Household beliefs about fiscal dominance[1]

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Abstract

Will large public debts in some euro area countries constraint the ECB not to raise rate and lead to persistent higher inflation in this economy? The answer to that question can vary with the prior individuals put on a fiscal dominance scenario. We use a customized survey of German households to elicit such priors and design a randomized information treatment to study how fiscal news affects individuals views about long-term inflation expectations. We find that a large majority of households think that it is likely or very likely that the ECB might be constrained not to raise rate because of EA countries large public debts. Information on public debt in France and Italy have a positive impact on euro-area debt-to-GDP ratio medium-run expectations as well as on the long-run inflation expectation. Consistent with theory, the effects are larger for individuals who think there is a higher probability to enter a fiscal dominance regime. Such priors are not revised with the information treatment. At the aggregate level, these are partially offset by the expectations of individuals who put a larger weight on monetary dominance regime.

Keywords: Fiscal and monetary policy, household inflation expectations, heterogeneous beliefs, randomized control trial, survey data

JEL Classification:

[1]Andrade: Federal Reserve Bank of Boston. Gautier: Banque de France. Mengus: HEC Paris and CEPR. Mönch: Goethe University and CEPR. Schmidt: Bundesbank. This paper reflects the opinions of the authors and does not necessarily express the views of the Banque de France, the Bundesbank, the Eurosystem, the Federal Reserve Bank of Boston, or the Federal Reserve System.

1 Introduction

Can a fiscal authority constrain monetary policy to inflate away its debt instead of implementing a fiscal consolidation? While such a risk seemed quite remote in advanced economies over the past decades, it may have significantly increased after the fiscal packages and the unconventional monetary policies that have been conduced in reaction to the Great Recession and the COVID-19 pandemic. As a result, these economies are experiencing debt-to-GDP ratios that are unprecedented since WWII together with very low and flat yield curves. Some commentators doubt that interest rates would be sufficiently raised if inflation pressures needed to be fought, as these increases would endanger public debt sustainability in several euro-area countries, with a risk of triggering a contagion to other countries and a recession in the eurozone. Reflecting these concerns, some central bankers recently called for more fiscal discipline in order to help the central bank achieve price stability (e.g. Schnabel, 2022).

The risk that a fiscal authority forces the central bank to set its monetary policy in order to maintain the sustainability of its public debt instead of achieving price stability has been emphasized in the theoretical contributions of Sargent and Wallace (1981), Leeper (1991), Sims (1994), and Woodford (1994) among others. This risk typically increases with a country debt-to-GDP ratio as the threat of fiscal authority to default becomes more credible (Bassetto, 2002). Bianchi and Melosi (2017) show that a New Keynesian model with time varying probabilities that the economy is in a fiscally-led regime or in a monetary-led regime can explain the low frequency movements of inflation in the US, in particular the Great Inflation of the 70s then followed by the Volcker disinflation of the 80s. In this approach, private sector's perception of the risk of a fiscally-led regime is a key determinant of their long-run inflation expectations and hence of trend inflation.

In this paper, we provide direct empirical evidence on households' perceived risks of fiscal dominance, and on how news about future debt-to-GDP have a causal impact on the long-run inflation expectations of households. More precisely, we design and exploit a customized survey conducted on about 6,000 German households in November 2021 in which we ask individuals about their perceived risk of fiscal dominance. We also implement a randomized controlled trial giving information on fiscal outlook for three largest euro area economies, Germany, France, and Italy, to assess how exogenous fiscal shocks affect the long-run inflation expectations of households.

Our focus on household beliefs is motivated by the fact that they are very much exposed to fiscal dominance risks and that, in the New Keynesian setup, households inflation expectations are a key channel through which the risk of fiscal dominance will turn out to be inflationary. Studying German individuals is also of particular interest as they tend to be more aware about inflation and concerned about inflation risks compared to US households (See e.g. Hoffmann et al., 2021). Moreover, as a euro area member, Germany may be more exposed to the risk of fiscal dominance: In a monetary union, a common monetary policy interacts with national fiscal policies and their associated heterogeneous and sovereign yield curves. So, while monetary policy could be consistent with both stable inflation and sustainable public debt for the average euro area country, it could destabilize public debt for countries with the largest debt-to-GDP.

