Assessing Expectations as a Joint Monetary-Fiscal and State-Dependent Phenomenon

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Abstract

We assess the simultaneous impact of fiscal and monetary shocks on US survey-based macroeconomic expectations elicited from consumers as well as from financial and economic experts, within and outside low-debt states of the world. Our econometric exercise reveals a number of empirical patterns. First, within states of low debt we do not observe much of a response, if at all, of consumers' expectations to the fiscal and monetary shocks we jointly consider. Second, the response of consumers' expectations to each shock is typically distinctly different outside states of low debt as compared to within states of low debt. Notably, outside low-debt states, tax hikes appear to induce consumers to expect an expansionary movement along the Phillips curve shortly after the shock occurs, which is consistent with the anticipation of positive effects associated with a successful consolidation. Contractionary monetary policy shocks induce pessimistic macroeconomic expectations outside the low-debt state, consistent with the notion that the burden of debt increasingly drags on macroeconomic outcomes. In addition, results obtained with consumer data resemble those obtained with expert data more closely once the economy is outside the low-debt state, suggesting that high public debt induces consumers to be more attentive vis-à-vis fiscal and monetary developments.

Keywords: macroeconomic expectations, narrative shocks, fiscal policy shocks, monetary policy shocks, public debt.

JEL Classification: E31, E52, E62

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1 Introduction

Expectations play a key role in the way fiscal and monetary policy propagate in the economy. Empirically, however, relatively little is known about how people assess the macroeconomic effects of fiscal and monetary policy. In this paper, we study how monetary and fiscal policy shape consumer expectations about future prospects of the economy using state-dependent models. Specifically, we allow the effects of fiscal and monetary policy to vary according to the level of government debt. This is important as it is conceivable that people perceive fiscal and monetary policy differently depending on the state of public finances. For instance, in a state of relatively high debt people may think of monetary policy as a device to stabilize public debt rather than to stabilize output and the price level. In addition, the perception of the macroeconomic effects of fiscal and monetary policy may depend on the state of public finances as people may anticipate a consolidation to occur to bring public finances back on a sustainable path (Blanchard, 1990; Bertola and Drazen, 1993; Sutherland, 1997; Ardagna, 2004).

The importance of the joint behavior of monetary and fiscal policies in determining inflation is one of the main themes in Leeper and Campbell (2016). As suggested there and in Wallace (1981), different fiscal behavior allows the same monetary policy action to have different impact. This, in effect, renders monetary policy actions state-dependent. In addition, as explained in Leeper and Campbell (2016), with some price stickiness (along with distortionary taxation) there will generally exist "pervasive interactions between monetary and fiscal policy."Our work takes into account both the above-mentioned state-dependence of monetary policy actions by considering different states determined by the debt level, as well as the simultaneous effects of fiscal and monetary policy actions at any point in time.

To evaluate the exogenous effects of fiscal and monetary policy on expectations in state-dependent models, we consider narrative measures for shocks in taxes, expenditures, and the policy rate. Specifically, we use a cleaned version of the Romer and Romer (2010) legislative tax changes by Mertens and Ravn (2014), military news shocks put forward

by Ramey (2011) and Ramey and Zubairy (2016) to proxy the effects of government expenditures, and an updated series of the Romer and Romer (2004) innovations to monetary policy from Coibion et al. (2017). We apply the local projections method put forward by Jordà (2005) as we deem this to be a suitable approach for studying how fiscal and monetary policy affect expectations conditional on the sustainability of public finances. This framework allows the dynamics of impulse responses of expectations to vary according to the state of the economy by introducing interaction terms.

As a measure for macroeconomic expectations we mainly use aggregated survey data from the University of Michigan's Surveys of Consumers (Michigan Survey). This survey elicits expectations about key macroeconomic variables, in particular about unemployment, inflation and interest rates. In addition, we consider survey answers regarding consumption intentions and satisfaction with government policy to infer how consumers' personal attitudes are affected by fiscal and monetary policy shocks. To complement our analysis conducted with consumer data, we assess the effects of these shocks on experts. To this effect, we use aggregated survey answers from the Survey of Professional Forecasters (SPF). Comparison of the results obtained with these two different sets of respondents allows us to evaluate potential biases in the formation of expectations of the general public such as the prevalence of rational inattention motives involved in the updating of their expectations.[1]

Our analysis uncovers a number of interesting empirical patterns prevalent in these survey data. In times of low public debt, consumer expectations largely appear to not react to fiscal and monetary policy shocks in a distinct and systematic way. By contrast, outside low-debt states, reactions of consumer expectations are more pronounced. Thereby, several observations stand out. Shortly after tax hikes occur in times of relatively high public debt, consumers paint a more optimistic picture about future macroeconomic developments consistent with an expansionary movement along the Phillips curve. A plausible explanation for this is that consumers believe in a successful consolidation and

[1]It is well documented that household forecasts tend to be less efficient and more disperse. Moreover, forecasts by professionals may lead those made by households (Mankiw et al., 2004; Carroll, 2005).

anticipate positive macroeconomic effects. An indication that supports this view is that satisfaction with public policy markedly increases following the tax shock. Interestingly, government expenditure shocks do not exhibit symmetric effects compared to the tax shocks as one may plausibly expect from standard models. Even though the effects are not very pronounced, expenditure shocks tend to exert a positive effect outside the low-debt state, despite the fact that higher expenditures potentially further impair the sustainability of fiscal positions. Monetary policy affects consumer expectations outside low-debt states in a distinct and adverse way. Consumers worry about higher future unemployment and are clearly dissatisfied with public policy following a contractionary shock.

In comparison with the effects of fiscal and monetary policy shocks onto expectations for financial and economic experts, it is striking that outside low-debt states, responses of consumers resemble more closely the results obtained with the SPF data. This suggests that high public debt induces consumers to be more attentive vis-à-vis fiscal and monetary developments. As fiscal and monetary policy is likely to affect the economy more decisively in times of high public debt, this is in line with models of e.g. rational inattention (Sims, 2003).

The next section describes the data at hand. Following that, we describe our state-dependent approach to jointly estimating the impact of monetary and fiscal policy actions on inflation and other consumer and professional forecasters' expectations. The fourth section presents our empirical results while the last section briefly concludes.

