful change in both the Czech Republic and Hungary. A notable concern in both countries which has been identified during the course of this research, is the fact that many of the problems which are currently present in the Czech and Hungarian NSIs have now existed for considerable time. In Hungary, for example, the main weaknesses of the Hungarian innovation system as recognised by the OECD report in 2008 (OECD 2008) are still the same as the issues affecting Hungary over a decade later. A number of the problems in both countries have historical and cultural underpinnings and are exceptionally difficult to resolve. Indeed, the role of history is particularly important as innovation and growth are largely about long-run changes. This research suggests that the current measures are ineffective at overcoming the historically-related problems which are being faced in the Czech Republic and Hungary.

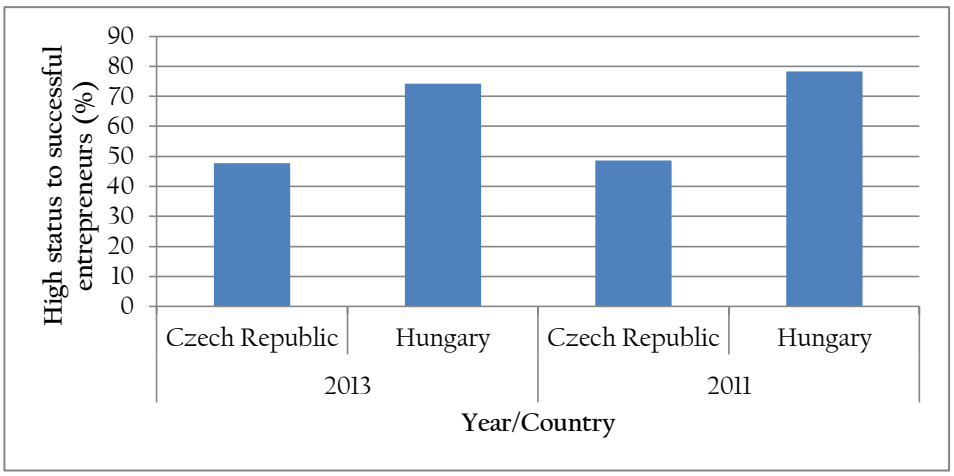
Czech and Hungarian differences

Although there are a number of similarities affecting the Czech and Hungarian NSIs, there are also some increasingly significant differences which account, in part, for

the current variations in performance between the two countries and which could potentially have an even greater and divergent impact on their future capacities. As the previous chapters have highlighted, at the beginning of the transition period Hungary had some notable advantages, such as a greater amount of private sector activity, which had largely resulted from the fact that Hungary had begun its transition to a liberal market economy before the official dissolution of the Soviet Union and earlier than the Czech Republic. However, the performance indicators gathered and discussed during the course of this project suggest that, 30 years later, the Czech Republic now leads Hungary in most, if not all, areas in which the success of an NSI is measured. Whilst both countries have witnessed some development and improvement of their NSIs, such as better access to finance for innovative companies and projects and more investment in R&D, the progress in Hungary has been much less than would have been expected given its initial potential and strong scientific history. This research suggests that Hungary currently has some important challenges which need to be addressed in order to prevent its performance from slipping further behind that of comparable countries.

The first difference concerns the differing innovative contribution of SMEs in the Czech Republic and Hungary. Indeed, the previously discussed dependence on foreign firms is arguably worse in Hungary due to the weaknesses within its SME sector, possibly the Achilles heel of the Hungarian NSI. This finding is slightly perplexing given the fact that, in terms of the public perception of entrepreneurship, Hungary actually has a considerable advantage over the Czech Republic. Indeed, as shown in Figure 13, a significantly higher percentage of Hungarians believe that high status is given to successful entrepreneurs than is the case in the Czech Republic. It is difficult to explain the considerable difference in perception between the Czech Republic and Hungary but it seems feasible that it could, at least in part, be due the fact that the Czech Republic adopted and retained a far more orthodox version of communism as opposed to the 'Goulash Communism' in Hungary where some elements of a free market economy were introduced several years before the Soviet Union disbanded. The limited change in data between 2011 and 2013 could, in turn, highlight how perception and attitudes are slow to change. From the Czech Republic's point of view, the less favourable perception of entrepreneurs in the Czech Republic could represent a deterrent to entrepreneurship as an occupational choice.

