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Consumption, labor income uncertainty, and economic news coverage

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Abstract

In the past decade, weak household consumption was an important reason for low rates of overall economic growth in Germany. Many explanations for the weakness have been provided and investigated in previous studies, but the role of media-driven uncertainty has not been addressed. Therefore, this study examines the link between economic news coverage and aggregate consumption. Consumption, information-processing, and decision-making theory all serve to derive hypotheses, which are evaluated using time-series data and information obtained from media content analyses. For the period from 2001 to 2009, the results indicate that consumption is mainly influenced by the long-run effects of news coverage. In this regard, decisions to consume are subject to an optimism bias, such that favorable news leads to a stronger increase in consumption than the decrease caused by unfavorable news. Media effects are erratic in the short run though, because it takes time for households to identify new economic trends.

Keywords: Consumption; Uncertainty; News coverage

JEL classification: C32; D83; E21

1 Introduction

In Germany, the past decade has been characterized by a lengthy debate about weak domestic demand, especially in regard to private consumption. According to the influential German Council of Economic Experts, consumption has suffered from uncertainty about future labor income, for example because of pessimism about overall economic trends, the performance of the labor market, and public discussions about fiscal and social policy matters (e.g., SVR 2003, 2008). Because it constitutes a large part of domestic demand, insufficient private consumption likely reinforced low overall economic growth rates.

This study investigates the role that economic news coverage plays in this context. On the one hand, households depend on news media to gain information about economic trends,

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because often such information cannot be obtained through alternative sources, such as experiences in everyday life or interpersonal communication. On the other hand, media coverage about economic issues tends to be disproportionately negative (e.g., Kepplinger 2000; Hagen 2005; Soroka 2006), which often induces biased perceptions or expectations, such as with regard to the general economic situation (Brettschneider 2003) or inflation (Dräger 2011).

However, no previous investigations consider whether there is a direct link between economic news coverage and consumption. Modern consumption theory suggests that expenditures are strongly affected by perceptions of uncertainty about future labor income. In particular, preferences for precautionary or buffer-stock saving lead to reduced consumption, especially in times of increasing or high uncertainty. Therefore, this study not only investigates whether there is a link between media-driven uncertainty and household behavior but also attempts to characterize this potential relationship. Possible answers to these questions emerge from aggregate time-series data, as well as information obtained from media content analyses, covering the period from 2001 to 2009 in Germany. Error-correction models serve to evaluate the sign of the possible relationship, the issue of causality among the variables, and the magnitude of potential media effects.

Several measures of labor income uncertainty already have been proposed, including the unemployment rate, stochastic income variation variables, and unemployment expectations. Using economic news coverage to capture insecurity perceptions might not necessarily provide a better uncertainty measure in a statistical sense, but an evaluation of the effects of information transmitted by news media can lead to new insights about influences on aggregate consumption beyond actual economic developments, such as with respect to the detection and quantification of biases induced by news reporting.

The next section discusses the theoretical background for this study, on which basis three hypotheses are derived, followed by a description of the data that serve to verify these hypotheses. After explaining the econometric strategy and presenting the estimation results, this article concludes with a discussion of the implications of its findings.

2 Theoretical background and hypotheses

On the basis of the life-cycle and permanent-income hypotheses, consumption theory emphasizes the effects of uncertainty on optimal consumer behavior (Leland 1968; Sandmo 1970; Dreze and Modigliani 1972; Kimball 1990). It distinguishes two sources of uncertainty: capital and non-capital risk. This study focuses on the latter source because it concerns a large proportion of the population. Moreover, media variables that capture labor income and job uncertainty can be constructed more easily.

Formal models of precautionary saving predict an optimal consumption path, according to which the growth rate of consumption is linked to income growth and the degree of uncertainty (e.g., Caballero 1990). The income-consumption link is usually explained by imperfect capital markets, liquidity constraints, agents' myopia, and rule-of-thumb behavior, such that consumption cannot be freely allocated over time but depends on income growth. The effects of uncertainty are explained by the precautionary saving motive. High or increasing labor income uncertainty depresses consumption demand because consumers want to shield themselves against negative income shocks.

The buffer-stock theory of saving (Zeldes 1989; Deaton 1991; Carroll 1992, 1997) constitutes an extension of precautionary saving theory as it introduces specific attitudes towards risk. In particular, it assumes that consumers have a target, ideal wealth-to-permanent-income ratio. In addition to the precautionary saving motive, consumers can be impatient, such that they consume more than their current income, which restricts the accumulation of wealth. If their actual wealth is below the target, consumers save because the precautionary motive dominates impatience; if it is above the target, impatience dominates, and consumers spend. In this set-up, income uncertainty affects the balance between precaution and impatience. For example, an increase in uncertainty leads to a higher level of target wealth, which increases savings and decreases consumption.

This study argues that economic news, which is unfavorable from the household's point of view (e.g., news about increasing unemployment), leads to or increases employees' concerns regarding their own job and labor income, because many factors that determine their individual future employment situation cannot be observed through other channels than the news media. If employees and their families are afraid of wage cuts or even job loss, their inclination for precautionary or buffer-stock saving increases and they reduce their consumption expenditures. Conversely, it is plausible to assume that favorable news (e.g., news about decreasing unemployment) leads to less uncertainty, less concerns, and more consumption. Of course, not all households revise their individual perceptions of income uncertainty when media coverage about the labor market or other relevant aspects becomes (un-)favorable, whether because their labor income is not affected by labor market dynamics and business cycles, or because they do not depend on labor income at all. However, for the majority of households, economic news likely has effects on their individual perceptions of income uncertainty. This influence should be detectable in aggregate numbers, which reflect the sum of individual consumption decisions.