We start by laying out a theoretical framework which shows that, given current information, agents can have heterogeneous beliefs about the probability of a fiscal dominance regime and that, everything else being constant, the larger that probability, the more inflation an individual should expect.

We then ask individuals whether they think that the scenario under which the ECB will be constrained not to raise rates in the future is likely or not. We also survey individuals on their views on the likelihood of a sovereign default of at least one euro area member in the coming years. We find that both scenarios are likely or very likely for about 75% of households in the sample. Moreover, the two scenarios are not exclusive in the mindset of respondents. About 1/4 of households think that both are likely or highly likely.

We then look at whether, consistent with the fiscal dominance view of inflation, news about future fiscal debt have an impact on long-term inflation expectations. A key challenge when aiming at identifying the reaction of expectations to fiscal news is to measure an exogenous fiscal shock. Following the method of Coibion et al. (2019, 2021), we address this issue by relying on a randomized controlled trial conducted in the previous customized survey of households. More specifically, we provide randomly selected groups of respondents with public information from the European Commission about future debt-to-GDP projected for France, Germany, and Italy over a 3-year horizon. In addition, we also consider two treatments providing public information on the interaction between monetary policy and fiscal policy. The first one is on the quantity of government debt assets that the ECB holds due to its asset purchase programmes. The second one is a public statement made in a interview by former Bundesbank President Jens Weidmann reiterating that the ECB mandate is price stability and not to help governments to finance their debt. We then investigate how a set of individual expectations react to these information treatments.

We obtain four main results. First, the information treatments have an impact on the expected euro area debt-to-GDP ratio that individuals expect. Information on the debt-to-GDP ratio projected on the medium run for France and Italy increases the expected debt-to-GDP ratio for the euro area. The same information for Germany decreases it. Information on the interaction of monetary and fiscal policy decrease the expected euro area debt-to-GDP ratio. Importantly, these information treatments randomly shift individual fiscal expectations.

Second, treatments that increase debt expectations also lead individual to revise their long-run inflation expectation upwards. By contrast, treatments that decrease debt expectations have no effect on individual long-run inflation expectations.

Third, our treatments have no impact on the perceived risk that a euro area member country will default over the following years, or that the ECB will not be able to raise rates in order to maintain the sustainability of sovereign debt of euro area countries. So the fiscal shocks that we consider do not change the perceived probability to be in a fiscally or a monetary led regime. The risk individuals associate to these scenarios depends on individual characteristics such as age, education, location, and political leaning.

Fourth, while the effect of treatment on debt expectations and on inflation expectations are on average

small, they vary substantially across individuals. Consistent with the theoretical setup with heterogeneous beliefs on fiscal dominance, individuals who put a larger probability on the risk of fiscally led regime have a larger reaction of debt and of inflation. Individuals who puts a larger probability on a default, hence on a monetary led regime have a smaller reaction of inflation.

Overall, our results are consistent with the fact that the same fiscal news can be interpreted differently. On average it is not very inflationary as the expectation reaction of individuals who put a large probability on the scenario of fiscal dominance are offset by the small reaction of individuals who put a large probability on the scenario of monetary dominance. As in Andrade et al. (2019), the heterogeneity of beliefs, which can be rational, mitigates the inflation expectation channel hence, in our case, the inflationary consequences of running large debt-to-GDP ratios which can become unsustainable.

Literature review. [TBC]

2 Fiscal news and heterogeneous beliefs

In this section, we present the theoretical background behind our empirical findings. We first derive the well-known intertemporal budget constraint of the government. Then, we clarify how, according to the standard theory, private agents should connect expectations regarding future debt evolutions, fiscal surpluses, default and inflation.

The intertemporal budget constraint of the government. Time is discrete and indexed by $t \in \{0, 1, ...\}$. We first derive the intertemporal budget constraint of the government.