2 Data

2.1 Consumer Data

For our analysis we consider survey data from the Michigan Survey. These data are increasingly used to study expectations of the general public in a macroeconomic context (see e.g. Carvalho and Nechio, 2014; Coibion and Gorodnichenko, 2015; Wong, 2015; Bachmann et al., 2015; Dräger et al., 2016), and are particularly well suited for our anal-

ysis. Respondents are households and their answers are presumably more representative for how people, in general, view economic developments than answers from professional forecasters that are interviewed in other surveys about macroeconomic developments.[2]

We focus on survey questions that give us an indication on how people assess the macroeconomic environment, how they view their personal real income and consumption plans, and how satisfied they are with economic policy. We capture people's notion about the macroeconomic environment with questions about how people view economic activity, interest rates, and inflation over the 12 months ahead. The Michigan Survey contains two types of survey questions, questions with quantitative and questions with qualitative answers. For all questions we use cross-sectional aggregates provided by the survey center.

For expected inflation we use average point estimates provided by respondents, which are elicited through the following questions:

> (A12) *'During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now?* (A12b) *By about what percent do you expect prices to go (up/down) on the average, during the next 12 months?'*

The remaining questions we use in our analysis are qualitative. To capture expectations about interest rates we use the following question:

> (A11) *'No one can say for sure, but what do you think will happen to interest rates for borrowing money during the next 12 months – will they go up, stay the same, or go down?'*

Note that this question does not refer to a specific rate and respondents may not specifically have the monetary policy rate in mind. However, given that the transmission mechanism of monetary policy performs sufficiently well, changes in borrowing rates

[2]Coibion and Gorodnichenko (2015) even argue that firms' expectations about economic activity and inflation are better approximated by household answers compared to answers from professional forecasters, since small and medium-sized enterprises usually have no professional forecasters on staff and are not likely to use professional forecasting services.

should be mainly due to changes in the policy rate. Hence, views about future monetary policy, should be reflected in answers to this question.

The survey center aggregates the individual, qualitative answers using balance scores. In case of expectations about future interest rates, the share of respondents that believe that interest rates go up in percent is subtracted from the share of respondents indicating an expected decrease of interest rates. To have this score fluctuating around a level of 100, 100 is added. Hence, when interest rate expectations generally go up among respondents, the index actually goes down. For our purposes, this does not warrant an intuitive interpretation of the score. Therefore, we reverse the index such that it goes up when more respondents believe that interest rates increase.[3]

To proxy expectations about real economic developments in a broad sense, we consider unemployment expectations. The question capturing unemployment expectations reads:

> (A10) *'How about people out of work during the coming 12 months – do you think that there will be more unemployment than now, about the same, or less?'*

Similar than for the interest rate expectations, the balance score of unemployment expectations provided by the survey center goes up when actually relatively less people worry about higher future unemployment. Hence, to facilitate an intuitive interpretation in our context, we reverse the index in the same way than for interest rate expectations. For the remaining questions we consider the indexes as provided by the survey center.

We study the adjustment of consumption plans using the question:

> (A18) *'About the big things people buy for their homes – such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?'*

Finally, we proxy satisfaction with economic policy with the following question:

[3]We subtract 100, multiply the difference between the two fractions by minus one, and add a level of 100 again.

(A9) *As to the economic policy of the government – I mean steps taken to fight inflation or unemployment – would you say the government is doing a good job, only fair, or a poor job?*

2.2 Financial and economic experts

The SPF elicits survey answers from a group of approximately 40 private sector economists from financial and research institutions who conduct forecasts about key macroeconomic variables. Respondents fill out a questionnaire form and provide point estimates for a number of variables and various forecasting horizons ranging from one quarter to 10 years. Note that while the Michigan Survey asks for qualitative forecasts of unemployment and interest rates, the SPF elicits point estimates.

For our analysis, we use the cross-sectional averages provided by the Federal Reserve Bank of Philadelphia. Specifically, we use the three quarter ahead forecast for the headline CPI inflation rate (denoted CPI5 in the SPF dataset), the three-month Treasury bill rate (TBILL5), and the unemployment rate (UNEMP5). Data about the expected T-Bill rate and the expected CPI inflation rates are available from the third quarter of 1981 while the expected unemployment rate is available since 1968.

2.3 The state of public finances

To construct a measure of the state of public finances we consider the debt-to-GDP ratio. More specifically, we use the seasonally adjusted quarterly total federal public debt as percent of GDP to select states of relatively high public debt. As a cutoff, we choose the 66th percentile of the distribution of the debt-to-GDP ratio. For the sample we consider in the baseline this cutoff is approximately 60.2 percent, where debt-to-GDP ratios below this threshold are considered as "low-debt" states.

2.4 Fiscal and monetary policy

We consider narrative measures for monetary and fiscal policy shocks that are frequently used in the literature.

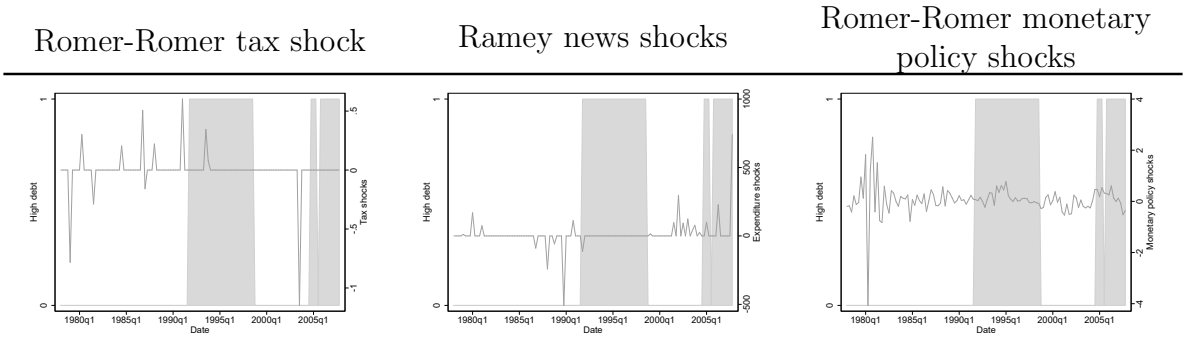
To study the effects of monetary policy we consider narrative shocks from Romer and Romer (2004), which are extended by Coibion et al. (2017). These shocks are innovations to monetary policy unrelated to changes in the macroeconomic environment. The intuition is to use forecasts available to the FOMC members to purge changes in the policy rate. Changes in the policy rate that are orthogonal to the information set of FOMC members are retained and used to proxy monetary policy shocks. These monetary policy innovations are available at a monthly frequency whereas most of the data we use is only available at a lower frequency. Therefore, we transform this monthly series by utilizing quarterly averages.