Hypothesis 1 There is a negative relationship between unfavorable economic news and consumption, whereas the relationship between favorable economic news and consumption is positive.

Many empirical studies assume that causality runs exclusively from labor income uncertainty to consumption. However, the reverse direction of causality cannot be ruled out a priori (Carroll 1992). For example, it is conceivable that consumption demand decreases for exogenous reasons (e.g., a change in economic policy), which causes firms to cut production and dismiss workers, which in turn increases the amount of news about increasing unemployment. However, this direction is unlikely to be detected in the data of this study, because it would involve a number of mediating variables.

Hypothesis 2 Causality is one-sided and runs from news coverage to consumption.

Regarding the magnitude of media effects, previous research in similar contexts has suggested that negative and positive news might affect consumption differently. In this regard,

it is useful to distinguish between *per-unit* and *quantity-related* asymmetry in favorable versus unfavorable media coverage.

The first type of asymmetry refers to the marginal effects of individual news reports, such as when a single negative report has a greater impact than a positive one. Selective exposure to information might explain this form of asymmetry (Klapper 1960; Zillmann and Bryant 1985), in that sense that people tend to avoid unfavorable news, fit it to their beliefs or preferences, or forget it. In contrast, news that corresponds to their existing attitudes receives increased attention and may have a greater effect on their perceptions of reality. Although previous research shows that people act on biased beliefs (Staw 1974; Camerer and Lovallo 1999), it is not clear a priori, whether this implies stronger effects of negative or positive news.

Literature on optimistic information processing (Compte and Postlewaite 2004; Köszegi 2006; Eil and Rao 2011) suggests stronger effects of favorable news if it relates to recipients' self-image, because gaining self-confidence offers substantial individual utility. According to Bénabou and Tirole (2002), this effect pertains to both direct utility, such that the information recipient feels better (consumption value), and to indirect utility, because higher self-confidence provides a better impression to others (signaling value). Moreover, self-confidence may help increase capabilities and performance (motivation value), such that an optimistic self-image may be more advantageous than an accurate one.

In contrast, according to prospect theory (Kahneman and Tversky 1979), negative information should have stronger effects, because decisions-making processes are often influenced by loss aversion and endowment effects. Therefore, people respond differently to favorable and unfavorable changes in economic variables (Kahneman et al. 1991; Tversky and Kahneman 1991). In fact, the increased sensitivity to negative information is a robust finding in the psychological literature (e.g., Cacioppo and Gardner 1999; Baumeister et al. 2001; Rozin and Royzman 2001).

However, in the context of labor income uncertainty, it seems more likely that households process information with an optimism bias rather than being overly sensitive to negative news. Aggregate consumption reflects the sum of individual decisions to spend money. These decisions are based on egotrophic evaluations of how (un-)certain the own labor income is, which strongly correlates with perceived job (in-)security. Because work and a person's occupation are integral parts of self-confidence, a secure job and income may be just as important for a positive self-image as intelligence, attractiveness, or social status, for example. Therefore, this study anticipates that the optimism bias dominates.

Separate from the marginal effects of individual news reports, *quantity-related* asymmetry might stem from the often observed quantitative dominance of negative over positive coverage. According to Iyengar (1990), media can create an accessibility bias through the frequent coverage of a particular topic, which affects judgments about the topic's salience. Quantitative negativity in economic news coverage then would cause households to perceive larger degrees of income uncertainty, thus weakening the optimism bias.

Hypothesis 3 A single favorable report leads to a stronger increase in consumption than the decrease caused by a single unfavorable report, but this bias is weakened by large amounts of negative relative to positive news coverage.

3 Data

Data to evaluate the preceding hypotheses are available for the period from 2001 to 2009 in Germany. All time series are expressed on a monthly frequency. On the one hand, this is the highest frequency possible to measure the macroeconomic variables that are of interest for this study. On the other hand, it is the lowest frequency to measure media coverage in a meaningful way (in the context of time-series analyses), because economic news can be very dynamic within weeks or even days. However, measuring media coverage on a monthly basis sufficiently still captures most dynamic movements, as shown by previous studies that involve time series of economic news coverage (e.g., Hagen 2005; Soroka 2006; Dräger 2011).

3.1 Consumption

In Germany, data on private consumption expenditures are part of the national accounts systems and thus available on a quarterly basis only. However, from regular surveys conducted by the German Federal Statistical Office, monthly data are available for sales of non-durable goods. Although sales have been used as a proxy for consumption expenditures in previous studies, this measure is not the first choice here, because it is influenced by other factors, such as exports. Instead, following the procedure that the U.S. Bureau of Economic Analysis (BEA 2011) uses to construct its popular consumption indices, this study employs the high-frequency information contained in the monthly sales data to disaggregate quarterly consumption expenditures. In particular, seasonally adjusted, real monthly sales of non-durable consumer goods serve as an indicator variable to disaggregate seasonally adjusted, quarterly, real private expenditures for non-durable¹ goods, by applying the proportional interpolation method of Denton (1971)². The resulting time series is expressed in logarithms.