In each period t, the budget constraint of government writes

$$B_t + P_t T_t = (1 + i_{t-1})\delta_t B_{t-1} = P_t G_t.$$

where B_t is date-t nominal debt, P_t the price level, i_{t-1} the nominal interest between periods $t-1$ and t, G_t real government expenditures, T_t real taxes and $\delta_t \in [0, 1]$ is the haircut imposed by the government on its past debt repayment. For simplicity, we focus here on one-period nominal debt.

The pricing of bonds is as follows:

$$1 = E_t \left\{ \frac{\xi_{t+1}}{\xi_t}(1 + i_t)\delta_t \frac{P_t}{P_{t+1}} \right\}$$

where ξ_t is the date-t stochastic discount factor. Using these two equations, one can write:

$$\frac{B_{t-1}}{P_t}(1 + i_{t-1})\delta_t = (T_t - G_t) + E_t \left\{ \frac{\xi_{t+1}}{\xi_t} \frac{B_t(1 + i_t)\delta_{t+1}}{P_{t+1}} \right\}$$

Iterating forward and denoting the inflation rate by $\pi_t = P_t/P_{t-1} - 1$, one obtains

$$\frac{B_{t-1}}{P_{t-1}}\frac{(1+i_{t-1})}{(1+\pi_t)}\delta_t = \underbrace{E_t\left\{\sum_{\tau=t}^{\infty}\frac{\xi_\tau}{\xi_t}\left(T_\tau - G_\tau\right)\prod_{k=t+1}^{\tau}\delta_k\right\}}_{\text{PV of future surpluses}} + \underbrace{E_t\left\{\lim_{H\to\infty}\frac{\xi_H}{\xi_t}\frac{B_H}{P_H}\prod_{k=t+1}^{H}\delta_k\right\}}_{\text{Bubble term}}.$$

The real value of public debt should equal the present discounted value of future surpluses and a bubble term. This bubble term was investigated by Bassetto and Cui (2018) or Brunnermeier et al. (2020) and exists in models featuring dynamic inefficiency, uninsurable income risk or when debt provides liquidity services.[1]

Looking ahead and dividing both sides by real GDP denoted by Y_t the intertemporal budget constraint of the fiscal authority is expected to be met when:

$$\begin{aligned}&E_t\left\{\frac{(1+i_{t+h})}{(1+\pi_{t+h+1})}\frac{B_{t+h}}{Y_{t+h}P_{t+h}}\delta_{t+h+1}\right\} = \cdots\\ &\cdots + E_t\left\{\sum_{\tau=t+h+1}^{\infty}\frac{\xi_\tau}{\xi_{t+h+1}}\frac{T_\tau - G_\tau}{Y_\tau}\prod_{k=t+h+2}^{\tau}\delta_k(1+g_k)\right\} + E_t\left\{\lim_{H\to\infty}\frac{\xi_H}{\xi_t}\frac{B_H}{Y_H P_H}\prod_{k=t+h+1}^{H}\delta_k(1+g_k)\right\}. \quad (1)\end{aligned}$$

where g_k is the growth rate in period k.

An expected increase in debt. Suppose that agents expect an increase in the future debt level $B_{t+h}/(Y_{t+h}P_{t+h})$. A first way to accommodate higher debt is simply default, with some δ_τ, $\tau \geq t+h+1$ being below 1.

Assuming away default, this higher level of debt may be accommodated in multiple ways. In the absence of default, we have:

$$1 = E_t\left\{\frac{\xi_{t+1}}{\xi_t}(1+i_t)\delta_t\frac{P_t}{P_{t+1}}\right\} = (1+r_{t-1})E_t\left\{\frac{\xi_{t+1}}{\xi_t}\right\}.$$