To evaluate the effects of changes in taxes we use narrative tax shocks by Romer and Romer (2010), that should be orthogonal to the business cycle. They use legislative documents, such as presidential speeches and Congressional reports, to identify the size, timing, and context of tax policy changes. Based on this characterization, they select exogenous tax shocks. However, it has been shown that the Romer and Romer (2010) shocks are not likely to be exogenous and may be related to, e.g., past deficits. Therefore, Mertens and Ravn (2014) include the narrative shocks into a VAR framework to further clean the Romer and Romer (2010) shocks. We consider the Mertens and Ravn (2014) version of the Romer and Romer (2010) tax shocks. The tax shocks are measures in percent of nominal GDP in the quarter the tax change occurred.

Finally, to study the effects of public expenditures we consider the military news shocks put forward by Ramey (2011) and Ramey and Zubairy (2016). These news shocks are changes in government spending that are related to arguably exogenous political and military events and that are observable through narrative records. The news shocks are measured as changes in the expected present discounted value of government spending.

Figure 1 shows the fiscal and monetary policy shocks together with our measure for the fiscal stance indicated by the shaded areas.

Figure 1: Fiscal and monetary policy shocks and government debt



Notes: Shaded areas indicate episodes in which the debt-to-GDP level exceeds 60.2 percent.

3 Econometric approach

A suitable approach to study how fiscal and monetary policy affect expectations conditional on the sustainability of public finances is the local projections method put forward by Jordà (2005). This framework is very flexible and allows the dynamics of impulse responses to vary according to the state of the economy by introducing interaction terms.[4] The Jordà method requires estimation of a series of regressions for each horizon h. We fit the following model to the data, that allows state-dependence and the simultaneous evaluation of the effects of tax, expenditure, and monetary policy shocks:

$$
\begin{aligned}
x^e_{t+h} = {} & \alpha_h + \beta_h^{state} I_t + \beta_h^m mon.\ shock_t + \beta_h^t tax\ shock_t + \beta_h^e expend.\ shock_t \\
& + \beta_h^{m,state}(mon.\ shock_t * I_t) + \beta_h^{t,state}(tax\ shock_t * I_t) + \beta_h^{e,state}(expend.\ shock_t * I_t) \\
& + \sum_{\tau=1}^{k} \gamma_{h,\tau} x^e_{t-\tau} + \sum_{\tau=1}^{k} \gamma_{h,\tau}^{state}(x^e_{t-\tau} * I_t) + \delta'_{\mathbf{h}} \mathbf{X}_{t-1} + \delta_{\mathbf{h}}^{state'} \mathbf{X}_{t-1} * I_t + trend + trend^2 \\
& + \epsilon_{t+h}
\end{aligned}
$$

The dependent variable is in each case one of the survey measures described in Section 2. For example, we consider survey-based consumers' expectations regarding economy-

[4] Auerbach and Gorodnichenko (2013) were the first to use this technique to estimate state-dependent fiscal models, employing it in their analysis of fiscal multipliers in recessions and expansions. This approach has become one of the primary tools to study state depend effects of shocks (see e.g. Jordà et al., 2013; Ramey and Zubairy, 2016; Romer and Romer, 2016; Tenreyro and Thwaites, 2016).

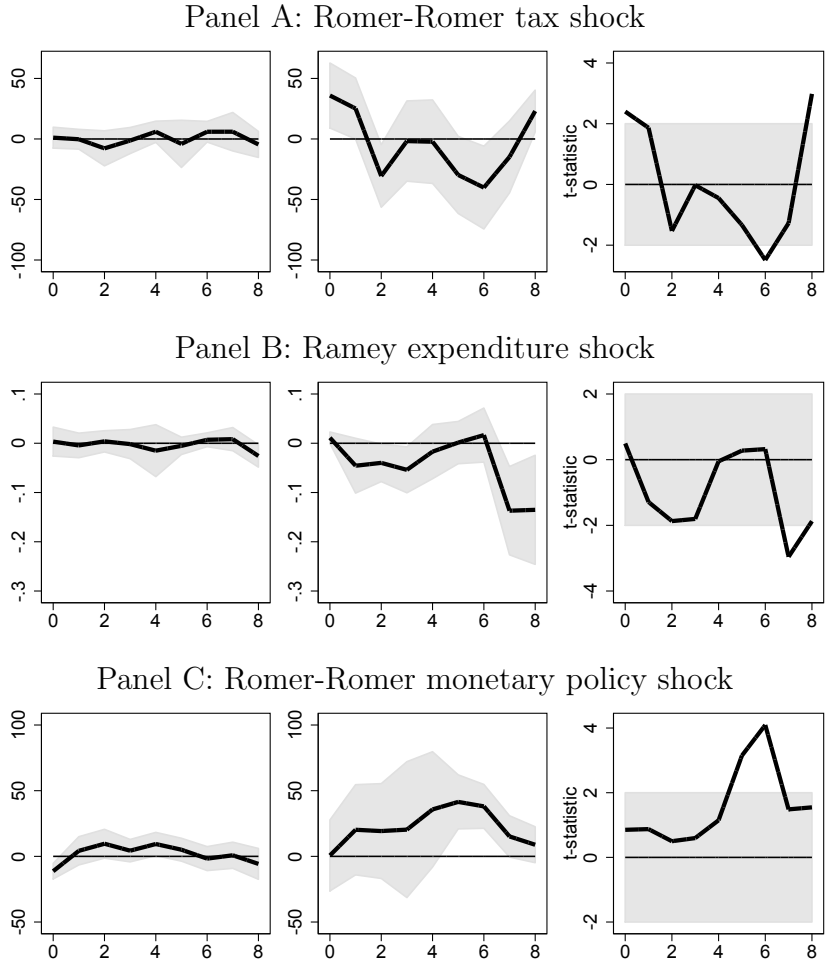
wide inflation, unemployment and interest rates. Control variables are used in order to, for example, capture the state of the business cycle one quarter before people provide survey answers. More specifically, we include the logarithm of real GDP, the CPI inflation rate, and the Federal Funds rate as control variables. Throughout, we use the lagged value of $\mathbf{X}$ to avoid endogeneity issues. However, as macroeconomic data is released with a certain lag, $\mathbf{X}_{t-1}$ may in fact proxy the information set of agents more accurately than $\mathbf{X}_t$. In addition, we control for a linear as well as a quadratic trend. Given an arguably exogenous shock measure is available, the only complication associated with the Jordà method is the serial correlation in the error terms induced by the successive leading of the dependent variable. To take account of this, we use the Newey-West correction of the standard errors. The impulse response functions presented below in a state of low-debt are just the sequences of the estimated β_h^m, β_h^t, and β_h^e coefficients. The impulse response functions to shocks outside the low-debt state are the sequences of $(\beta_h^m + \beta_h^{m,state})$, $(\beta_h^t + \beta_h^{t,state})$, and $(\beta_h^e + \beta_h^{e,state})$.