3.2 Labor income

In previous studies of the effects of uncertainty on consumption, labor income has been controlled using real GDP (Hahm 1999; Menegatti 2007, 2010), disposable income (Flacco and Parker 1990; Malley and Moutos 1996; Hahm and Steigerwald 1999; Lyhagen 2001; Huang et al. 2008; Mody et al. 2012), or wage income (Carroll and Dunn 1997). Because real GDP and disposable income are not available on a monthly basis in Germany, this study employs the seasonally adjusted index of agreed wages and salaries, calculated on a monthly basis by the German Federal Statistical Office and obtained through the IMF International Financial Statistics database. Because the index is published in terms of wages per man hour, it is multiplied by the aggregate numbers of hours worked, to account

¹In accordance with most empirical literature, this study excludes durable goods to keep the analyses as simple as possible, because standard consumption theory does not account for the additional complexity that durable goods introduce.

²Both variables come from the OECD Main Economics Indicator database. This study also considers consumer confidence indicators and the disaggregation procedure of Chow and Lin (1971) to obtain monthly consumption series. However, those attempts lead to an implausibly low or high variance in the disaggregated series, whereas the described combination of indicator and disaggregation procedure leads to a variance that is very similar to quarterly consumption expenditures.

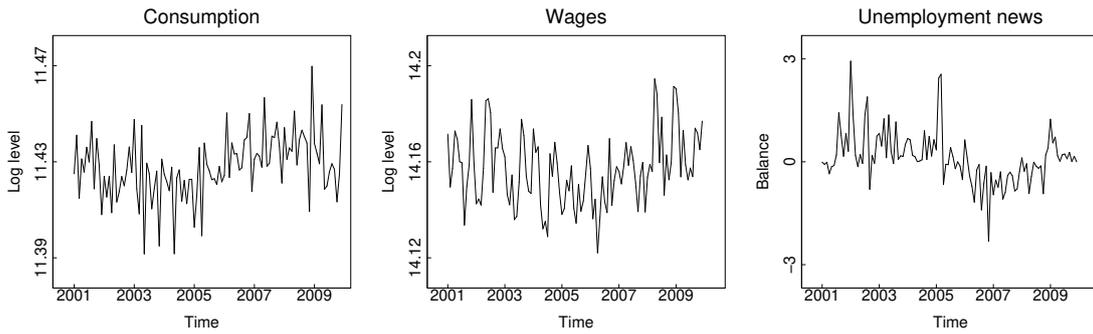


Figure 1: Time-series graphs

for possible changes in aggregate working hours. In addition, the index is deflated by the consumer price index and expressed in logarithms.

3.3 Media coverage

In the empirical literature, macroeconomic uncertainty measures refer to stochastic income variation variables (Flacco and Parker 1990; Hahm 1999; Menegatti 2007, 2010), the unemployment rate (Malley and Moutos 1996), or survey-based variables (Carroll 1992; Carroll and Dunn 1997; Hahm and Steigerwald 1999; Lyhagen 2001). This study proposes to use information about economic news coverage to measure income and job uncertainty, because those data can provide additional insights about how aggregate consumption is determined. In particular, this study uses the aggregated, monthly news output pertaining to increasing or decreasing unemployment, extracted from the media data set described in Garz (2012), using the same selection of media outlets, and applying the same weighting procedures to account for the reports' individual placement and the outlets' audience reach.³ The resulting counts are expressed as a balance series that provides the number of reports about increasing unemployment minus the reports about decreasing unemployment.

3.4 Order of integration

Visual inspection of the variables suggests that the data might not be stationary, as depicted in Figure 1. In this regard, unit root tests are not clear-cut with respect to consumption and unemployment news, as Table A.1 in the Appendix details. Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests indicate that both variables are non-stationary and integrated at an order of 1, whereas stationarity could be assumed according to the Phillips-Perron tests. In contrast, the test results consistently indicate that wages can be assumed to be stationary.

³The media data come from Media Tenor International; see <http://www.mediatenor.com> for details. The sample includes the public service news casts *Tagesschau* and *Heute*, the private news cast *RTL aktuell*, the national daily tabloid *Bild*, and two major weekly news magazines, *Der Spiegel* and *Focus*.

4 Cointegration analysis

Formal theoretical arguments suggest that the link between consumption and uncertainty refers to the growth rate of the former and the degree of the latter. However, from an empirical perspective, it is more pragmatic to investigate the relationship using an error-correction formulation, which involves the level and change of the variables, because some of the time series are likely non-stationary. An error-correction formulation prevents spurious regression results that might occur in these circumstances and has the advantage of accounting for both long- and short-run information contained in the variables. This study follows the strategy of Malley and Moutos (1996) and Lyhagen (2001) to first analyze the data in a vector error-correction model (VECM), using the Johansen (1988) procedure. VECMs capture interrelations among the variables, which prevents endogeneity problems and provides information about causality between variables.

4.1 Johansen tests and vector error-correction

Because wages appear stationary, they cannot contribute to a cointegration relationship. Yet initially, wages are included as an endogenous variable in the VECM to investigate the short- and long-run relationships among all variables. Because the usual lag-length selection criteria (i.e., Akaike, Bayesian, Hannan-Quinn, and likelihood-ratio tests) contradict one another, this study seeks the most parsimonious lag order that still leads to white-noise residuals. This effort implies setting the maximum lag length to 12 months (there are no indications of higher-order autocorrelation at any point of the analysis) and carefully investigating the residuals with each step when excluding a lag, which leads to a specification with 4 lags. Because VECMs are rather sensitive to the selection of lag length, a specification with 5 lags provides a means to evaluate the robustness of the estimates. Specifications with more than 5 lags are likely inefficient due to overparameterization; using fewer than 4 lags leads to (at least) autocorrelated residuals. Visual inspection of the data suggests that the deterministic part of the VECM should involve either a restricted or an unrestricted constant, because the variables in levels clearly have an intercept and may or may not follow a deterministic trend.