Figure 13: High status to successful entrepreneurs in the Czech Republic and Hungary 2011-2013



(Source: Global Entrepreneurship Monitor 2018)

(NB. These statistics are based on the percentage of 18-64 population who agree with the statement that in their country, successful entrepreneurs receive high status.)

In terms of innovation, however, a considerable amount of Hungarian SMEs carry out very little innovation-related activities, tending instead to follow a dependent or traditional firm strategy (see Chapter 2). This research has noted that the innovation performance of Hungarian SMEs is particularly poor in spite of a considerable amount of public R&D funding being directed towards this sector. In fact, Czech SMEs are notably more innovative despite receiving sizeably less public funding (Table 12). This could indicate that, firstly, Hungarian companies are for some reason unable to use the funds efficiently and can therefore not convert the financial investment into more significant tangible outcomes. Secondly, it could suggest that the current method for selecting the recipients of public funding is poor and that subsidies are instead targeting uncompetitive companies rather than those with the potential to use the funding more efficiently. This problem is likely exacerbated by the considerable amount of bureaucracy in Hungary and the frequent systemic changes. Thirdly, the lack of openness and problems with corruption could mean that significant amounts of the public funding earmarked for R&D is essentially being lost and is not reaching its intended target. The poor performance of the SME sector in Hungary is an area of major

concern and one which is severely hindering the development of Hungary's NSI. This issue would unquestionably benefit from receiving greater political attention.

Table 12: Innovative firms in the Czech Republic and Hungary

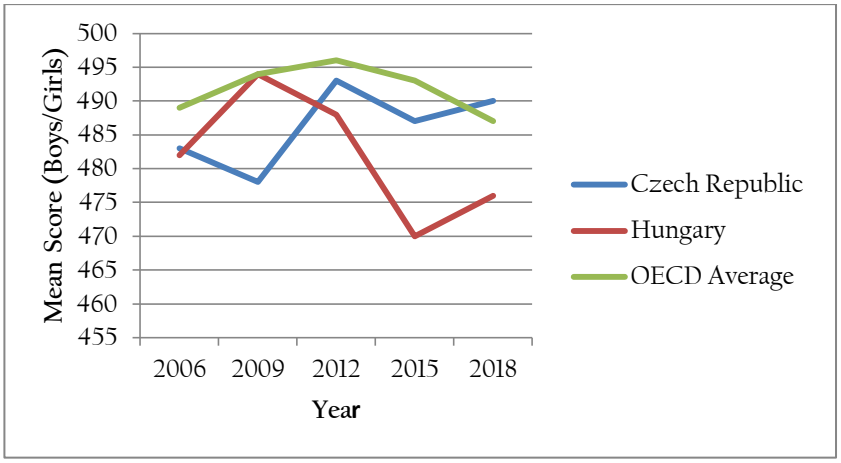
Innovative Firms (Product/Process or Organisational/Marketing)			
	Total (as a percentage of all firms)	SMEs (as a percentage of SMEs)	Large (as a percentage of large firms)
Czech Republic	41.9	40.1	76.5
Hungary	31.3	29.9	65.5
Firms Receiving Public Support			
Czech Republic	24.8	23.1	39.2
Hungary	45.6	47.2	35.1

(Source: OECD 2015b)

Another area in which the Czech Republic and Hungary are beginning to differ relates to the availability of labour. With regard, first of all, to the education system, whilst both countries are experiencing some problems with their education systems in terms of ensuring that they are providing students with the skills and knowledge which are now necessary, the problems do seem to be particularly exacerbated in Hungary. Indeed, as noted in Chapter 6, much frustration about the archaic nature of the Hungarian education system was expressed during the interviews conducted for this research. PISA statistics, for example, show a particularly worrying trend for secondary education in Hungary (see Figures 14, 15 and 16). Hungary is below the OECD average in all areas – reading, maths and science – and has shown a downward trend, especially in reading and science. Whilst the Czech Republic too has shown a downward trend, with the exception of reading, the latest data still show the country is ahead of the OECD average in all three dimensions. Although, in this respect, the Czech Republic's position has arguably been assisted by a slight decrease in the OECD average scores. The Czech Republic is also producing considerably more graduates with 86,741 bachelor, master and doctoral graduates in 2017, compared with 60,267 in Hungary