For simplicity, let us assume a constant inflation target $\pi_t = \pi^\star$, a constant risk free rate $r_t = r^\star$ and a constant GDP growth rate g. We then obtain the following the intertemporal budget constraint for the government, relative to GDP:

$$E_t\left\{\frac{(1+i_{t+h})}{(1+\pi^*)}\frac{B_{t+h}}{Y_{t+h}P_{t+h}}\right\} = \underbrace{E_t\left\{\sum_{\tau=t+h+1}^{\infty}\left(\frac{1+g}{1+r^\star}\right)^{\tau-t-h-1}\frac{T_\tau - G_\tau}{Y_\tau}\right\}}_{\text{PV of future surpluses}} + \underbrace{E_t\left\{\lim_{H\to\infty}\left(\frac{1+g}{1+r^\star}\right)^{H-t-h-1}\frac{B_H}{Y_H P_H}\right\}}_{\text{Bubble term}}. \quad (2)$$

Notice that the last term can be rewritten as the relative value of the bubble term to current real GDP:

$$E_t\left\{\lim_{H\to\infty}\left(\frac{1+g}{1+r^\star}\right)^{H-t-h-1}\frac{B_H}{Y_H P_H}\right\} = \frac{1}{Y_t}E_t\left\{\lim_{H\to\infty}\left(\frac{1}{1+r^\star}\right)^{H-t-h-1}\frac{B_H}{P_H}\right\}.$$

According to equation (2), a rise in debt-to-GDP $B_{t+h}/(Y_{t+h}P_{t+h})$ should either be compensated by higher inflation π^*, by a rise in the present value of future surpluses or by an increase in the bubble term.

[1] Crucially, in these cases, no transversality condition—wh forces the bubble term to be 0, as it is the case in standard model.

Importantly, each of these means do not exclude any other one, but they are substitutes: a moderate rise in the present value of future surpluses does not rule out the possibility of higher inflation, but reduces the level of inflation required for the intertemporal budget constraint (2) to be satisfied.

That higher debt translates into higher inflation is the idea behind fiscal dominance. In contrast, higher debt triggering the government to adjust fiscal policy is consistent with Ricardian fiscal policy and monetary dominance—the central bank is not forced to adjust the price level in response to fiscal policy. The third outcome—the bubble term—results from the demand for public debt that pushes interest rates at the levels consistent with bubbles.[2]

So far, we have assumed away default, but default as well is a way for the government to satisfy its budget constraint—even when taking into account that the government may face higher real interest rates when default is expected to take place in the future—and, as the other means, it is a substitute with the others.

This leads to two empirical implications regarding households' beliefs on debt evolution, fiscal paths and inflation:

Proposition 1. *When anticipating an increase in debt-to-GDP ratio, a household also expects one or a combination of the following outcomes:*

1. *A fiscal dominance scenario, i.e. a higher level of inflation* $\pi^\star$
2. *A normal-time monetary dominance scenario, i.e. a fiscal consolidation as to increase the present value of the fiscal surpluses; or a stabilization of the debt/gdp ratio at that new higher level, exploiting the fact that* $r^\star < g$ *(bubble term);*
3. *A sovereign-crisis monetary dominance scenario, i.e. a default of one or several euro area countries.*

Proposition 2. *Consider two households, A and B, receiving the information on future debt-to-GDP ratio. If household A puts more probability on the fiscal dominance scenario than household B, then household A expects a higher inflation rate than household B.*

3 Survey design

The micro-data we use to answer our research questions is from the Bundesbank Online Panel Households (BOP-HH). The survey runs every month on a sample of individuals, which are at least 16 year old and have used the internet at least once in the past months.[3] A large part of the 2,000 to 7,000 individuals per wave, is participating in the survey more than once.

[2] Bassetto and Cui (2018) identify that low real returns on government debt may not sufficient for the existence of a bubble on government debt, for example when they result from a high price put risk.

[3] For a description of the basic methodology see Beckmann and Schmidt (2020).

The BOP-HH collects information on individuals' expectations regarding inflation and other macro-economic variables, their income expectations and consumption patterns, as well as socio-demographic variables, like age, gender, income, region, gender, city size, education, employment status and vote at Parliament elections.[4]

In November 2021, we add a special module to the BOP-HH questionnaire. In particular, we set-up a randomized control trial (RCT). We split the total sample of 6,023 respondents into six randomly selected groups. Three out of the six groups receive information on the current as well as projected debt level and debt-to-GDP-ratio for France, Italy and Germany, respectively. One group receives information on the ECB's debt purchase program, one a statement from the former Bundesbank president Weidmann, regarding price stability, and one group, the control group, receives no additional information.

