Households' Forming Subjective Expectations Using Perceived News: Do Shocks to 'Good' News Matter More than 'Bad' News?

By
Joshy Easaw, Atanu Ghoshray and Saeed Heravi

Abstract

The present paper examines the microfoundations of how households form subjective expectations about the macroeconomy. In particular, we are interested in the role of perceived news. The paper outlines a theoretical model where households may give unequal importance (or weights) to 'good' and 'bad' news. We also consider whether the relationship is state-varying and has any structural changes. The ensuing empirical investigation uses Time-Varying Smooth Transition Autoregressive (TV-STAR) models on household survey data compiled for the US. We find that weights given to the news are state-varying, with little, or no, weight given to bad news. There is also a clear structural change in the relationship after September 2001.

JEL Codes: D84, E31

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I: Introduction:

When households form their subjective expectations about the macroeconomy they have to decide how relevant are the recent news they have received. They may come across a mixture of news, which suggest mixed prospects for the aggregate economy. Importantly, they have to decide whether the news is "good" (favorable) or "bad" (unfavorable) and, subsequently, their relative impact on future changes to the aggregate economy.

This is also indicative of how households categorize the news is subjective and they may be selective when using the information. This also suggests that the notion of news and their relative importance is subjective to individuals, who are also selective when using information. These concepts are not necessarily new. In their classic paper Akerlof and Dickens (1982) maintain that a decision-makers subjective beliefs (or expectations) are formed in two ways: either directly, via self-persuasion or, indirectly, through the choice of signals. In a recent paper Eliaz and Speilger (2006), focusing on the latter, suggests that the decision-maker's 'anticipatory feelings' are influential when it comes to the choice of signals. For instances, those with left (right) wing tendencies will read and are influenced by newspapers with left (right) views. Indeed, cognitive dissonance suggests that households may not give equal weights to perceived good and bad news. The 'ostrich effect', put forward by Karlsson et al (2005), argues that in the face 'bad news' household will choose to be inattentive or '"put their heads in the sands" to shield themselves from further bad news' (pp 3), while choosing to be attentive during periods of 'good news'. For instances, recently Argentesi et al (2006) using Italian data show that non-professional agents tend to buy Italy's financial newspaper when share prices are high but not when they are low.

Recently, Carroll (2003) and (2006) showed that expert opinions are transmitted to the household via the news media. He also argued that households receive information through social transmission as they interact with their neighbors. The latter exposes the household to the subjective opinions of their neighbors. In both instances, households observe the relevant information imperfectly.

The updating of households' subjective expectations may be partially constrained by how frequently they observe aggregate or macro shocks. Nevertheless, when they do receive the necessary signals they need to process the information. Recent research, such as Sims (2005) and Begg and Imperator (2001) and references therein, focus on the cognitive ability of decision-makers to process information suggesting that there is a 'cost of thinking'. Reis (2004) and (2006) appeal to the costs of acquiring and absorbing information, while Carroll (2006) suggest 'epidemiology'.

In this paper we put forward a testable theoretical model where households form subjective expectations about the macroeconomy based on news as perceived by the households. We consider whether households give equal weights, or importance, to perceived 'good' and 'bad' news and the 'cost of thinking' or search costs imply that updating subjective expectations is not instantaneous. The model is also extended to allow for structural change. We, therefore, allow the relative weights and speed of updating to be both state and time-varying. The empirical investigation uses Time-Varying Smooth Transition Autoregressive (TV-STAR) model, with one transition introduced by Lundbergh et al (2003). We use survey-based data for US households compiled by the *Survey Research Center*, University of Michigan, (*SRC*). The survey ascertains households' perception of how business conditions, or the aggregate economy, will change in a year's time. The remainder the paper is organized as follows: Section II outlines the theoretical framework. This the basis of the empirical analysis found in Section III. In this section we also introduce and outline the data used. Finally, the summary and conclusions are drawn in Section IV.

II: The Model:

We outline a model where households form their optimal subjective expected change to business conditions, or macroeconomy, ($\tilde{E}_t\ (M_{t+i})^*$) as a ratio (α) of their perceived views of recent news (N_t) as follows:

$$\frac{\tilde{E}_t\ (M_{t+12})^*}{N_t} = \alpha \qquad (1)$$

where $\tilde{E}_t\ (M_{t+12})^*$ is the subjective expectation for a year-ahead (or 12 months-ahead) formed in the current period (t).This can be specified alternatively as:

$$\tilde{E}_t\ (M_{t+12})^* = \alpha N_t \qquad (2)$$

News at the aggregate comprises of perceived good news (N_t^G) less bad (N_t^B): $N_t = N_t^G - N_t^B$ and, therefore;

$$\tilde{E}_t\ (M_{t+12})^* = \alpha[N_t^G - N_t^B] \qquad (2')$$

This, however, assumes households give equal importance (or weights) to good or bad news when forming subjective expectations. Relaxing this assumption, equation (2') can be re-specified as:

$$\widetilde{E}_t\,(M_{t+12})^* = [\delta N_t^G - \gamma N_t^B] \qquad (3)$$

where $0 \le \delta \le 1$and $0 \le \gamma \le 1$ are the weights put on N_t^G and N_t^B respectively. If N_t^G (N_t^B) is deemed more important then $\delta > \gamma$ ($\gamma > \delta$), and $\delta(\gamma)$ approximates zero if the importance good (bad) news is small or negligible. Finally, we assume that $\alpha = 1$.