4 Results

4.1 Consumer expectations

A preview of the impulse response functions of consumer (unemployment, inflation and interest rate) expectations to shocks in taxes, government spending and monetary policy shown in Figures 2, 3, and 4, reveals two main patterns. First, within states of low-debt we do not get much of a response (if at all) of consumers' expectations to any of the three shocks we consider, as seen in the first column of each of these figures. Second, outside low-debt states of the world, the response of consumers' expectations to the shocks we consider are in a number of cases quite striking as can be seen in the second column of Figures 2, 3, and 4. As a result, the response of consumers' expectations to each of the three shocks we simultaneously consider is typically distinctly different outside states of low-debt as compared to within states of low-debt, as seen in the third column of each figure where we report the t-statistics for the null hypothesis that the impulse responses

Figure 2: Unemployment expectations



Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

within and outside low-debt states are identical. Below, we present a number of results along these lines.

In Figure 2, we consider the responses of unemployment expectations to tax hike shocks (Panel A), government spending shocks (Panel B) and interest rate hike shocks (Panel C). The first column shows responses to each type of shock for low-debt states of the world. In this case, we observe rather muted and unsystematic responses across shocks. By contrast, outside low-debt states, responses are considerably more pronounced as we can see in the second column of Figure 2.

When tax changes occur outside low-debt states, the responses are more pronounced

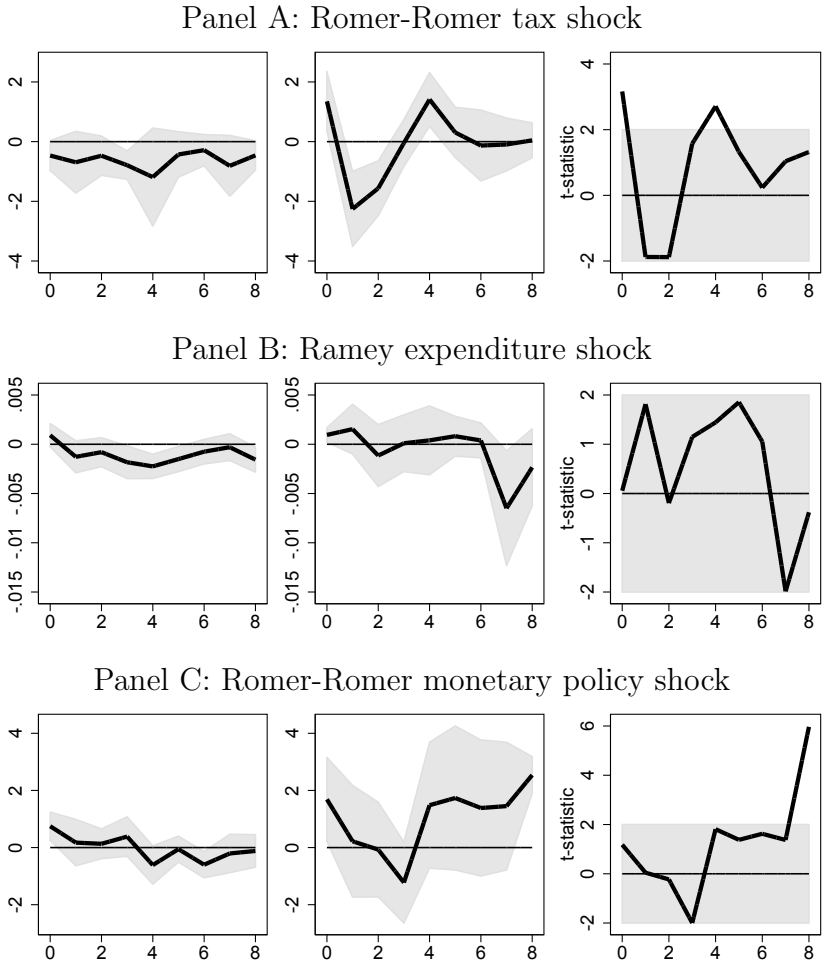
and imply that people initially expect higher unemployment. Approximately two quarters after impact of a tax hike shock, however, unemployment expectations tend to go down. A plausible explanation is that people believe in a successful fiscal consolidation which may relate to a more optimistic view of future economic developments. Consistent with this, a government facing relatively high debt undertaking tax hike policies provides households with a good signal about its credibility which translates into expectations for better economic outcomes in the future.[5] As we will see in the next section, this interpretation is supported by the positive perception of households regarding government policies following a tax hike shock.

Moreover, outside low-debt states, government spending shocks appear to be more effective and tend to reduce unemployment expectations as seen in the second column of Panel B in Figure 2. In this case, consumers expect lower unemployment one quarter after impact of a government spending shock, and this fall becomes even more evident seven quarters after impact. Hence, interestingly, the expansionary effects of an increase in expenditures is larger outside low-debt states. This is in fact consistent with higher satisfaction with economic policy vis-à-vis the expenditure shock and suggests that consumers do not worry about potentially higher debt due to higher government expenditures. Hence, consumers do not interpret the effects of shocks in expenditures and taxes symmetrically, as suggested by the standard textbook treatment of these shocks. At least this appears to be case for expenditures in the military sector as captured by the narrative measure we use.

Finally, consumers gradually expect higher unemployment in responses to an interest rate hike as we can see in Panel C of Figure 2, which is in line with standard neo-Keynesian view. The increase becomes very evident four quarters after impact and outside low-debt

[5]This reaction may plausibly be related to the so-called expectations channel, through which a fiscal consolidation may exert expansionary effects (Blanchard, 1990; Bertola and Drazen, 1993; Sutherland, 1997; Ardagna, 2004). If public debt is perceived to be unsustainable, then consumers expect a consolidation to occur in the future. In anticipation of the consolidation, people build up a stock of savings to be able to compensate the expected decline in disposable income due to the fiscal contraction. When the consolidation finally occurs, households may respond with an increase in consumption, resulting in higher aggregate demand. If this channel is active, then any contractionary effects induced by the consolidation are counteracted and, if the channel is strong enough, may even lead to expansionary effects at the macroeconomic level.