Treatments. The exact wording of the treatment texts is as follows:[5]

Treatment 1 ("Debt – France") *France's government debt is currently €2,762 billion, amounting to 115% of its gross domestic product[6] (i) . According to the European Commission, it is expected that this figure will total more than €3,240 billion in 2024, probably amounting to 118% of gross domestic product.*

Treatment 2 ("Debt – Italy") *Italy's government debt is currently €2,696 billion, amounting to 156% of its gross domestic product (i). According to the European Commission, it is expected that this figure will total more than €2,800 billion in 2024, probably amounting to 153% of gross domestic product.*

Treatment 3 ("Debt – Germany") *Germany's government debt is currently €2,398 billion, amounting to 70% of its gross domestic product (i). According to the European Commission, it is expected that this figure will total more than €2,680 billion in 2024, probably amounting to 72% of gross domestic product.*

Treatment 4 ("ECB Purchases") *According to information provided by the European Central Bank (ECB), it has purchased around 30% of the government debt of the euro area Member States; this amounts to more than €3.9 trillion.*

Treatment 5 ("Weidmann") *In a newspaper interview, President of the Deutsche Bundesbank, Jens Weidmann, said that the European Central Bank's (ECB) low interest rates help it to fulfill its mandate, namely safeguarding price stability. The ECB should not be pressured into pursuing other objectives, such as guaranteeing minimum returns on certain types of investment or helping governments with payment problems.*

Questions. To assess the impact of the treatments, we use several questions spanning expectations on debt evolutions, fiscal policies, default and risk of fiscal dominance.

[4]See table x in the appendix for details on our control variables.

[5]The German version of the treatment texts and questions, actually used in the survey, is available in the appendix.

[6]Respondents could call up an info box with the following text: "Gross domestic product (GDP) is the value of all goods and services produced within the national borders of an economy in a given year."

First, we measure debt-to-gdp-expectations of households post-treatment, using both qualitative and quantitative questions:

Question 1. *At present, total government debt of all euro area Member States amounts to 100% of euro area gross domestic product (i). Do you think the ratio of government debt to gross domestic product will be higher or lower in five years' time than at present?*

1. *Far lower,* ***2.*** *Somewhat lower,* ***3.*** *Roughly the same,* ***4.*** *Somewhat higher,* ***5.*** *Far higher.*

Question 2. *In your opinion, to what level will the ratio of euro area government debt to gross domestic product (i) fall / rise in five years' time? XXX percent*

Second, we ask households about their expectations on fiscal policies and how they determine debt evolutions:

Question 3. *. What do you think will be the main reason behind a reduction (increase) in the ratio of government debt to gross domestic product?*

1. *Governments will raise (lower) taxes.* ***2.*** *Governments will reduce (increase) expenditure.* ***3.****The euro area economy will grow to a greater (lesser) extent than government debt.* ***4.*** *Interest rates on government debt will remain low (be high).*

Third, we ask households about their views on fiscal dominance, that is whether they think that the central bank is not hindered by government's debt when setting monetary policy:

Question 4. *Within the next five years, the ECB will be unable to sufficiently raise its key rates to control inflation, as this would make it too expensive for one or several of the euro area countries to finance their government debt.*

1. *Very likely,* ***2.*** *Fairly likely,* ***3.*** *Neither likely nor unlikely,* ***4.*** *Fairly unlikely,* ***5.*** *Very unlikely.*

Fourth, we ask households about their expectations regarding sovereign default risk in the euro area:

Question 5. *Within the next five years, at least one country in the euro area will be unable to repay its government debt on time.*

1. *Very likely,* ***2.*** *Fairly likely,* ***3.*** *Neither likely nor unlikely,* ***4.*** *Fairly unlikely,* ***5.*** *Very unlikely.*

Finally, we measure long-term inflation expectations, with the same question that is also included in the core part of the survey, pre-treatment:

Question 6. *What value do you think the inflation rate or deflation rate will take on average over the next five/ten years?*

4 Fiscal dominance risk in the data

In this section, we document several patterns about the perception of fiscal dominance risk by households. To this purpose, we rely on questions 4 on whether households perceive monetary policy decisions to be bound by public debt financing issues and question 5 on the risk of a sovereign default of one or several euro area countries.