Altogether, this implies testing for cointegration in four different specifications. The results of Johansen's test statistics (see Tables A.2 and A.3 in the Appendix) concordantly indicate one cointegrating relationship for the specifications with 4 lags/restricted constant and 5 lags/unrestricted constant. Rejection of the null hypothesis of no cointegration fails only at slightly above the 10% significance level in the case of 5 lags/restricted constant, whereas the results are ambiguous in the case of 4 lags/unrestricted constant.

Table 1 summarizes the estimation results of the two specifications in which the existence of one cointegrating relationship is unambiguous (models 1 and 2). Neither model suffers from significant autocorrelation, autoregressive conditional heteroscedasticity, or non-normality in the residuals. In general, with adjusted R^2 values of 0.58 and 0.59, respectively, the consumption variable is best explained in the system, whereas the wage equations are characterized by adjusted R^2 values of only 0.17. Similarly, the error-correction term is always highly significant in the consumption but not the wage equation; in the news equation, its significance varies between the 5% and 10% level. In both models, the estimated

long-run coefficients – normalized with respect to consumption – imply that the relationship between consumption and wages is positive, whereas it is negative with respect to unemployment news.

Table 1: VECM estimation results

	Model 1	Model 2	Model 3	Model 4
<i>Long-run</i>				
Consumption	1.000 [0.000]	1.000 [0.000]	1.000 [0.000]	1.000 [0.000]
Wages	-0.632 [0.151]	-0.479 [0.146]		
Unempl. news	0.013 [0.003]	0.014 [0.002]	0.013 [0.003]	0.013 [0.003]
<i>Adjustment</i>				
Consumption	-0.596 (0.004)	-0.804 (0.001)	-0.705 (0.000)	-0.804 (0.000)
Wages	0.279 (0.237)	0.016 (0.954)		
Unempl. news	-23.089 (0.045)	-23.738 (0.083)	-11.379 (0.246)	-7.134 (0.505)
	Eq1/Eq2/Eq3	Eq1/Eq2/Eq3	Eq1/Eq2	Eq1/Eq2
Exog. var.			(0.00)/(0.25)	(0.00)/(0.56)
LR	(0.02)/(0.36)/(0.05)	(0.01)/(0.96)/(0.11)	(0.00)/(0.27)	(0.00)/(0.58)
SC(12)	(0.15)/(0.69)/(0.46)	(0.35)/(0.82)/(0.82)	(0.55)/(0.45)	(0.77)/(0.85)
ARCH(12)	(0.27)/(0.78)/(0.19)	(0.28)/(0.24)/(0.08)	(0.49)/(0.38)	(0.30)/(0.24)
NORM	(0.11)	(0.12)	(0.03)	(0.04)
Adj. R2	0.58/0.17/0.34	0.59/0.17/0.34	0.63/0.30	0.64/0.32

Notes: Standard errors are given in brackets, p-value in parentheses. Model 1 is specified with 4 lags (restricted constant), model 2 with 5 lags (unrestricted constant), model 3 with 4 lags (restricted constant and treating wages as weakly exogenous), and model 4 with 5 lags (unrestricted constant and treating wages as weakly exogenous). LR, SC(12), HET(12), and NORM, refer, respectively, to a likelihood-ratio test for weak exogeneity, the Ljung-Box Q statistic for serial correlation up to order 12, the Breusch-Pagan test for heteroscedasticity up to order 12, and the Doornik-Hansen test for multivariate normality.

Moreover, the results indicate that wages (and maybe even unemployment news) could be weakly exogenous with respect to consumption. According to likelihood-ratio tests, the null hypothesis of weak exogeneity cannot be rejected for the wage variable (p-values of 0.36 and 0.96, respectively); the tests are not clear regarding unemployment news though (p-values of 0.05 and 0.11, respectively). As the next step, it is therefore expedient to re-estimate models 1 and 2, including wages as an exogenous variable. The results are also summarized in Table 1, labeled models 3 and 4. Again, the residuals are satisfactory, except for the normality assumption. As an exogenous variable, wages are highly significant in the respective consumption but not in the news equation. Moreover, likelihood-ratio tests now indicate that unemployment news can be assumed to be weakly exogenous as well (p-values of 0.27 and 0.58, respectively).

It can thus be concluded that wages and unemployment news are not influenced by consumption, which is a first indication of one-sided causality. However, it is useful to evaluate the interrelations among the variables using further tools, specifically, Granger causality tests and impulse-response functions. Model 2 serves as a basis when applying these tools, because it appears as the best specification from a statistical point of view. Models 3 and 4 suffer from non-normal residuals; a likelihood ratio test for the null hypothesis that the restricted constant in model 1 is zero cannot be rejected (p-value = 0.51). However, the results of the Granger causality tests and impulse-response functions are barely affected

when using the other specifications. Moreover, the VECM results do not change when using a sample that is restricted to the period from 2001m1 to 2007m12 (available on request), which indicates robustness with respect to potential effects of the global economic crisis.