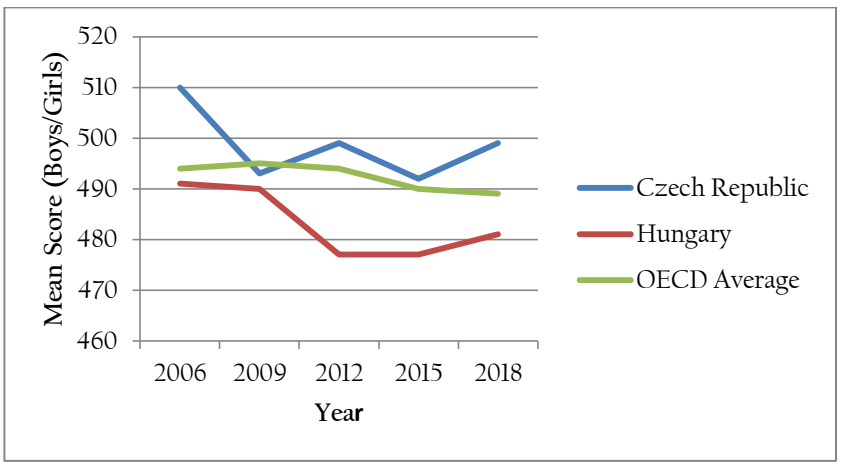
(OECD 2018b). Some explanation for the lower graduate numbers in Hungary could be provided by the relatively high dropout rate from Hungarian universities discussed in Chapter 6.

Figure 14: PISA reading performance in the Czech Republic and Hungary 2006-2018



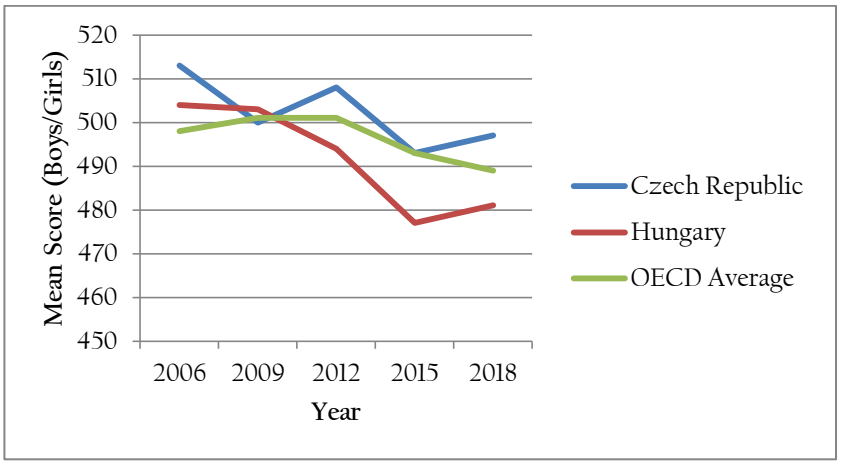
(Source: PISA 2018)

Figure 15: PISA mathematics performance in the Czech Republic and Hungary 2006-2018



(Source: PISA 2018)

Figure 16: PISA science performance in the Czech Republic and Hungary 2006-2018



(Source: PISA 2018)

In addition to the problem of actually providing an education system which can produce a highly-skilled labour force, there is the problem of the highly-skilled workers who do exist being drained from the country. Although both countries have clearly experienced problems relating to brain drain, this research indicates that this is currently becoming less of a concern in Czech Republic. In Hungary, on the other hand, it was mentioned in nearly every interview. This problem, it appears, has been intensified by Hungary's current political direction which is giving rise to considerable tensions. Attempts to retain or attract Hungarian scientists back to Hungary, such as the Momentum programme launched by the Hungarian Academy of Sciences, have experienced some success but it is doubtful that, under the current circumstances, this will be sufficient to significantly reduce the impact of brain drain in Hungary. The lower average wages also mean that it is difficult for Hungary to attract highly-skilled workers. This research suggests that if the present situation of an underperforming education system and a high degree of brain drain continues, the lack of a sufficiently skilled labour force could potentially become a serious obstacle to Hungary's attempts to improve its innovation performance.