The specification depicted by equation (3) also assumes that households update their subjective expectations instantly. As discussed earlier, relevant information is observed imperfectly, regardless whether the choice of signals is selective, and cognitive inability also implies there is a 'cost of thinking'. This suggests that the household incurs both search and transactions costs respectively. The absorption rate, or speed of updating, (λ) reflect these costs:

$$\widetilde{E}_t\,(M_{t+12}) = \lambda\{[\delta N_t^G - \gamma N_t^B]\} + (1-\lambda)\widetilde{E}_{t-1}(M_{t+12}) \qquad (4)$$

where $0 < \lambda < 1$.

Households assume rate the macroeconomy changes, or grows is due a permanent innovation. Households, therefore, have to forecast any permanent innovation in period $t+1$. Following Carroll (2003), it would be reasonable to assume that households are able to do this based on their perceived news in period t but beyond period $t+1$ permanent innovations are unforecastable. Hence,

$$\widetilde{E}_{t-1}(M_{t+12}) = \widetilde{E}_{t-1}(M_{t+11})$$
$$\widetilde{E}_{t-2}(M_{t+12}) = \widetilde{E}_{t-2}(M_{t+11}) = \widetilde{E}_{t-2}(M_{t+10})$$
$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

and equation (4) can be re-specified as[1]:

$$\widetilde{E}_t\,(M_{t+12}) = \lambda\{[\delta N_t^G - \gamma N_t^B]\} + (1-\lambda)\widetilde{E}_{t-1}(M_{t+11}) \qquad (4')$$

and for ease of notation:

$$\widetilde{E}_t\,(M_{t+12}) = \beta^G N_t^G + \beta_i^B N_t^B + \beta_i^M \widetilde{E}_{t-1}(M_{t+11}) \qquad (5)$$

where $\beta^G = \lambda\delta$, $\beta^B = -\lambda\gamma$ and $\beta^M = (1-\lambda)$.

This assumes that the relative weights, or importance, given to 'good' and 'bad' news and the absorption rate of subjective expectations are constant. Any positive or negative shock to 'good' (or 'bad') news may result in households changing the relative weights. They may also be more willing to incur search or thinking costs and absorb their expectations faster. Hence, the linear relationship depicted in equation (5) can be extended to allow for structural change as follows:

$$\widetilde{E}_t\,(M_{t+12}) = \beta'^G\,N_t^G + \beta'^B_i\,N_t^B + \beta'^M_i\,\widetilde{E}_{t-1}(M_{t+11}),\ \text{if}\ ,\Delta N_{t-i}^G(\text{or}\ \Delta N_{t-i}^B) < \tau\ ,\ \text{or} \qquad (6)$$

$$\widetilde{E}_t\,(M_{t+12}) = \beta''^G\,N_t^G + \beta''^B_i\,N_t^B + \beta''^M_i\,\widetilde{E}_{t-1}(M_{t+11})\ ,\ \text{if}\ ,\ \Delta N_{t-i}^G(\text{or}\ \Delta N_{t-i}^B) \geq \tau\ ,$$

where *i = 0,1,…* Equation (6) indicates that there are distinct regimes, that is different relative weights given to news and the absorption rate varies with the type of shock to good and bad news. τ is a threshold which could be zero. In the case of 'good' news, if it is zero the households' perceived 'good' news is improving' ('worsening') with positive (negative) shocks to 'good' news. The size of the shock may matter. In which case, households may perceive 'good' news to 'improve' ('worsen') when the shock is larger (smaller) than a particular (non-zero) threshold (τ). There may also be specific

[1] As Carroll (2003) notes these are strong assumptions. He also points out that in practice there would be a very high correlation between period $t-1$ forecasts of changes to the macroeconomy in period t and the period $t-1$projection of changes in $t+1$.

events in time, such as the aftermath of September 11th, which could also affect the relative importance of the two types of news and the speed of updating. The remainder of the paper focuses on investigating empirically the implications the model outlined in this section.

III: Empirical Analysis and Results:

III.1. The Data: Michigan/SRC:

The household-based survey data used in the current analysis is that complied by *Survey Research Center*, University of Michigan, (*SRC*) for the US. The samples for the *SRC* are statistically designed to be representative of all US households, excluding those in Alaska and Hawaii. Each month, a minimum of 500 interviews is conducted by telephone[2].

The exact wordings of the surveys conducted by the *SRC* that we are concerned with are:

1. "Now turning to business conditions in the country as a whole – do you think that during the next twelve months we'll have good times financially, or bad times, or what? ($\tilde{E}_t\,(M_{t+12})$)

2. During the last few months, have you heard of any favorable or unfavorable changes in business conditions? (N_t^G and N_t^B)

Indices are then calculated by computing the relative scores; the percentage of individuals giving favorable replies minus the percentage giving unfavorable replies. The compiled indices, essentially, reflect the forecast of the majority surveyed, which we use as a proxy for the representative household's subjective expectations and

[2] Further details pertaining to the *SRC* series can be obtained at the respective websites; *http://www.sca.isr.umich.edu*. A recent survey of these indices can be found in Ludvigson (2004)

perceived good and bad news regarding the macroeconomy. The sample covers the period from January 1978 to November 2005.

The question is framed and indices are compiled indicating that households have clear distinctions between perceived favorable (good) and unfavorable (bad) news. Households may experience both good and bad news concurrently. For instances, they may perceive good news regarding employment but bad news regarding interest rate. They may not necessarily cancel each other out and together form perceived aggregate news about the aggregate economy.