4.2 Granger causality

Granger causality refers to the ability of a variable's past values to predict current realizations of another variable. Testing for Granger causality in a vector error-correction context often involves a distinction between the short and the long run. However, this study applies the frequency-domain approach proposed by Breitung and Candelon (2006). In contrast with conventional Granger causality tests, this approach involves the calculation of test statistics over various frequencies, thus providing more detailed information about the relationships among variables, which is especially useful when cointegrated data are involved.

Figure 2 shows the results of the frequency-wise Granger tests. Each graph displays the F statistic for a pair of variables – conditioned on the respective third variable – for each frequency in the interval. A frequency of 0 refers to the very long run; the time horizon decreases with increasing frequency. A frequency λ can be converted into the cycle length T by $T = 2\pi/\lambda$. Test statistics above the horizontal line are at least significant at the 5% level.

The tests indicate no significant Granger causality between the variables, except that past values of unemployment news are able to forecast consumption at low frequencies, which indicates long-run causality. The highest significant frequency is 0.58, which implies that Granger causality can be assumed for cycles longer than 11 months.

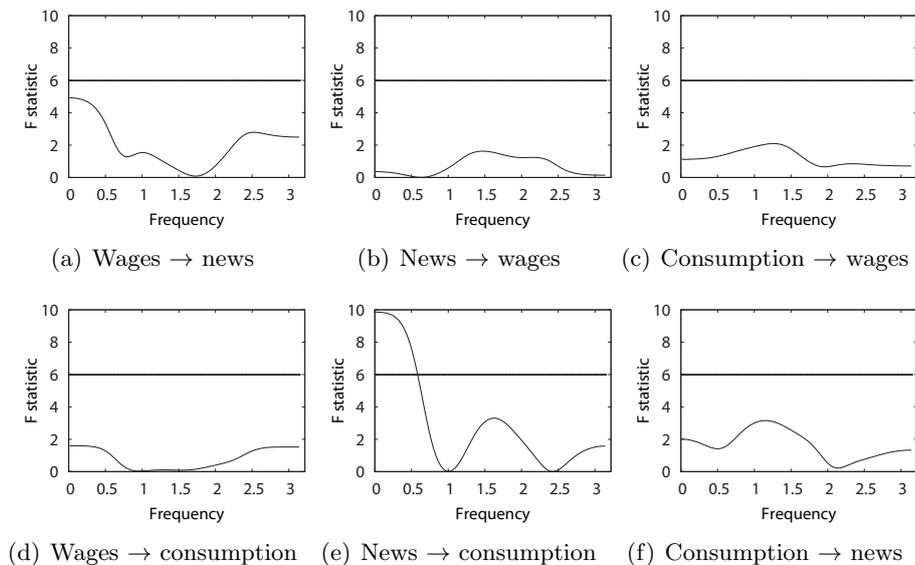


Figure 2: Frequency-wise Granger causality

4.3 Impulse-response functions

Impulse-response functions provide information about the dynamics of effects between variables, such as how an unexpected change in a variable affects another variable over time. This study computes causally interpretable impulse-response functions by restricting the contemporary relations between the variables using the following Cholesky ordering: wages \rightarrow unemployment news \rightarrow consumption. This ordering is motivated by the theoretical arguments discussed in Section 2 and the previous insights of the VECM analysis. The impulse-response functions are robust when applying any other Cholesky ordering as well.

Figure 3 shows the resulting impulse-response functions along with the 95% confidence band (based on 1,000 bootstrap replications). An unexpected positive change in the wage variable leads to an instantaneous and persistent increase in consumption, in line with consumption theory. However, the effect becomes statistically significant only after a delay of some months. A shock in the news variable, which by definition refers to an unexpected rise in the amount of news about increasing unemployment, causes consumption to fall. This result also implies that an unexpected increase of news about decreasing unemployment causes consumption to rise. The news effect is persistent and becomes continuously significant after around 11 months, which corresponds with the result of the frequency-wise Granger test. The impulse-response functions do not indicate other significant reactions of variables to shocks. Again, this finding emphasizes the exogenous character of wages and unemployment news with respect to consumption.

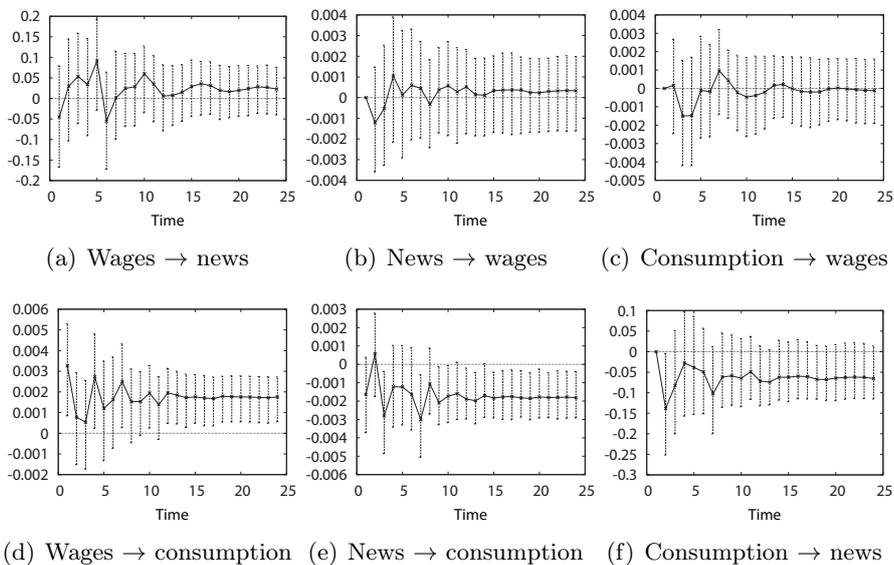


Figure 3: Impulse-response functions

4.4 Single-equation estimates

The previous results indicate that wages and unemployment news are not significantly influenced by the consumption variable, which implies that a single-equation error-correction model (ECM) can be consistently estimated. In this set-up, media effects can be evaluated