Fiscal dominance is an important risk for a large majority of households Table 1 reports the share of respondents for different probabilities of a fiscal dominance and a default scenario.

Overall, 79.8% of households believe fiscal dominance is either likely or very likely (with 32.8% who think that it is very likely). In contrast, 14.3% are neutral and only 0.7% think that fiscal dominance is extremely unlikely.

These shares have to be compared with the large fraction of households—78.4%—who expect a default to be either likely or extremely likely.

At the individual level, expecting fiscal dominance is also well associated with expecting a default. Indeed about 90% of households expecting that it is very likely that the ECB will be constrained not to raise rates, think that it is very likely or likely that a EA country default over the next years. About 80% of households expecting that it is likely that the ECB will be constrained not to raise rates, think so.

So the two risks seem to be correlated rather than substitute in the mindset of households. They reflect a pessimistic view of the macroeconomic outlook rather than the fact that, given the outlook, one policy will be chosen rather than the other.

Macroeconomic expectations. [TBC]

Determinants of beliefs about fiscal scenarios. Let $E(Scenario)$ be the fiscal scenario expected by an individual. We run the following probit regression

$$E(Scenario) = \alpha + \sum_i \beta_i Treatment_i + Controls + Error \tag{3}$$

The results are presented in Table 2. We obtain that none of the treatments has a significant effect on the answers to any of the two scenarios. In contrast, controls do have an effect. The composite portait of individuals more likely to expect a default in the euro area is a relatively old woman living in the South of Germany, either not voting or voting for the right parties or Die Linke. The one of individuals more likely to expect the ECB to be constrained in its monetary policy is relatively similar except that it is relatively more a man.

5 The effect of treatments on euro area public debt expectations

We investigate the effect of information treatments on households' fiscal expectations. Table 3 provide some qualitative expectations regarding future debt evolutions as a function of treatments. Overall, most individuals expect debts to increase in the euro area, with 49% expecting the ratio of debt to GDP to be "somewhat higher" and 29.2% to be "far higher".

FR and IT debt treatments have small positive effect on the qualitative EA debt expectations. The ECB purchase and Weidmann statement treatments lead to lower shares of individuals expecting debt to increase (either "much more" or "more") but higher shares of individuals expecting debt to stay the same or decrease.

To confirm these results, we regress individuals views on debt evolution on treatments, namely

$$E(\Delta Debt) = \alpha + \sum_i \beta_i Treatment_i + Controls + Error \tag{4}$$

We use two different measures for $E(\Delta Debt)$. A qualitative and a quantitative measure. We report the results of the effect of the treatment on the qualitative measure in Table 4 and the effect of the treatment on the quantitative measure in Table 5. We confirm that that the FR and IT debt treatments have a postive effect on expected EA debt evolutions compared to the control group. The DE debt treatment as well as the QE and Weideman treatment lower these expectations.

6 The effect of treatments on long-term inflation expectations

In this section, we investigate if information about the path of debt-to-GDP ratio in different countries affect the inflation target of the ECB perceived by individual households. We also study if information about monetary policy non-conventional asset purchases and a public statement reiterating the commitment of the Eurosystem to a monetary dominance regime also have an impact on these expectations. We measure the impact on revisions in inflation expectations, i.e., the difference between the response to the question on long-run inflation expectations observed after the information treatment and the response to the question on long-run inflation of the same individual observed before the treatment.