Such perceived news may not reflect households views about which specific phase the aggregate economy is currently experience, that is recessionary or boom. It would be assuming unrealistic expertise on the part of households. It may be more reasonable to assume that they reflect households' perceived 'turning points' in the aggregate economy. They are similar to judgmental or directional forecasts[3]. So if they have heard recently of any good (bad) changes to the aggregate economy, they would anticipation an upturn (downturn). Within this context, news could be more (less) favorable reflecting momentum, that is acceleration (deceleration). For example, when households expect interest rates to fall and would perceive this as good news for the aggregate economy, expecting an upturn. However, interest rates fall by smaller amount than expected, say by 0.25% instead of 0.5%. This could be conceived as less favorable

[3] Manski (2004) refer to these as 'verbal expectations' (pp. 1338), while refer to them as consumer, or household, sentiments (see Ludvigson (2004) and references therein). More importantly, it affects households' consumption behaviour (see Carroll et (1994) and Souleles (2003)) and business cycles Matsusaka, J, and Sbordone A (1995) and recently the focus of monetary policy-making (see Greenspan (2002)). Furthermore, the data used are collected from the same households and, hence, consistent meaning.

news (as opposed to no fall or rise in interest rates which would be bad news) as the economy may not accelerate as much.

Figure 1 below depicts the individual variables, while Table 1 the relevant statistics:

Figure 1 and Table 1[about here]

Table 1 contains the basic parameters of the statistical distributions of the households' expectations, good and bad news. When measuring the variability, of variables, the range and standard deviation of the variables shows that the least amount of variability is in the good news followed by bad news. The highest amount of variation is found in the households' expectations of the macroeconomy. The households' expectations of the macroeconomy exhibits negative skewness. Negative values for the skewness indicate that observations are skewed leftwards, or that the left tail is heavier than the right tail. The indication here is that there were more episodes of downward spikes than upward spikes in the indices of households' expectations of the macroeconomy. For both good and bad news we find that the indices exhibit positive skewness, an indication that more episodes of upward spikes (episodes of rising indices) than negative ones. Kurtosis measures whether the price distribution is peaked or flat in comparison to a normal distribution. Data sets with low kurtosis tend to have a flat top near the mean instead of sharp peaks which characterizes higher kurtosis values. Good news tends to have a high kurtosis indicating large movements in the indices were common. In comparison, bad news and the households' expectations of the macroeconomy tend to display relatively smaller movements in indices during the period under consideration

A battery of unit root tests is conducted to test whether the variables displayed any stochastic trends. The standard ADF test suggests that the data is stationary as we can reject the null hypothesis of a unit root in the variables. This result is reinforced with the results obtained employing the ERS and PN tests due to Elliot-Rothenberg-Stock (1996) and Perron-Ng (1996) respectively. We can conclude that the variables employed in this study are stationary.

III.2: Econometric Methodology:

The structural change, or regime switching behavior, behavior could be captured using smooth transition regression (STR) models. The regime-switching issue depicted in equation (6), allowing for structural change, can be generalized as follows:

$$\widetilde{E}_t\,(M_{t+12}) = \beta_0' w_t + \beta_1' w_t F_1(s_{1t}) \qquad (7)$$

where w_t is the vector of explanatory variables ($N_t^G, N_t^B, \widetilde{E}_{t-1}(M_{t+11})$) and s_t are distinct transition variables. The transition variables are depicted as a logistic function;

$$F(s_t) = [1 + \exp\{-\gamma\,(s_t - \tau)/\hat{\sigma}(s_t)\}]^{-1} \quad \gamma > 0, \qquad (8)$$

Specifying the transition variables as a logistic function, since it is a monotonically increasing function of s_t, enables us to capture any effect as a result a change to either types of news or a specific event on how households. Hence, shift the relative weights given to these perceived news and the rate of absorption. The switch between the two regimes $F(s_t) = 0$ and $F(s_t) = 1$ is captured by the parameter γ. It can be smooth (for relatively small γ) or abrupt, similar to a threshold (large γ). The location of the switch, or transition, between the two regimes is given by the threshold parameter τ . We closely follow the Time-Varying Smooth Transition Autoregressive (TV-STAR) model, with one transition introduced by Lundbergh et al (2003). Hence, the nonlinear model capturing changes to the relative weights given the two types of news and speed of updating is as follows;

$$\widetilde{E}_t\ (M_{t+12}) = \sum_{i=0}^{j} \beta_1' w_t\ (1 - F(s_t)) + \sum_{i=0}^{j} \beta_2' w_t\ F(s_t)) \qquad (9)$$

The rest of the section considers the estimation and implications of both the relationship between households' subjective expectations and perceived news, that is the linear and non-linear models respectively.

III.3: Results:

Firstly, we need to establish the linear version of the model which corresponds to equation (5). The postulated long run relationship between $\widetilde{E}_t^M$, N_t^G and N_t^B can be couched in an ARDL model as follows:

$$\widetilde{E}_t\ (M_{t+12}) = \sum_{i=0}^{p} \beta_i^G N_{t-i}^G + \sum_{i=0}^{q} \beta_i^B N_{t-i}^B + \sum_{i=1}^{r} \beta_i^M \widetilde{E}_{t-1}(M_{t+11}) + \varepsilon_{1t} \qquad (10)$$

where $\beta^G = \lambda\alpha\delta$, $\beta^B = -\lambda\alpha\gamma$, $\beta^M = (1-\lambda)$ and ε_{1t} is assumed to be *i.i.d* $(0, \sigma^2)$ error term. The lag length p, q and r are chosen to generate white noise errors. The results of the estimated ARDL model are contained in Table 2 below:

Table 2 [about here]

As indicated in the theoretical model, subjective expectations are determined positively with good news and inversely with bad news.