in greater detail. Specifically, the balance series of unemployment news can be split into news about increasing and decreasing unemployment, which supports tests of whether favorable and unfavorable news has symmetric effects. Due to insufficient degrees of freedom, this evaluation would not be possible in the VECM context. In contrast, the lag structure in a single-equation regression can be modeled more flexibly. For example, individual lags can be excluded in the case of statistical insignificance, which likely leads to higher estimation efficiency, because standard errors decrease. Moreover, the approach serves as a robustness check with respect to an alternative, broader media measure: negative and positive news about the general economic situation.⁴ The single-equation ECM is formulated as:

$$\Delta y_t = \rho y_{t-1} + \boldsymbol{\theta}' \mathbf{x}_{t-1} + \sum_{j=1}^{p-1} \varphi_j \Delta y_{t-j} + \sum_{j=0}^q \boldsymbol{\pi}'_j \Delta \mathbf{x}_{t-j} + \varepsilon_t, \quad (1)$$

where y denotes the dependent variable, \mathbf{x} the vector of explanatory variables, and Δ the first-difference operator. The residuals ε are assumed to be normally and independently distributed. In this ECM, the short-run dynamics are evaluated through the parameters for the (lagged values) of the variables in first differences, φ and $\boldsymbol{\pi}$. The particular lag structure is obtained by following a general-to-specific strategy, which involves estimating the model with a lag length of 12 months and successively excluding all lags that are not significant at the 10% level. The speed of adjustment after a deviation from the long-run relationship is measured by ρ ; the long-run multipliers are computed as $-\widehat{\boldsymbol{\theta}}/\widehat{\rho}$. This ECM does not require the variables to be integrated of the same order. However, because the model includes a combination of stationary and non-stationary variables, this study applies the bounds-testing procedure suggested by Pesaran et al. (2001) to verify the existence of a long-run level relationship, which implies testing the null hypothesis $H_0: \rho = \boldsymbol{\theta} = 0$.

Table 2 summarizes the estimation results and residual tests for the different single-equation specifications. When the balance series of a news variables is included, the specification assumes symmetric media effects, whereas using separate variables for favorable versus unfavorable news allows the media effects to be asymmetric. In all cases, the model diagnostics are satisfactory, because each specification is characterized by white-noise residuals, and there are no indications for parameter instability or structural breaks. The latter result implies that the estimated coefficients are robust over time, which is a rather important finding considering potential effects of the global economic crisis.

⁴These variables are also constructed as described in Section 3.3. Media Tenor International evaluates both explicit (i.e., wording is characterized by clear terms of agreement or refusal) and implicit (i.e., taking the respective context into account) judgments to distinguish between negative and positive news.

Table 2: Single-equation estimation results

	Unemployment news		General economic news	
	Symmetric	Asymmetric	Symmetric	Asymmetric
<i>Long run</i>				
Error-correction term	-0.654 [0.161]	-0.801 [0.160]	-0.334 [0.144]	-0.289 [0.161]
Wages	0.420 [0.147]	0.355 [0.107]	0.708 [0.394]	0.713 [0.513]
Bal. unempl. news	-0.011 [0.003]			
News incr. unempl.		-0.000 [0.003]		
News decr. unempl.		0.021 [0.005]		
Bal. gen. econ. news			-0.003 [0.003]	
Gen. econ. news neg.				-0.000 [0.004]
Gen. econ. news pos.				0.003 [0.010]
PSS _{Fstat.}	7.601	7.342	3.656	2.111
PSS _{crit.} 1%/5%/10%	6.36/4.85/4.14	5.61/4.35/3.77	6.36/4.85/4.14	5.61/4.35/3.77
<i>Short run (sum of lags)</i>				
Consumption	-0.968 (0.007)	-0.198 (0.413)	-1.475 (0.000)	-1.479 (0.000)
Wages	0.456 (0.000)	0.678 (0.000)	0.203 (0.026)	0.199 (0.022)
Bal. unempl. news	-0.005 (0.059)			
News incr. unempl.		-0.010 (0.019)		
News decr. unempl.		-0.028 (0.024)		
Bal. gen. econ. news			-	
Gen. econ. news neg.				-0.009 (0.002)
Gen. econ. news pos.				0.008 (0.009)
<i>Residuals/model fit</i>				
SC(12)	9.909 (0.624)	13.292 (0.348)	7.929 (0.791)	8.734 (0.725)
HET(12)	6.414 (0.930)	11.651 (0.928)	4.295 (0.891)	15.755 (0.263)
NORM	0.086 (0.958)	1.560 (0.458)	0.034 (0.983)	0.014 (0.993)
RESET	0.188 (0.829)	0.774 (0.465)	0.623 (0.539)	1.819 (0.169)
CUSUM	1.371 (0.174)	1.606 (0.113)	0.974 (0.333)	1.580 (0.118)
QLR	2008:03 > 10%	2006:11 > 10%	2005:06 > 10%	2005:05 > 10%
Adj. R2	0.724	0.744	0.668	0.711