Another area in which some difference between the Czech Republic and Hungary can be observed relates to the political attention which innovation has received. The Czech Republic does appear to have maintained a more consistent effort towards supporting innovation as can be seen by the steady increase in public

investment in R&D (discussed in Chapter 5). Hungary, on the other hand, has been much more sporadic in its innovation-related efforts. The governance system for innovation has witnessed considerable disruption as a result of the numerous restructuring exercises and the government has repeatedly failed to meet its public funding commitments. In this respect, this research supports the findings of Havas (2011) and suggests that Hungary has shown a lack of political and strategic commitment towards promoting innovation. What is particularly peculiar about this situation is that there is hardly a lack of awareness about the importance of innovation in Hungary. Indeed, as noted in Chapter 6, Hungary currently has a considerable number of innovation-related strategies. There does, however, appear to be insufficient targeted, coordinated and consistent action in order to actually realise Hungary's innovation goals. Innovation requires long-term strategic thinking, planning and implementation and this is something that seems to be lacking in Hungary at present.

7.3) A positive development

With regard to the influence of the EU, although Chapters 5 and 6 identified a strong misfit between the EU's Innovation Policy and the national specificities of both the Czech Republic and Hungary, there is one area in which a positive development can be observed, namely the launch of the Policy Support Facility (PSF). The PSF is a new instrument which was introduced as part of the EU's Horizon 2020 strategy and, at the request of Member States, independent high-level expertise and guidance can be provided by the EU in the form of peer reviews, mutual learning exercises and country specific support. The EU claims that the PSF 'responds to the strong need to offer more customer-oriented services to support evidence-based policy making' (European Commission 2018). Hungary was in fact, together with Bulgaria, one of the first countries to request a peer review. The 'Peer Review of the Hungarian Research and Innovation System' was published in 2016 having been preceded by a 'Pre-Peer Review of the Hungarian Innovation System' in 2015. The report is written by an independent panel of experts, from Ireland, Poland, the UK and the Netherlands, together with a small group of national peers. Information for the report was gathered through two field visits to Budapest (24th-26th February and 18th-20th April 2016) and is based on evidence provided through in-depth discussions with various stakeholders and experts as well as quantitative data (from Eurostat and the Hungarian Statistical Office).

The report looks at (1) R&I Governance, Funding and Policy-Making, (2) Availability of Human Resources for R&I, (3) Framework conditions for Innovation in the Business Sector and (4) Science-Industry Cooperation, Technology Transfer and Entrepreneurship. The findings have led to the development of seven 'Policy Messages' which are supported by a number of detailed recommendations presented throughout the report. Although Hungary can continue to call upon the PSF for support, the report makes it clear that responsibility for the follow-up to the Peer Review, as well as the implementation of its recommendations, lies with Hungary. It is envisaged that the recommendations will be implemented within 3 years at which point a PSF Post-Peer Review can be requested.

Interviews (Government Official 6 2016; Government Official 10 2016; Government Official 12 2017) revealed that, on the whole, the Peer Review had been well received and that it accurately reflected the current state of Hungary's NSI. Indeed, the Peer Review does seem to have made some progress at addressing previous frustrations, namely that the EU had failed to understand and appreciate the specifics of the Hungarian situation. It was suggested (Academic 5 2016) that the EU had a tendency to 'preach' about best practice without understanding whether this form of best practice could feasibly be implemented in Hungary given its political and cultural environment. The Peer Review clearly lays out the main strengths and weaknesses of the Hungarian NSI and offers a total of 33 detailed policy recommendations. The report also draws on successful examples from other countries and highlights the potential lessons for Hungary. In this respect, both the methodological approach – which is both qualitative and quantitative – and the provision of policy recommendations together with supporting examples, does represent a more tailored approach in the policy support being offered by the EU.