We undertake a number of restrictions tests, which are found in Table 3 below:

Table 3 [about here]

As outlined in the theoretical section we are interested in the relative weights, or importance, given to respective news. We, therefore, not only consider whether subjective expectations are correlated with the two types of news but also their relative impacts. The two types of restrictions test, that is joint hypothesis and the sum of coefficients tests, relate respectively to the necessary and sufficient conditions to establishing the relationship between subjective expectations and perceived news. The necessary condition establishes whether subjective expectations and news are correlated, which they are[4]. The latter test relates directly to determining the relative importance given to either types of news. The restriction that the sum of the coefficients of the bad news equal to zero ($\sum_{i=0}^{q} \beta_i^B = 0$) cannot be rejected. The corresponding *F tests* on the other coefficients, $\sum_{i=0}^{p} \beta_i^G = 0$ and $\sum_{i=1}^{r} \beta_i^M = 1$, are clearly rejected[5]. This implies that $\sum_{i=1}^{r} \hat{\lambda}$ and $\sum_{i=0}^{p} \hat{\delta}$ are non-zero while $\sum_{i=0}^{q} \hat{\gamma}$ is not significantly different from zero. This clearly suggesting that little, or negligible, importance (weight) is given to bad news. The speed of updating is also slow, approximately around 4% of new news is updated each period.

As discussed in the previous section the linear relationship can be extended to capture structural change, distinguishing between periods when there are negative and positive shocks to the respective news and specific events. These non-linear extensions

[4] These restrictions tests are not reported here but available from the authors on requests.
[5] This result does not change we exclude either good or bad news.

are investigated using the linear model and estimates as the base. The non-linear relationship is estimated following the TV-STAR model:

$$\tilde{E}_t\,(M_{t+12}) = (\sum_{i=0}^{p} \beta'^{G}_{i}\; N^{G}_{t-i} + \sum_{i=0}^{q} \beta'^{B}_{i}\; N^{B}_{t-i} + \sum_{i=1}^{r} \beta'^{M}_{i}\; \tilde{E}_{t-1}(M_{t+11}))(1-F(s_t)) +$$

$$(\sum_{i=0}^{p} \beta''^{G}_{i}\; N^{G}_{t-i} + \sum_{i=0}^{q} \beta''^{B}_{i}\; N^{B}_{t-i} + \sum_{i=1}^{r} \beta''^{M}_{i}\; \tilde{E}_{t-1}(M_{t+11}))(F(s_t)) + \varepsilon_{3t} \qquad (11)$$

where the transition variables (s_t) used are either $\Delta N^G, \Delta N^B$ or time.

In the first instances it would be useful to examine the how the respective transition variables evolve diagrammatically, how smooth is the transition from one regime to the other and the size of the threshold:

Figures 2, 3and 4 [about here]

We choose the order of lags for the preferred transition is chosen based on the minimum AIC. The preferred transition for the news variables are ΔN^G_{t-1} and ΔN^B_{t-1} respectively. Models 1, 2 and 3 correspond to the respective transition variables: $\Delta N^G_{t-1}, \Delta N^B_{t-1}$ and time. The threshold distinguishing the regimes is non-zero and estimated at -1.899 for Model 1 (see Table 4 below). A structural change in the relationship between households' subjective expectations and news occurs when there are fairly small negative shocks to good news. The transition between the two regimes is abrupt, similar to a threshold, as $\hat{\gamma}$ is not significantly different from zero. In the case of bad news (Model 2), the threshold is also non-zero and estimated at 8.837. Bad news has to worsen substantially before there is a structural change to the relationship. The time transition variable is especially interesting. Structural change to the subjective expectations-news relationship takes place at September 2001 (0.85 of the sample period, see Table 4). In case of bad news and time the transition is also abrupt as $\hat{\gamma} = 0$

The estimates for the respective models and corresponding restrictions tests are outlined in Table 4 and 5 below:

Table 4 and 5[about here]

As with the linear model previously, we focus on the restrictions test. In particular, the restrictions tests that establishes the relative weight (or importance) given to good and bad news, that is the sum of the coefficients equal to zero, is reported here[6]. Regime 1 of Model 1 captures the subjective expectations-news relationship when good news is worsening due to negative shocks, which are moderate to large. Now some importance is given to bad news. Table 6 outlines the calculated values from estimated equation (11).

Table 6[about here]

Nevertheless, relative weight given to bad news ($\sum_{i=0}^{q} \hat{\beta}'^{B} = 1.6$) is approximately half that given to good news ($\sum_{i=0}^{p} \hat{\beta}'^{G} =$ 3).The absorption rate is slow and approximates the linear model at around 0.05. In the case when good news is improving or worsening by amounts less than 2 units, that is Regime 2, the relationship reflects the linear case, where no weight is given to bad news.