Notes: All models contain a constant (output omitted). Standard errors are given in brackets, p-values in parentheses. P-values for the short-run coefficients refer to the null hypothesis that the sum of lags equals zero. PSS denotes the F statistic and critical values of the bounds-testing approach proposed by Pesaran et al. (2001). SC(12), HET(12), NORM, RESET, CUSUM, and QLR refer, respectively, to the Ljung-Box Q statistic for serial correlation up to order 12, the Breusch-Pagan test for heteroscedasticity up to order 12, the Doornik-Hansen test for normally distributed residuals, Ramsey's specification test, the Harvey-Collier test statistic for parameter stability, and the Quandt likelihood-ratio test for a structural break at an unknown point (15% trimming).

The impact of the wage variable on consumption is positive in all specifications, in both the short and long run. The long-run multipliers of the media variables have the expected signs, such that unfavorable news leads to a reduction in consumption, whereas favorable media coverage causes an increase. Bounds-testing F statistics indicate that the underlying level relationship is not significant when using the variables for general economic news. In contrast, the models that include the unemployment news variables are characterized by highly significant long-run relationships; the corresponding error-correction terms indicate that adjustment after a deviation from this long-run relationship takes place rather quickly: Approximately 65% of a deviation dissipates within a month when symmetric effects of unemployment news are assumed, and that amount increases to approximately 80% when

allowing for asymmetric media effects. In the short run, the balance series of general economic news has no significant impact, whereas the other media variables are significant and feature the expected signs. Only the sum of short-run coefficients for news about decreasing unemployment is negative, which contradicts the hypothesized effect. Finally, the adjusted R^2 values are slightly higher when using unemployment instead of general economic news. Using separate variables to capture favorable and unfavorable news also improves model fit.

To evaluate whether favorable and unfavorable news has asymmetric effects on consumption, this study employs the Wald tests for *per-unit* and *quantity-related* asymmetry discussed by Garz (2012). Regarding the former type of asymmetry, these tests evaluate the null hypothesis that the sum of coefficients of negative and positive news equals 0; in the latter case, the tests are based on coefficients that take the quantitative dominance of negative over positive news into account. In this regard, positive values indicate a stronger impact of favorable news, whereas negative values suggest stronger effects of unfavorable news. Values that are not significantly different from 0 imply symmetric media effects.

Table 3: Wald tests for symmetry in media effects

	News about unemployment		General economic news	
	Per-unit	Quantity-related	Per-unit	Quantity-related
Long run	0.020 (0.003)	0.013 (0.009)	0.003 (0.823)	0.001 (0.894)
Short run	-0.038 (0.002)	-0.029 (0.001)	-0.001 (0.885)	-0.006 (0.025)

Notes: P-values are given in parentheses.

Table 3 shows the resulting test values, which are based on either the long-run multipliers or the short-run coefficients obtained from Equation (1). In the long run, the tests consistently indicate larger effects of favorable news. However, this asymmetry is only significant for unemployment, not for general economic news. The *quantity-related* values are smaller than the *per-unit* values, which implies that the optimism bias in the effects of single reports is weakened by disproportionate amounts of unfavorable news. This is plausible, because the amount of news about increasing unemployment exceeds that of news about decreasing unemployment, as the balance series in Figure 1 indicates.⁵ In the short run, the tests also indicate asymmetric media effects. However, in contrast with the long run, the negative effects dominate in this case. The asymmetry is statistically significant for unemployment news; in the case of general economic news, it is only significant when the quantitative dominance of negative over positive news is taken into account.

5 Conclusion

This study investigates the link between economic news coverage and private consumption. Time-series data and information obtained from media content analyses serve to investigate three hypotheses derived from consumption, as well as information-processing and decision-making theory. For the period from 2001 to 2009 in Germany, vector and single-equation

⁵In terms of the cumulative number of weighted reports, the ratio of the coverage of increasing to decreasing unemployment amounted to 1.5 to 1 in the considered period; negative reporting on the general economic situation exceeded positive coverage by a factor of 3.4.

error-correction models provide results that are robust with respect to changes in variable measurement, model specification, and over time.

These results confirm the first hypothesis, at least for the long run. Unfavorable economic news and consumption exhibit a negative relationship, whereas the relationship is positive with regard to favorable news. This finding holds for news about unemployment as well as the general economic situation, though it lacks statistical significance in the latter case. In the short run, however, there is an exception to the pattern: News about decreasing unemployment is not associated with increases in consumption. A likely explanation is that households do not update their information sets every month, because obtaining information entails costs (Mankiw and Reis 2002; Carroll 2003; Sims 2003). Therefore, aggregate numbers reveal the effects of new information about economic trends only after some time, when more households have up-to-date information. In the meantime, news coverage evokes random effects until a majority of households are able to judge the direction of new trends with some certainty. The consumption response function to an impulse sparked by the unemployment news variable supports this conjecture. The immediate time after an impulse is characterized by a rather erratic reaction, but the effect stabilizes after some months, with the hypothesized sign (Figure 3).