Nonetheless, although the Peer Review does in many respects indicate a positive development in the EU's approach towards innovation policy guidance, there are a few concerns which should be highlighted. Firstly, although the Peer Review does accurately list a number of the problems which Hungary is facing, it fails to offer any real measures or advice on how these can be tackled. In other words, whilst the report is very clear in terms of explaining what needs to be done and why, it offers very little information on how it can be done. For example, it does not mention or offer any suggestions on the problem of distrust between the various actors which, as already

discussed, discourages stakeholder engagement and causes lack of collaboration. With regard to brain drain, a problem mentioned repeatedly in interviews, the Peer Report concludes '[t]his is a complex issue and since the panel was unable to analyse the phenomenon using solid, quantitative data, it is suggested that the situation should be further analysed by the Hungarian government in order to pro-actively shape the future of the R&I system' (European Commission 2016c:49). Whilst this may be true, this statement does not really offer Hungary any concrete assistance in terms of addressing one of the most significant problems the country is currently facing. In short, whilst the report does offer a much more tailored approach to policy support which has been very much welcomed, the lack of specific guidance on how to achieve the recommendations may prevent it from having a more substantial impact in practice.

A second major concern with the Peer Review of Hungary is that it fails to address one of the major characteristics of the Hungarian NSI, namely its dependence on foreign-controlled enterprises. In fact, foreign-controlled enterprises feature in only a few paragraphs of the report. What this suggests is that although the EU has recognised the need for a more tailored approach towards innovation policy guidance, it still fails to place sufficient emphasis on the importance of economic structure. Yet the role of foreign-controlled companies in Hungary has become so significant that they must, likewise, feature prominently in any strategy for development of the Hungarian NSI. Hungary requires guidance on not only how to develop its own national factors, such as the governance structure and innovative entrepreneurship, but also how to integrate the foreign-controlled companies into its NSI, exploit the opportunities for developing indigenous knowledge capacity and mitigate the negative impacts such as labour market competition which is disadvantaging local companies. Without this, the opportunity to turn the Peer Review into a really informative and game changing policy tool will be missed.

7.4) Policy implications

Although the Czech Republic and Hungary have witnessed some development of their NSIs in recent years, they both face a sizeable task in overcoming various problems inherited from the communist period, several of which were exacerbated during the transition period. This research has shown that the ongoing influence of

these path dependent historical legacies is a major factor that is currently preventing the EU from having a more significant impact on the innovation policies and institutional arrangements in these countries. If the EU is to provide better assistance to these countries in dealing with the challenges they are facing, there are several areas of the EU's approach which would benefit from reconsideration. By better tailoring the EU's policy and policy tools to the specific needs of these countries, the EU could play a much more influential role in developing their NSIs and improving their innovation performances. Not only could this lead to stronger economic growth but it could also improve the perception of the EU within these countries.

One of the key areas for development is ensuring that the EU's policy guidelines are clear and relevant to the Czech Republic and Hungary. Concerns about the vagueness of more recent guidelines highlight the importance for the EU to strike a balance between allowing flexibility and yet retaining clarity. Whilst the requests of the EU must be clear, the methods of achieving these goals should be sufficiently flexible in order to allow them to be tailored according to the specific national contexts. The need for clarity is all the more important in the Czech Republic and Hungary, countries for which innovation is still a relatively new policy area and which is still in the process of developing their NSIs. A fundamental problem for both countries in developing their innovation strategies has been the lack of actors with sufficient knowledge and ability to formulate strategic and effective innovation policies. Clarity on the part of the EU would seem vital in assisting these actors in learning and developing strategies which have the potential to produce positive, long-term results.