Figure 3: Inflation expectations



Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

sates. Hence, consumers perceive such a policy as particularly contractionary when public debt is high which is intuitive as the burden of debt rises more due to higher interest rates when debt is already high.

Turning now to Figure 3, we can see in Panel A that in line with a movement along the Phillips curve associated to the tax hike, inflation expectations generally tend to go down following the shock. However, outside the low-debt state, the response is slightly deferred and overall relatively short-lived, while more pronounced during the first two quarter after impact. The relatively short-lived effect of the tax hike may be related to the anticipation of a successful, potentially expansionary fiscal consolidation which would

compensate the contractionary effect of the tax hikes and thus, stabilize inflation.

As evident in Panel B of Figure 3, consumers' inflation expectations fall seven quarters after impact of a government spending shock but only outside the low-debt state. Such a response may be due to consumers anticipating contractionary tax hikes some time after a surprise increase in government spending outside of low-debt states of the world. This is consistent with the evident fall in consumers' inflation expectations immediately after a tax hike shock outside low-debt states of the world, shown in Panel A.

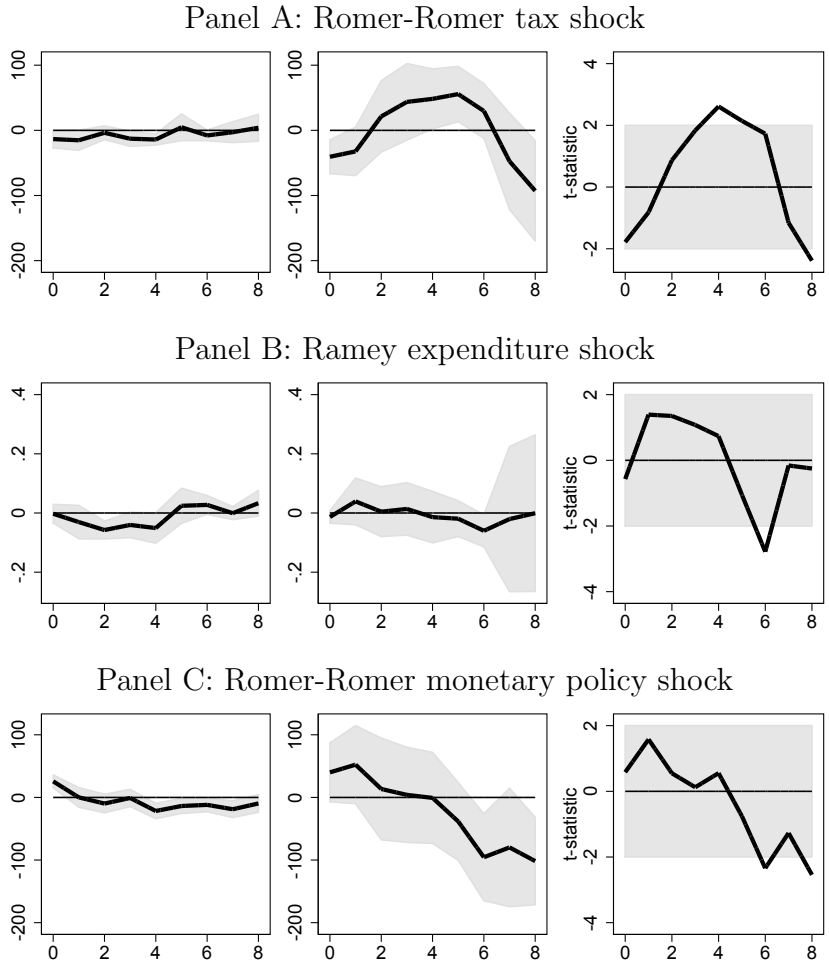
In the second column in Panel C of Figure 3, we can see that consumers' inflation expectations initially rise on impact, then fall temporarily, and rise again four quarters after a monetary policy shock, outside low-debt states of the world. No response is evident within the low-debt state as evident in the first column in Panel C. The distinct difference within versus outside low-debt states of the world is evident in the third column of Panel C.

In Panels A, B and C of Figure 4 we present the responses of consumers' interest rate expectations to respective shocks in taxes, government spending and the interest rate. As shown in the first column of Panel A of Figure 4, consumers' interest rate expectations slightly fall up to four quarters following a tax hike shock, within the low-debt state. This would be consistent with the traditional Keynesian view of tax hikes leading to lower output so that interest rate expectations fall in accordance with a Taylor rule type relationship.[6] In contrast to this, when the economy is outside the low-debt state, consumers appear to process the tax hike differently. While as the shock sets in they expect interest rates to fall, interest rate expectations significantly overshoot until the sixth quarter, outside the low-debt state. As we can see, consumers' interest rate expectations finally fall six quarters after a tax hike shock.

Interestingly, interest rate expectations are, overall, not distinctly affected by government expenditures, which makes it difficult to identify systematic patterns in the responses (see Panel B of Figure 4). We see that there is minimal response of interest

[6]In fact, a number of empirical studies find that people form interest rate expectations in line with the Taylor rule (Carvalho and Nechio, 2014; Dräger et al., 2016; Geiger and Scharler, 2017).

Figure 4: Interest rate expectations



Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

rate expectations either within or outside low-debt states of the world.

Furthermore, as we can see in the second column of Panel C, we observe distinct differences in the responses inside and outside the low-debt state in the event of monetary policy shocks. While, qualitatively, responses go into similar directions, the responses are much more pronounced outside the low-debt state suggesting that consumers are more sensitive to changes in the policy rate once public debt is comparatively high. This appears plausible as the burden of debt changes due to the policy shock, thereby exerting larger effects on the refinancing ability and the risk premium outside the low-debt state. Interestingly, approximately four to eight quarters after a monetary policy rate hike shock

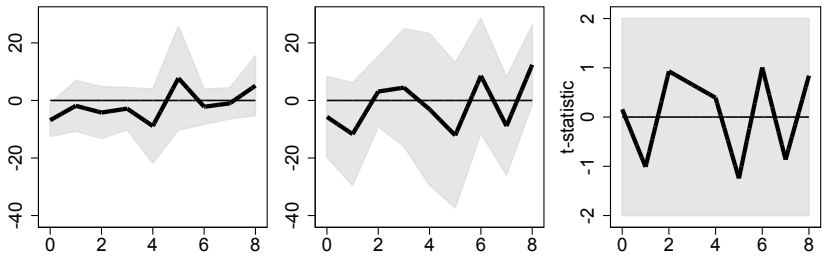
consumers expect lower interest rates. Notably, this overshooting pattern is much more pronounced outside the low-debt state. A plausible explanation for this pattern is that consumers expect the monetary authority to stabilize debt after the initial rise in the policy rate in order to reduce the burden of debt and the country risk.