We saw earlier that in the case of changes to bad news (Model 2), the switch between regimes only takes place when bad news worsens considerably, as suggested by the estimated threshold 8.837. Regime 1 captures the relationship during periods of improving bad news ($\Delta N^{B} < 0$) and modest worsening. Conversely, Regime 2 captures

[6] As before the results are not reported here but available from the authors on requests.

periods when bad news is worsening considerably ($\Delta N^B > 8.837$). In Regime 1, the relationship mimics the linear model. However, in Regime 2 the subjective expectation-news relationship is depicted as an auto-regressive process. Households do not update their subjective expectations when bad news is worsening considerably.

Turning to Model 3, which incorporates the time transition variable, there are distinct regimes before and after September 2001. This captures the impact of the September 11th terrorists attack. Prior to September 2001, that is Regime 1, households form subjective expectations consistent with the linear model. Little or no relative weight is given to bad news and the speed of updating subjective expectations is slow, around 4% is absorbed each period. This is in sharp contrast to the post September 2001 period. Here some relative importance is given to bad news ($\sum_{i=0}^{q} \hat{\beta}''^{B} = 0.55$). Nevertheless, it is still less than a quarter of the relative weight given to good news. The most interesting feature of this regime is the absorption rate is now considerably faster ($\sum_{i=1}^{r} \beta''^{M} = 0.36$). Households update their subjective expectations 9 times faster since September 2001.

The diagnostics indicate no evidence of parameter non-constancy for all three models. However, it is notable that the model where the change in bad news is the transition variable (Model 2) does not account for all features of the households' subjective expectations-news relationship. There is evidence of parameter instability remaining in the non-linear specifications at the 5% significance. This is not found for Models 1 and 3.

III.3: Discussion of Results:

The estimates of both the linear and non-linear models provide strong evidence that it is good news that matters overwhelmingly when households form subjective expectations about the aggregate economy. The only times when some weight, or importance, is given to bad news is during Regime 1 of Model 1 and Regime 2 of Model 3. That is during periods when good news is worsening and in the aftermath of September 11. But in both cases, the importance given to bad news is considerably less than that given to good news. Households' ignoring bad news is consistent with cognitive dissonance and/or overconfidence. A good example of 'ostrich behavior' is found in Regime 2 of Model 2. When bad news increases, or worsens, by large amounts households no longer absorb or update their subjective expectations.

In an important recent paper Brunnermeier and Parker (2005) put forward a model of household subjective beliefs, distinguishing between 'optimal' and 'objective' expectations. They argue that households 'having their expectations about the future not affect their current felicity is inconsistent', as 'agents care in the present about utility flows that are expected in the future in defining what beliefs are optimal.' (pp. 1093-4). Hence, households prefer to more positive, or optimistic, outlook of the future. Even in the case of the aggregate economy and, therefore, ignore or give less importance to bad news.

The rate of absorption, or speed of updating, subjective expectations due to perceived news is slow. Only between 5 and 3% of changes to news are updated each period. As discussed previously the speed of updating does not just reflect imperfect observation of news pertaining to the aggregate economy but also cost of thinking when news is observed. This is especially important when the news is as perceived by households, reflecting subjectivity and choice of signals. Nevertheless, during periods of adverse uncertainty the absorption rate increases considerably as indicated by the difference before and after September 2001. This is consistent with Akerlof et al (1996 and 2000), where they argue that ignorance would be more costly for households during periods of bad news. Here, we see that only the face of extremely bad or adverse news are households more willing to incur transactions cost and update their aggregate or macro information set. Similar to Carroll (2003) a larger volume of news leads to higher absorption.

IV: Summary and Concluding Remarks:

The purpose of the paper is to investigate how households form subjective expectations about changes to the aggregate economy based, or business conditions, on their perceived news. Recent papers have highlighted the role of news. While the news media transmits the opinions of experts, the different news media may choose to emphasize certain opinions. Households themselves may be choosy and also obtain other households' opinions through social interaction. We introduce a simple testable theoretical model where households may not give equal weights, or importance, to perceived good and bad news. The empirical analysis also accounts for structural change to the subjective expectations-perceived news relationship due to shocks to either good or bad news and also over time. The results indicate that little or no weight is given to bad news. Indeed, when bad news is worsening considerably households do not update their expectations due to perceived news. The rate of absorption increases dramatically in the aftermath of September 11th 2001. Households are more willing to incur search and 'thinking' costs during periods of uncertainty.

As Carroll (2003) points out households' subjective expectations about the aggregate economy have important implications. It affects their subjective expected utility, which will, in turn, impact their consumption behavior, as suggested by Brummermeirer and Parker (2005). When households form subjective expectations giving little importance to bad news there are direct implications for households' decision-making process, such as expected real-wages and labor supply. Wage contracts are usually in nominal terms and households have to convert them to real, or relative, terms. Since households give little importance to bad news it may explain downward wage rigidities.