We report some summary statistics of individuals' revisions as a function of the treatment that they received in Table 6. We make several observations. First, in comparison with no treatments, treatments increase the share of individuals revising upward their inflation expectations and also increase the average revision. Second, this effect is relatively small – here about 0.2pp – and appears only due to debt treatments – that is, providing information on debt evolution for France, Germany and Italy. Third, treatments lead to slightly higher upward revisions, but they also lead to more negative downward revisions. As a consequence, the positive effect of treatments on inflation expectations is mainly due to the fact that more individuals revise upward. In a back-of-the envelope calculation from Table 6, we obtain that three quarters

of the effect of treatments comes from the extensive margin and only one quarter from the intensive margin. That latter result is consistent with the evidence in Andrade et al. (2020) emphasizing the key role of such an extensive margin in the fluctuations of households' inflation expectations. Fourth, if treatments may have a positive and significant effect overall, they lead a lot of individuals not to revise their expectations (always above 42%) and they do not prevent individuals from downward revisions – that, as we noted above, can be more negative then without treatments.

To confirm these results, we regress revisions in inflation expectations on dummy variables that code the treatment:

$$\pi^{expected}_{expost} - \pi^{expected}_{exante} = \alpha + \sum_i \beta_i Treatment_i + Controls + Error \tag{5}$$

Table 7 provide the estimation results. Notice that, to deal with outliers, we use Huber regressions[7] as in Coibion et al. and we control for age, region, gender, city size, income, education, employment status and vote at Parliament elections.

First, on average, treatments lead to a positive and significant revision in inflation expectation as showed by regression (1) in Table 7. Yet, this positive and significant effect is limited to treatments on debt as highlighted by regression (2) in Table 7. In contrast, information treatments on ECB purchases or on the statement by Jens Weidmann do not have significant effects (regressions (2) and (3)).

Digging further in the effects of debt treatments (regression (3)), we can observe that it is the information treatment on the debt evolution of France and Italy, while the information treatment of German debt has no significant effect. Two comments are in order. On the one hand, this result is intuitive as France and Italy's debt levels are almost twice as high as the one of Germany and the projected path is declining in Germany while it levels off in France and Italy. But, on the other hand, this also means that German households have a sense that debt evolution in other euro area countries may have an effect on their country's own inflation rate and that, in a monetary union, fiscal dominance risk is not limited to their country's fiscal stance.

Second, while significant, the effect of information treatments is small here as well. At most, they lead to a revision of 0.1pp of inflation expectations as for the treatment providing information on French debt.

Third and finally, we also confirm in regressions (4) and (5) the effect of treatments on the extensive margin. In these columns, we report marginal effects of Probit regressions relating dummy variables for positive and negative inflation revisions to the information treatment dummies. We obtain that treatments either increase the share of upward revisions or decrease the share of downward revision.

7 Heterogeneous fiscal scenarios

We use the responses to the additional questions on the risks of fiscal dominance and a country default scenarios to split the sample of individuals according to (i) the (qualitative) probability that they put on the

[7] We have also reestimated Table 7 using standard OLS with the sample trimmed at 1%. The results are qualitatively similar.

scenario of fiscal dominance and (ii) the (qualitative) probability that they put on the scenario of the default of a EA member.

As we documented above (see Table 3), these beliefs are not impacted by the fiscal news randomly provided. However, they affect how agents react to fiscal news.

7.1 The effect of information about future public debt on inflation depends on the narrative

We re-estimate equations (4) and (5) for various subgroups of individuals classified according to (i) the (qualitative) probability that they put on the scenario of fiscal dominance and (ii) the (qualitative) probability that they put on the scenario of the default of a EA member.

Table 2 displays the results for the effect on the qualitative expectations about the evolution of EA debt. Individuals who think that a scenario of fiscal dominance is very likely expect a larger increase in the EA debt-to-GDP ratio in reaction to the FR and IT debt treatments than individuals who think that the scenario of a default is very likely.

Table 8 displays the results for the effect on debt expectations. The main result is that individuals who think that a scenario of fiscal dominance is very likely expect a larger increase in the long-run EA inflation rate than other individuals in reaction to the FR and IT debt treatments.