4.2 Consumer attitudes

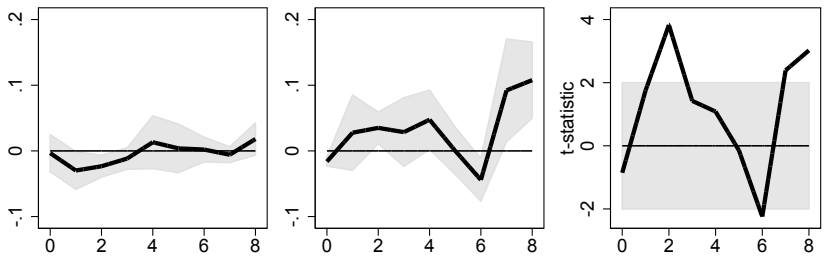
In the next step of our analysis, we evaluate how fiscal and monetary policy shocks affect consumer attitudes and how these changes in attitudes relate to the observed changes in consumer expectations. Specifically, we look at the effects of the shocks on consumption intentions in Figure 5, and government satisfaction in Figure 6.

Figure 5: Consumption intentions

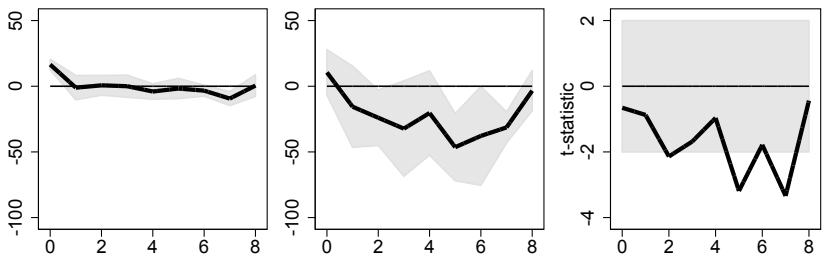
Panel A: Romer-Romer tax shock



Panel B: Ramey expenditure shock



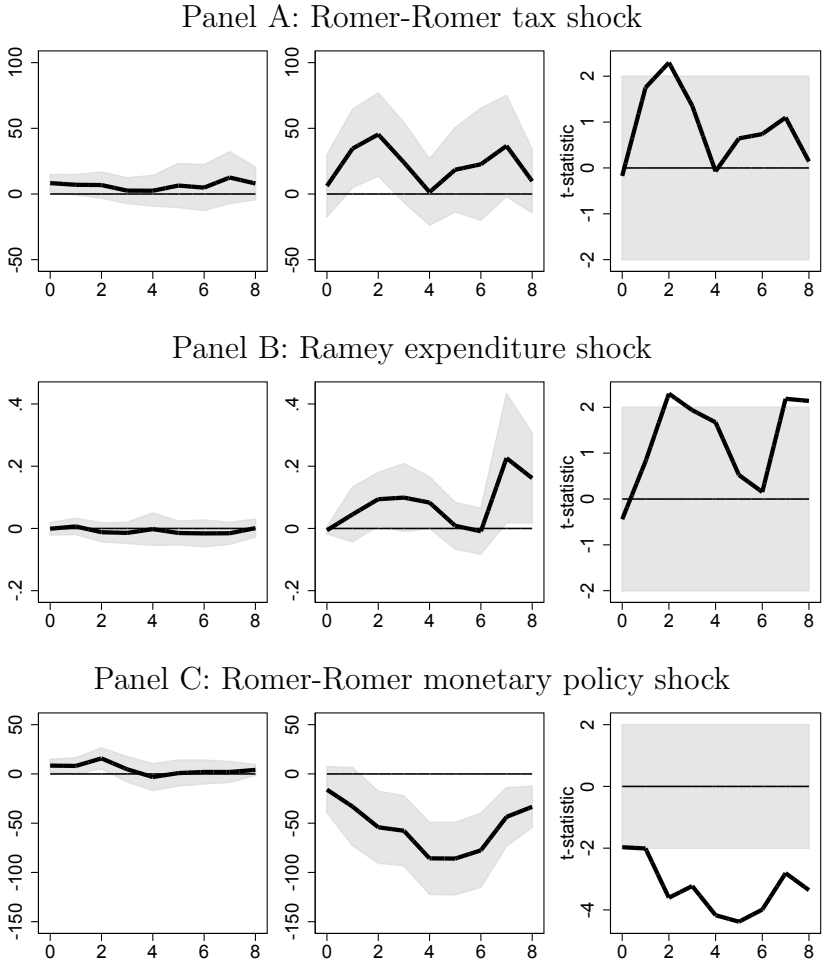
Panel C: Romer-Romer monetary policy shock



Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

Responses of consumption intentions to tax shocks presented in Panel A of Figure 5, are not evidently systematic. In the second column of Panel B in Figure 5, we can see that consumption intentions rise beginning in the first quarter after impact of a positive government spending shock, outside the low-debt state. Moreover, as evident in the second column of Panel C in Figure 5, consumption intentions respond with a sustained drop following an interest rate hike shock, as long as the economy is outside the low-debt state of the world. Once again, no response is evident after an interest-rate hike shock within the low-debt state, as shown in the first column of Panel C.

Figure 6: Satisfaction with the government



Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

Finally, in Panels A, B and C of Figure 6 we consider households' satisfaction with

government policies, following respectively, a tax hike shock, a government spending shock and an interest rate shock. In the first column of each of the three Panels of Figure 6, we see again the evident non-response of consumers to each of the three shocks we consider, within low-debt states of the world. However, consumers do respond strongly outside the low-debt state.

In the second column of Panel A in Figure 6 we see an increase in satisfaction with government policies following a tax hike shock outside the low-debt state. This increase is apparent on impact but persists eight quarters out. This increased satisfaction of households with government policies when a government facing relatively high debt undertakes a tax hike, likely reflects an improvement in the credibility of the government as perceived by households. The positive perception of households regarding government policies following a tax hike shock, is then consistent with how a tax hike appears to affect economic activity (unemployment) in the second column of Panel A in Figure 2. That is, a government facing relatively high debt undertaking tax hike policies provides households with a good signal about its credibility which translates into an expectation of improved future economic outcomes.