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Figure 1

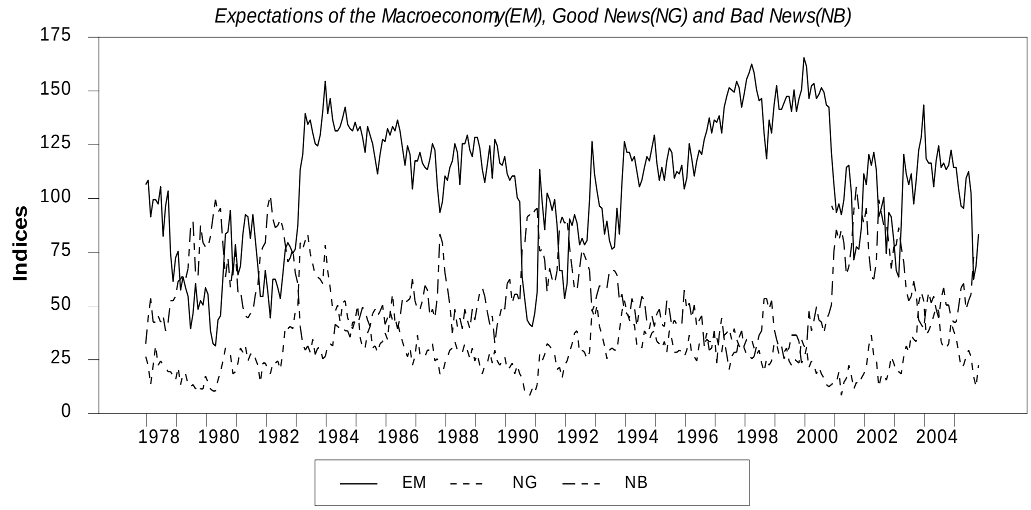

Table 1: Descriptive Statistics and Unit Root Tests

	EM $[E_t^M]$	NB $[N_t^B]$	NG $[N_t^G]$
	Descriptive Statistics		
Observations	335	335	335
Mean	107.00	54.49	29.40
Median	113.00	50.00	28.00
Maximum	165.00	105.00	83.00
Minimum	31.00	20.00	8.00
Std. Dev.	29.29	18.67	12.71
Skewness	-0.49	0.62	1.38
Kurtosis	2.56	2.61	6.11
	Unit Root Tests		
ADF	-3.43* (0)	-4.07** (0)	-4.08** (0)
ERS	-3.44** (0)	-2.63** (0)	-3.98** (0)
PN	-3.32** (0)	-2.57** (0)	-3.80** (0)

** and * Denote significance at the 1 and 5% levels respectively. The numbers in parentheses denote lag lengths or bandwidth.

Table 2: Linear Model (Equation (10))

Variables	*Coefficient[t-ratio]*
N_t^G	0.662 [7.194]
N_{t-1}^G	-0.307 [2.608]
N_{t-2}^G	-0.224 [2.302]
N_t^B	-0.603 [9.456]
N_{t-1}^B	0.412 [4.730]
N_{t-2}^B	0.188 [2.634]
E_{t-1}^M	0.687 [12.69]
E_{t-2}^M	0.172 [2.753]
E_{t-3}^M	0.105 [2.481]
Diagnostics Tests	
$\overline{R}^2$	0.92
AIC	4.215
SC	0.71 [0.39]
ARCH	2.338[0.12]

Table 3: Restrictions Test (Linear Model):

Null Hypothesis	*F-Statistic [p-value]*
$\sum_{i=0}^{p} \beta_i^G = 0$	9.87 [0.00]**
$\sum_{i=0}^{q} \beta_i^B = 0$	0.059 [0.80]
$\sum_{i=1}^{r} \beta_i^M = 1$	7.01 [0.00]**