Not only must the guidelines be clear but they also need to consider the specific national conditions and challenges. An important factor in this respect is to consider the differences in economic structure between countries and the influence of this structure on the functioning of the country's NSI. The dependence of the Czech Republic and Hungary on foreign-owned MNEs, for both their economic growth and innovation capacity, presents specific problems which differ from countries with contrasting economic structures. The dualistic nature of these countries' economies and innovation systems requires policy actions which are particular to this type of political economy. This could include measures to improve the integration of foreign companies into the national environment, to create conditions which will encourage the possibility of spillover effects or to provide assistance to local companies who struggle

to compete against the larger MNEs for labour. As noted in this research, the dependency on foreign-owned MNEs is having a paradoxical effect on the Czech and Hungarian NSIs and requires ongoing attention.

Giving consideration to national conditions also means that attention should be paid to the influence of national history and culture. The cases of the Czech Republic and Hungary clearly demonstrate how significant the role of path dependency is in NSI development. Understanding how the Czech and Hungarian NSIs continue to be influenced by their histories would enable the EU to provide better fitting policy guidelines with a much greater likelihood of tangible outcomes. The lack of trust and problems of fragmentation limit the extent to which a bottom-up approach to policy, such as that advocated by the Smart Specialisation Strategy, currently stand any chance of success in either the Czech Republic or Hungary. In other words, giving consideration to national history and culture will not only help to identify the causes of the observed problems but it will also provide information on what type of policy approach is realistically feasible.

In addition to the importance of national conditions, such as economic structure, history and culture, the Czech Republic and Hungary are at very different stages of developing their NSIs than many of the older Member States. This raises questions about whether the EU having one innovation policy for all EU Member States is the most appropriate way in which to approach this policy area. For example, one of the criticisms of the Washington Consensus, a set of economic policy recommendations for developing countries produced in 1989, was that it did not give sufficient attention to the individual situation of each country (Stiglitz 2004). The EU's innovation policy at present can also be seen to suffer from a similar weakness and this is perhaps even more concerning given the considerable diversity that exists between EU Member States. A differentiated policy approach which targets countries based on their stage of development and national specificities may be a more suitable direction in which to develop the EU's innovation policy. Such a method could prove much more beneficial at tackling the recognised innovation divide between the old and new Member States than the EU's current innovation policy approach.

The more tailored approach offered by the Policy Support Facility is, in this respect, a step in the right direction. As this is only an optional support facility, the EU must encourage Member States to take advantage of this opportunity. The Peer Review

which was undertaken of Hungary offers some very useful policy advice although in some areas, such the issue of brain drain, the advice did not go far enough. In addition, the implementation of the policy recommendations is entirely the responsibility of the individual Member State which could be problematic in Hungary given the previously discussed implementation gap. It may be useful for the EU to provide a policy expert, who understands the national conditions, to help guide the implementation of the recommendations. Although the Policy Support Facility does offer a lot of potential benefits, these will only be realised in the facility is properly administered.

A final area which would benefit from review concerns the EU's current policy tools. The EU provides a substantial amount of funding for innovation-related activities in Member States, the Structural Funds being particularly important to the Czech Republic and Hungary, and each EU Framework Programme has committed a greater amount of funding. However, this research would suggest that some caution should be expressed about the EU's current funding trajectory as increasing the funding is clearly no guarantee of an improvement in innovation performance. Indeed, as noted in Chapter 5, the Soviet Union invested considerably in R&D and yet weaknesses within the Soviet innovation system prevented the full potential of this investment from being realised. This research has highlighted several concerns about the EU's Structural Funds which are limiting their ability to achieve the intended goals. Providing a smaller amount of funding, which is better targeted and monitored, may be more beneficial that the very generous funding which is currently available.

7.5) Contributions to knowledge

This research has contributed to knowledge in several ways. Firstly, by integrating the concepts of National Systems of Innovation, Varieties of Capitalism and Historical Institutionalism it has demonstrated how these factors mediate the process of Europeanisation. This research has shown how the dependency of the Czech and Hungarian innovation systems on foreign actors and the impact of path dependency have limited the extent to which the EU is able to impact upon their innovation policies and institutional frameworks. In doing so, this research has shown how integrating these variables can improve our understanding of Europeanisation. This could be valuable to future studies within this area.