In the second column of Panel B in Figure 6, we can see an increase in satisfaction from government policies following a government spending shock outside the low-debt state. This increase is apparent on impact and persists, again, eight quarters following the spending shock. Finally, in the second column of Panel C in Figure 6, we see that consumer satisfaction with government policies drops on impact following an interest rate hike shock. This fall is evidently persistent and clearly visible eight quarters out. However, we can also see that this fall begins to be reversed or fade out six quarters after the initial interest rate shock.

4.3 Professional forecaster expectations

Responses of unemployment, inflation and interest rate expectations of professional forecasters to tax hike shocks, government spending shocks and interest rate hike shocks, are shown respectively in Figures 7, 8 and 9 and Panels A, B and C in each case. Overall, we

observe several similarities across the two different groups of respondents. Professional forecasters, like consumers, tend to react to monetary and fiscal policy shocks more distinctly outside states of low-debt even though differences in responses outside and inside the low-debt state are slightly less pronounced in this case.

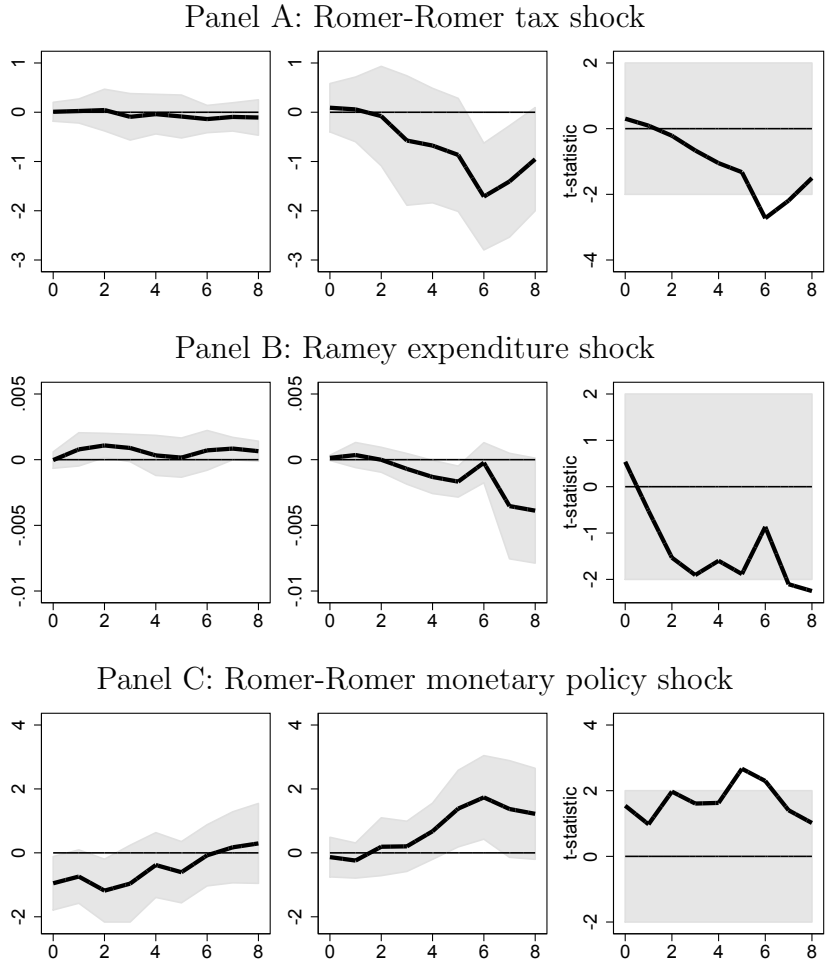
Interestingly, as seen in the second column of Panel A in Figure 7, outside the low-debt state professional forecasters expect a fall in unemployment three quarters after a tax hike shock occurs. This is consistent with the view that professional forecasters receive a tax hike in a state of relatively higher debt as a good signal for a government's credibility which in turn improves expectations for future economic activity as a result. Thus, the fact that we observe this only outside the low-debt state could be due to professional forecasters expecting positive effects of the fiscal consolidation efforts undertaken by the government.

Turning now to Panel B in Figure 7, it appears that when the economy is outside the low-debt state, professional forecasters expect a rise in expenditures as being more effective. In particular, in response to a government spending shock, outside the low-debt state, professional forecasters gradually expect a lower unemployment rate after the first two quarters.

In Panel C of Figure 7, we consider the response of professional forecasters' unemployment expectations to an interest rate hike shock. Inside the low-debt sate, professional forecasters appear to interpret the hike in taxes as a positive sign for future economic activity and expect lower unemployment over approximately one year. By contrast, outside the low-debt state, unemployment expectations increase four quarters after impact of such a monetary shock when the economy is outside the low-debt state, reflecting perhaps professional forecasters understanding of how a higher interest rate environment negatively effects economic activity in a standard neo-Keynesian setting with some degree of price stickiness.

Looking at the inflation expectation responses of professional forecasters to tax hike shocks in Panel A of Figure 8, we observe an overshooting pattern when the economy is outside the low-debt state. The initial fall in inflation expectations on impact and the