The data also confirm the second hypothesis by indicating one-sided causality, from news coverage to consumption. As the frequency-wise Granger tests indicate, this effect mainly prevails in the long run, which corresponds with the finding that the short-run effects are relatively erratic. Although the other direction of causality cannot be ruled out with absolute certainty, the data in this study do not indicate any effects running from the level or changes in consumption to news coverage, likely because there is no direct link. The effects instead could be mediated by unobserved variables.

The magnitude of the estimated media effects confirms hypothesis 3, but again only for the long run. As already discussed with regard to hypothesis 1, media effects are erratic in the short run, such that there is no meaningful interpretation of the magnitude of favorable and unfavorable news. However, in the long run, households process information with an optimism bias, such that an individual favorable news report leads to a stronger increase in consumption than the decrease caused by an unfavorable report. People are interested in improving or retaining a positive self-image, because a secure job and certainty about future labor income is psychologically and socially as important as beauty, popularity, or prosperity, for example. Therefore, economic news affects perceptions of labor income and job uncertainty with an optimism bias, which influences household decisions to consume. As hypothesized, the results also indicate that larger amounts of unfavorable relative to favorable news coverage weaken the optimism bias.

Of course, the findings of this study are limited to the particular data-, country- and time-specific context. Further research is necessary to evaluate whether the findings also hold for durables consumption. If additional data become available, other countries and periods should be evaluated to obtain a more comprehensive understanding of media-driven uncertainty. This caution also applies to alternative income variables, which can provide robustness checks if appropriate data become available.

Nonetheless, the findings have important implications for economic policy and from a theoretical perspective. Journalists and policy makers should be aware that policy measures, such as those designed to stimulate private consumption, can be affected by the degree

of how critical news media report on economic developments, as well as the phenomenon that household decisions are based on potential biases in information processing. In this regard, models of household behavior or forecasts of consumption should account for such biases if possible, especially if assumptions about economic perceptions or expectations are involved.

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Appendix

Table A.1: Unit root tests

	ADF ^a			Phillips-Perron ^b			KPSS ^b			Conclusion
	Lags	Det.	P-val.	Bandw.	Det.	P-val.	Bandw.	Det.	LM-Stat. ^c	
Cons.	Level	9	c (0.42)	8	c (0.00)	8	c	0.65	I(0)/I(1)	
	Level	9	c, t (0.19)	7	c, t (0.00)	8	c, t	0.17		
	Diff.	10	(0.00)	14	(0.00)	17	c	0.13		
Wages	Level	0	c (0.00)	11	c (0.00)	3	c	0.37	I(0)	
	Level	0	c, t (0.00)	12	c, t (0.00)	2	c, t	0.33		
Unempl. news	Level	5	c (0.37)	4	c (0.00)	7	c	0.55	I(0)/I(1)	
	Level	5	c, t (0.38)	3	c, t (0.00)	6	c, t	0.15		
	Diff.	4	(0.00)	24	(0.00)	23	c	0.12		

^a Lag-length selection according to Akaike criterion (maximum lag order = 12).

^b Bandwidth selection as suggested by Newey and West (1994).

^c Critical values (1%/5%/10%): 0.74/0.46/0.35 (constant), 0.22/0.15/0.12 (constant and trend).

Table A.2: Johansen tests (4 lags)

Trace			Maximum eigenvalue				Conclusion
H ₀	H ₁		H ₀	H ₁			
Restricted constant							
r = 0	r ≥ 1	37.189 (0.033)	r = 0	r = 1	21.534 (0.062)		
r ≤ 1	r ≥ 2	15.655 (0.204)	r ≤ 1	r = 2	11.113 (0.252)	r = 1	
r ≤ 2	r ≥ 3	4.542 (0.349)	r ≤ 2	r = 3	4.542 (0.348)		
Unrestricted constant							
H ₀	H ₁		H ₀	H ₁			
r = 0	r ≥ 1	37.167 (0.006)	r = 0	r = 1	21.519 (0.042)		
r ≤ 1	r ≥ 2	15.648 (0.049)	r ≤ 1	r = 2	11.107 (0.151)	r = ?	
r ≤ 2	r ≥ 3	4.541 (0.036)	r ≤ 2	r = 3	4.541 (0.033)		

Notes: P-values (in parentheses) are computed using the gamma approximation suggested by Doornik (1998).

Table A.3: Johansen tests (5 lags)

Trace			Maximum eigenvalue			Conclusion
Restricted constant						
H ₀	H ₁		H ₀	H ₁		
r = 0	r ≥ 1	32.807 (0.100)	r = 0	r = 1	19.772 (0.110)	
r ≤ 1	r ≥ 2	13.035 (0.382)	r ≤ 1	r = 2	9.400 (0.404)	r = 0
r ≤ 2	r ≥ 3	3.635 (0.480)	r ≤ 2	r = 3	3.635 (0.480)	
Unrestricted constant						
H ₀	H ₁		H ₀	H ₁		
r = 0	r ≥ 1	32.777 (0.025)	r = 0	r = 1	19.771 (0.077)	
r ≤ 1	r ≥ 2	13.006 (0.121)	r ≤ 1	r = 2	9.394 (0.261)	r = 1
r ≤ 2	r ≥ 3	3.612 (0.061)	r ≤ 2	r = 3	3.612 (0.057)	

Notes: P-values (in parentheses) are computed using the gamma approximation suggested by Doornik (1998).

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