Secondly, this research has contributed to a better understanding of the current challenges facing the Czech and Hungarian NSIs. In doing so, it has also identified a number of the causes for these problems, many of which have historical and cultural underpinnings. This provides a better understanding of the reasons why the Czech Republic and Hungary are struggling to catch-up with the innovation performance of some of the more developed Western EU Member States. These findings could be of use to policy advisors and government officials who would benefit from this information in order to inform future policy decisions.

Finally, by identifying the factors which are impeding the influence of the EU, this research has been able to suggest a number of policy recommendations which the EU could consider in order to increase its role in this policy area. This could provide some more direction for the EU in terms of tackling the innovation divide which is currently affecting EU Member States and it offers useful advice on how the EU could better support the development of the NSIs in the newer Member States. By playing a more active role in improving the innovation performance of the Czech Republic and Hungary this could, in turn, improve their perception of the EU. As both countries are currently demonstrating Eurosceptic tendencies, this could be a particularly valuable contribution.

7.6) Research limitations and further research

Although this research has been able to draw attention to the interaction between the various actors in the Czech and Hungarian NSIs, the perspective of private businesses has been more limited. Difficulty in obtaining interviews with business leaders, particularly those of foreign-owned MNEs, meant that they made a lesser contribution to this research. Conducting more interviews with participants from this sector could be useful in providing an even fuller picture of their current role in the Czech Republic and Hungary.

Another area in which this research could be further developed would be to compare these findings with another policy area. This may help elucidate whether the EU has had more, less or similar impact in other policy areas which, in turn, could identify other factors which assist or impede the EU's influence. This might help to

identify factors which the EU may wish to include in its approach to innovation policy and other areas in the future.

A further potential research option would be to conduct a comparison of the Europeanisation of innovation policy between a new and an old Member State. This would help to identify whether the extent of Europeanisation in new Member States has been different from that in old Member States and whether there are any lessons that can be learnt from their respective experiences. This may add further evidence to the discussion on whether the EU should consider a more differentiated policy approach amongst Member States, as discussed here.

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Appendix

Interviews

Academic 1 (2016) Interviewed by Neale-Edwards, C, Prague (21st November 2016)

Academic 2 (2016) Interviewed by Neale-Edwards, C, Prague (23rd November 2016)

Academic 3 (2016) Interviewed by Neale-Edwards, C, Budapest (29th November 2016)

Academic 4 (2016) Interviewed by Neale-Edwards, C, Szeged (30th November 2016)

Academic 5 (2016) Interviewed by Neale-Edwards, C, Szeged (1st December 2016)

Business Leader 1 (2016) Interviewed by Neale-Edwards, C, Online (5th October 2016)

Business Leader 2 (2016) Interviewed by Neale-Edwards, C, Prague (24th November 2016)

Business Leader 3 (2016) Interviewed by Neale-Edwards, C, Prague (25th November 2016)

Business Leader 4 (2016) Interviewed by Neale-Edwards, C, Online (15th March 2017)

Business Leader 5 (2016) Interviewed by Neale-Edwards, C, Online (1st September 2016)

EU Official 1 (2017) Interviews by Neale-Edwards, C, Brussels (31st January 2017)

EU Official 2 (2017) Interviews by Neale-Edwards, C, Maastricht (1st February 2017)

Government Official 1 (2016) Interviewed by Neale-Edwards, C, Online (10th October 2016)

Government Official 2 (2016) Interviewed by Neale-Edwards, C, Prague (21st November 2016)

Government Official 3 (2016) Interviewed by Neale-Edwards, C, Prague (21st November 2016)

Government Official 4 (2016) Interviewed by Neale-Edwards, C, Prague (22nd November 2016)

Government Official 5 (2016) Interviewed by Neale-Edwards, C, Prague (23rd November 2016)

Government Official 6 (2016) Interviewed by Neale-Edwards, C, Budapest (29th November 2016)

Government Official 7 (2016) Interviewed by Neale-Edwards, C, Budapest (30th November 2016)

Government Official 8 (2016) Interviewed by Neale-Edwards, C, Budapest (30th November 2016)