Figure 2: F- function vs. Change in Good News

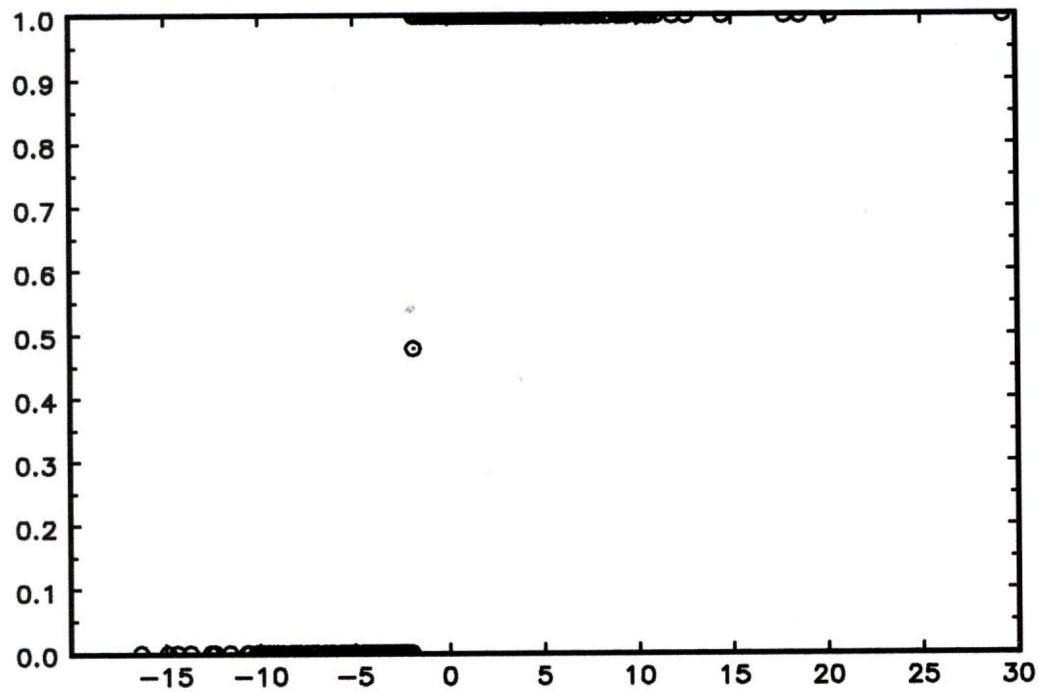

Figure 3: F- function vs. Change in Bad News

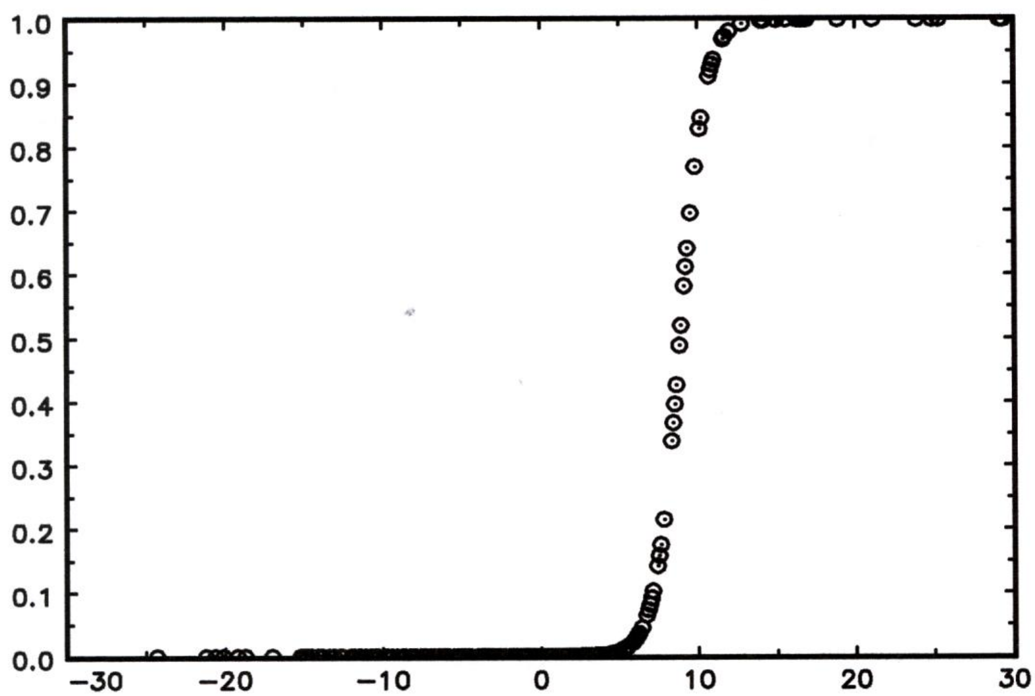

Figure 4: F- function vs. Time Trend

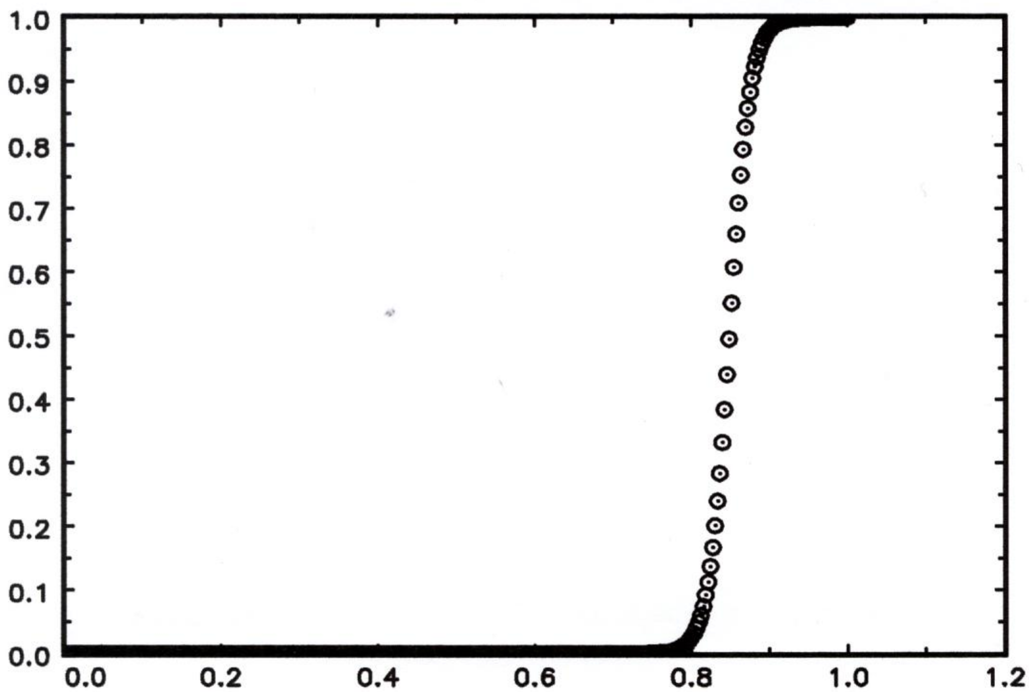

Table 4: Nonlinear Model (Equation (11))