Figure 7: Unemployment expectations

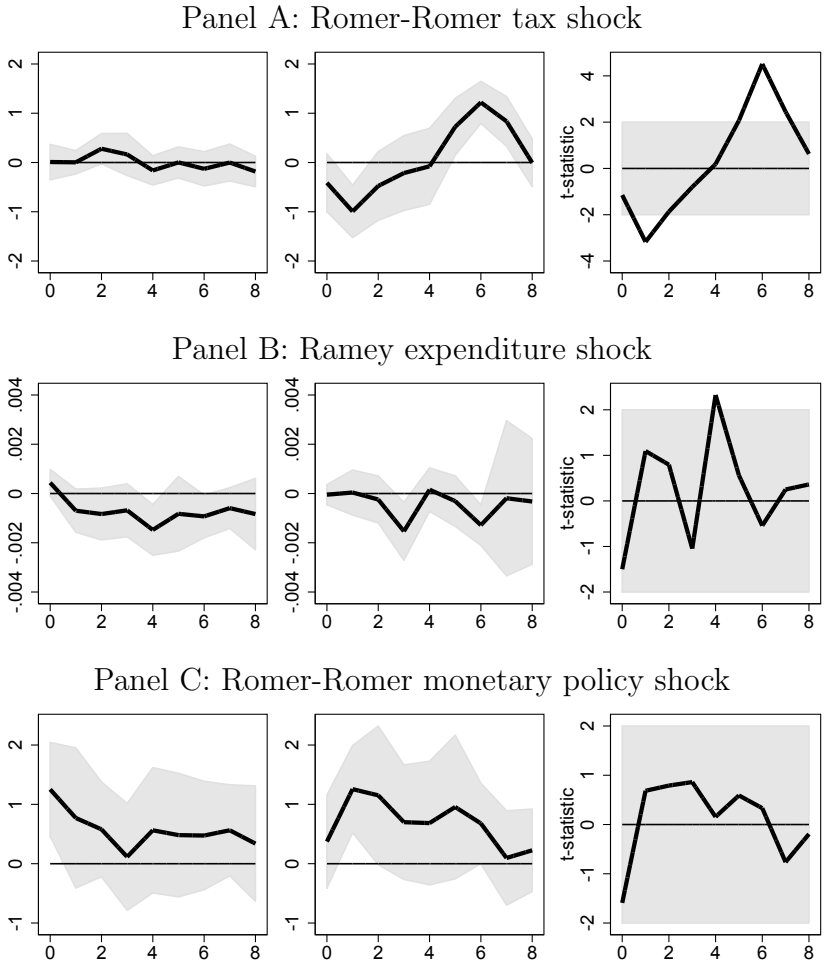


Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

first quarter after a tax hike shock is consistent with a standard contractionary effect of higher taxes on economic activity. That inflation expectations start reverting in the second quarter after impact of a tax hike shock and eventually rise five quarters out, is consistent with the positive impact on economic activity expectations we have seen in the second column of Panel A in Figure 7 where unemployment expectations are persistently lower following a tax hike shock. This is again supportive of the government emitting a signal of credibility and thus of higher future economic activity, when it raises taxes within a state of relatively high debt.

Turning to the impact of government spending shocks, we can see in Panel B of

Figure 8: Inflation expectations



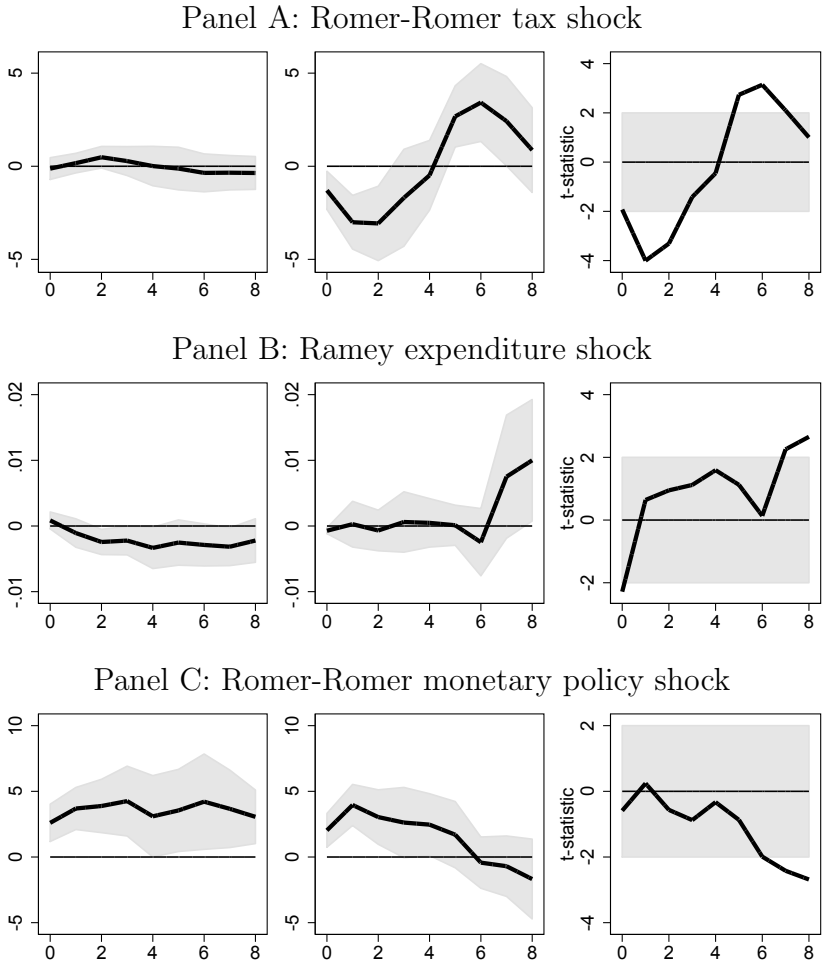
Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

Figure 8 that these, surprisingly, bring about lower inflation expectations for professional forecasters especially within the low-debt state of the world.

Finally, an interest rate hike shock is shown in Panel C of Figure 8 to raise inflation expectations both within and outside the low-debt state. This indicates that professional forecasters interpret interest rate hikes as signals for higher future inflation.

In Figure 9, we consider the interest rate expectations responses for professional forecasters. In Panel A, we can see that while there is no response of interest rate expectations to a tax hike shock within a state of low-debt, there is an overshooting pattern in the response outside the low-debt state with interest rate expectations falling on impact

Figure 9: Interest rate expectations



Notes: The hypothesis corresponding to the t-statistics shown in the right panel is that the coefficient on the interaction term is zero.

and during the first two quarters. Interest rate expectations then revert and eventually increase five quarters out.

In response to a government spending shock, we can see in the first column of Panel B in Figure 9 that interest rates fall somewhat but persistently so for eight quarters after an increase in spending within the low-debt state. By contrast, outside the low-debt state, there is a delayed increase in interest expectations seven quarters out following a government spending shock, as we can see in the second column of Panel B.

Finally, as we can see in Panel C of Figure 9, the response of interest rate expectations for professional forecasters to an interest rate hike monetary shock is positive on impact

and persistently so within the low-debt state while reverting back after six quarters outside the low-debt state as shown in the second column of Panel C.

Overall, also for financial and economic experts that they assess the effects of fiscal and monetary policy differently depending on whether or not the economy is in or outside a low-debt state. Moreover, we observe relatively more similarities in responses of consumers and experts outside of the low-debt state. This is indicative for the prevalence of rational inattention motives in the updating of consumer expectations. Only outside the low-debt state, when fiscal and monetary policy affect the economy also in an indirect way through the sustainability of public finances, consumers assess fiscal and monetary policy in a comparable way than experts.

5 Conclusion

We have set out to understand the joint state-dependent impact of monetary and fiscal policies on macroeconomic expectations. Based on our findings, expectations responses are typically distinctly different for states of low debt as compared to states of relatively higher debt. As expectations play a key role in the way how fiscal and monetary policy propagate in the economy, this has implications for the conduct of fiscal and monetary policy.

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