Government Official 9 (2016) Interviewed by Neale-Edwards, C, Budapest (30th November 2016)

Government Official 10 (2016) Interviewed by Neale-Edwards, C, Budapest (2nd December 2016)

Government Official 11 (2017) Interviewed by Neale-Edwards, C, Brussels (2nd February 2017)

Government Official 12 (2017) Interviewed by Neale-Edwards, C, Online (9th February 2017)

Investment Specialist (2016) Interviewed by Neale-Edwards, C, Prague (23rd November 2016)

Policy Analyst (2016) Interviewed by Neale-Edwards, C, Online (20th October 2016)

Research Institute Specialist 1 (2016) Interviewed by Neale-Edwards, C, Online (7th October 2016)

Research Institute Specialist 2 (2016) Interviewed by Neale-Edwards, C, Online (17th October 2016)

Research Institute Specialist 3a (2016) Interviewed by Neale-Edwards, C, Online (7th October 2016)

Research Institute Specialist 3b (2016) Interviewed by Neale-Edwards, C, Prague (22nd November 2016)

Example Interview Schedule

Introduction

- Could you briefly confirm your name and title for the benefit of the tape and tell me about your role in [NAME]?
- Before we get into the detail, I wanted to start with a broad question, could you tell me about your view of the role innovation policy in the Czech Republic/Hungary?

Policy making officials, government officials

- Could you tell me a little bit about the process of developing Czech/Hungarian innovation policy? For example, who is involved and what are the main factors influencing policy decisions? In the past, say, 15 years or so have there been any significant developments in the way innovation policy in Hungary is developed or changes to the actors involved?
- Clearly foreign direct investment (FDI) and multi-national enterprises (MNEs) play an important role in the Czech Republic/Hungary. What influence do you think these actors have on the development of national innovation policy? What are the main measures taken in the Czech Republic/Hungary in order to attract FDI?
- And what about the EU? Given that innovation is now a key concern for the EU, do you feel that the guidance offered by the EU is an important factor in decisions relating to innovation policy?
- Following on from this question, why do you believe that the EU has/has not had a significant impact on Czech/Hungarian innovation policy? (Who or what are the factors impeding the EU's influence?)
- What impact, if any, do you think the financial and economic crises of 2007-08 have had on the development of Czech/Hungarian innovation policy? Are there any other events you can think of that have had a significant impact on innovation policy? For example, political changes or business pressures?
- In your opinion, what are the strengths of the Czech/Hungarian innovation environment? And weaknesses?
- (HUNGARY) The governance structure of science, technology and innovation policy has changed several times in Hungary. So, too, the science, technology and innovation policy coordination body has been dissolved and reestablished several times and the agency responsible for implementing innovation has also undergone several changes. Why do you think that so many changes have occurred? What has the impact of these changes been?

- (HUNGARY) It has been suggested that innovation policy in Hungary is perhaps seen as less of a priority than other policy areas and that science, technology and innovation policy is something of a burden on the national budget. How would you respond to this suggestion? What is your view of the importance of innovation policy in Hungary?

Representatives of large companies, industry associations

- How satisfied are you with the way in which innovation policy is being developed in the Czech Republic/Hungary? What do you see as the main strengths and weaknesses at present?
- Do you feel that the needs of businesses like yours are fully understood by officials involved in making decisions related to innovation policy? Why?
- What factors do you believe need to be provided in order to allow your business to be even more innovative?
- As a native Czech/Hungarian business, what do impact do you believe the presence of foreign direct investment (FDI) and multi-national enterprises (MNEs) has on the innovation environment? Is it, on the whole, positive or negative?
- And what about the EU? Do you think that EU guidance has a direct impact on innovation in the Czech Republic/Hungary?
- Do you see any potentially serious impediments to innovation in the Czech Republic/Hungary in the (near) future?

Conclusion

- Is there anything else you feel is important to discuss about Czech/Hungarian innovation policy?
- Is there anybody else you suggest I should speak to about this topic?
- If I have any further questions, is it OK to drop you an e-mail?