	Model 1	***Model 2***	***Model 3***
Variables	***Coefficient[t-ratio]***	***Coefficient[t-ratio]***	***Coefficient[t-ratio]***
Regime 1			
N_t^G	0.758[4.449]	0.665[7.111]	0.674 [6.808]
N_{t-1}^G	-0.924[3.079]	-0.223[1.821]	-0.206[1.643]
N_{t-2}^G	-0.328[1.305]	-0.277[2.705]	-0.334 [3.113]
N_t^B	-0.843[7.058]	-0.611[8.882]	-0.562 [8.274]
N_{t-1}^B	0.670 [4.574]	0.410[3.808]	0.332[3.628]
N_{t-2}^B	0.088[0.720]	0.176[1.966]	0.211 [2.797]
E_{t-1}^M	0.650[6.740]	0.650[11.187]	0.643[10.814]
E_{t-2}^M	0.108[1.065]	0.160[2.436]	0.196[2.850]
E_{t-3}^M	0.171 [1.584]	0.066[1.107]	0.104 [1.640]
E_{t-4}^M	-0.025[0.260]	-0.057[0.941]	-0.019[0.311]
E_{t-5}^M	-0.052[0.556]	0.065[1.040]	-0.028[0.446]
E_{t-6}^M	0.000[0.001]	0.082[1.722]	0.077[1.649]
Regime 2			
$F \times N_t^G$	0.622 [5.865]	0.638[1.352]	0.795 [3.203]
$F \times N_{t-1}^G$	-0.500[3.119]	-0.654[1.320]	-0.687[2.042]
$F \times N_{t-2}^G$	0.044 [0.284]	0.380[0.738]	0.702 [2.388]
$F \times N_t^B$	-0.472 [6.357]	-0.448[2.018]	-0.643 [3.073]
$F \times N_{t-1}^B$	0.207[1.931]	0.391[1.317]	0.630[2.260]
$F \times N_{t-2}^B$	0.279[3.158]	0.045[0.145]	0.218[1.042]
$F \times E_{t-1}^M$	0.672[10.491]	0.824[4.222]	0.654[5.073]
$F \times E_{t-2}^M$	0.178 [2.344]	0.006[0.028]	0.030 [0.213]
$F \times E_{t-3}^M$	0.061 [0.910]	0.051[0.222]	-0.208 [1.460]
$F \times E_{t-4}^M$	-0.057[0.831]	0.438[1.701]	0.068[0.475]
$F \times E_{t-5}^M$	0.027[0.389]	-0.341[1.563]	0.144[0.989]
$F \times E_{t-6}^M$	0.078[1.542]	-0.087[0.721]	-0.047[0.461]
s_t	ΔN_{t-1}^G	ΔN_{t-1}^B	*Time*
γ	500.000[0.001]	10.066[0.925]	21.660 [1.280]
τ	-1.899[2.913]	8.837 [8.746]	0.848 [47.519]
$\bar{R}^2$	0.934	0.932	0.933
AIC	4.207	4.239	4.224

Diagnostics Tests [p-values]			
SC(4)	0.186	0.187	0.187
ARCH	0.291	0.291	0.291
Normality	0.000	0.000	0.000
Parameter constancy	0.657	0.962	0.532
Additional nonlinearity test for transition variable			
N_t^G	0.198	0.030	0.061
N_{t-1}^G	0.598	0.042	0.125
N_{t-2}^G	0.616	0.410	0.290
N_t^B	0.304	0.013	0.188
N_{t-1}^B	0.134	0.003	0.210
N_{t-2}^B	0.152	0.020	0.279
E_{t-1}^M	0.414	0.036	0.592
E_{t-2}^M	0.459	0.053	0.831
E_{t-3}^M	0.100	0.024	0.440
E_{t-4}^M	0.070	0.025	0.327
E_{t-5}^M	0.143	0.169	0.231
E_{t-6}^M	0.168	0.347	0.133

Table 5: Restrictions Tests (Non-Linear Model):

	Model 1	*Model 2*	*Model 3*
Null Hypothesis	*F-Statistic* *[p-value]*	*F-Statistic* *[p-value]*	*F-Statistic* *[p-value]*
Regime 1			
$\sum_{i=0}^{p} \beta_i^G = 0$	2.140 [0.033]	3.759 [0.000]	2.799 [0.005]
$\sum_{i=0}^{q} \beta_i^B = 0$	2.478 [0.013]	1.410 [0.159]	1.064 [0.288]
$\sum_{i=1}^{r} \beta_i^M = 1$	1.960 [0.050]	2.419 [0.016]	1.830 [0.068]
Regime 2			
$\sum_{i=0}^{p} F \times \beta_i^G = 0$	3.070 [0.002]	1.350 [0.177]	3.419 [0.000]
$\sum_{i=0}^{q} F \times \beta_i^B = 0$	0.763 [0.446]	0.154 [0.877]	2.469 [0.014]
$\sum_{i=1}^{r} F \times \beta_i^M = 1$	2.457 [0.014]	1.630 [0.104]	3.308 [0.001]

Table 6: Estimates of $\sum_{i=0}^{p} \hat{\delta}$, $\sum_{i=0}^{q} \hat{\gamma}$ and $\sum_{i=1}^{r} \hat{\lambda}$

	Model 1	*Model 2*	*Model 3*
Regime 1			
$\sum_{i=0}^{p} \hat{\delta}$	3	3.5	3.5
$\sum_{i=0}^{q} \hat{\gamma}$	1.6	0	0
$\sum_{i=1}^{r} \hat{\lambda}$	0.05	0.05	0.04
Regime 2			
$\sum_{i=0}^{p} \hat{\delta}$	2.7	0	2.22
$\sum_{i=0}^{q} \hat{\gamma}$	0	0	0.55
$\sum_{i=1}^{r} \hat{\lambda}$	0.06	0	0.36