8 Conclusion

[TBD]

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Table 1: Beliefs about fiscal dominance and default scenarios

	ECB not able to raise rate		
	very likely	likely	neutral or unlikely
All	33.2	47.5	19.3
Default in EA			
very likely	18.1	10.9	4.2
likely	15.7	22.4	9.4
neutral or unlikely	3.4	8.7	7.3

Table 2: Main Determinants of Scenarios - Marginal effects - "Very likely"

	(1) Default	(2) ECB rate
Debt FR	0.0203	-0.00426
	(0.0180)	(0.0183)
Debt IT	-0.00525	-0.0119
	(0.0177)	(0.0182)
Debt DE	-0.00842	0.0141
	(0.0177)	(0.0184)
ECB purchase	0.00585	0.00885
	(0.0178)	(0.0184)
Weidmann statement	-0.0256	-0.0123
	(0.0175)	(0.0182)
West	0.00753	0.0105
	(0.0158)	(0.0162)
South	0.0294**	0.0395***
	(0.0148)	(0.0152)
East	-0.00388	0.0228
	(0.0181)	(0.0189)
Age	0.00319***	0.00171***
	(0.000581)	(0.000602)
Man	-0.0618***	0.130***
	(0.0114)	(0.0122)
CDU/CSU	0.0635***	0.0479***
	(0.0150)	(0.0157)
Grunen	0.00938	-0.0227
	(0.0143)	(0.0151)
FDP	0.107***	0.0921***
	(0.0190)	(0.0197)
AfD	0.237***	0.313***
	(0.0287)	(0.0285)
Die Linke	0.0735***	-0.00692
	(0.0240)	(0.0237)
Another party	0.117***	0.120***
	(0.0256)	(0.0268)
No vote	0.0819***	0.0590*
	(0.0309)	(0.0317)
DNK	0.188*	0.234**
	(0.106)	(0.110)
Observations	5,957	5,962

Note: this table reports estimates of ordered probit where the endogenous variable is a qualitative variable on the likelihood of scenarios "'EA country default"' and "'ECB unable to raise rates". Marginal effects are reported for the outcome "'Very likely"'. We do not report marginal effects for city size, education, employment status, and income because they are mostly insignificant but they are included in the regressions. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3: Qualitative Expectations about EA Public Debt GDP Ratio

	Much less	Less	Same	More	Much more
All	0.5	7.0	14.4	49.0	29.2
No Treatment	0.7	6.9	12.6	49.0	30.9
All treatments	0.5	7.0	14.7	49.0	28.8
Debt - France	0.2	5.4	11.7	50.8	31.9
Debt - Italy	0.2	6.7	13.2	49.9	30.0
Debt - Germany	0.5	6.3	14.7	49.8	28.8
ECB purchases	0.8	9.2	16.9	45.3	27.7
Weidmann statement	0.7	7.6	17.1	49.0	25.6

Table 4: Information Treatment Effects on EA Debt Expectations - Marginal Effects -

	(1)	(2)	(3)
Treatment	-0.0233*		
	(0.0132)		
Treatment - Debt		-0.000574	
		(0.0139)	
Debt - France			0.0186
			(0.0173)
Debt - Italy			-0.00167
			(0.0171)
Debt - Germany			-0.0182
			(0.0169)
ECB purchases		-0.0558***	-0.0557***
		(0.0164)	(0.0164)
Weidmann statement		-0.0561***	-0.0561***
		(0.0163)	(0.0163)
Observations	5,965	5,965	5,965

Note: this table reports marginal effects of an ordered Probit model where the endogenous variable is equal to 1 if households believe that EA public debt will be lower or the same, 2 if they believe it will be somewhat higher and 3 far higher. The marginal effects are calculated for the outcome "far higher". Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections are included. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Information Treatment Effects on EA Debt Expectations - Quantitative Answers

	(1)	(2)	(3)
Treatment	-0.669*		
	(0.0132)		
Treatment - Debt		-0.163	
		(0.393)	
Debt - France			1.156**
			(0.473)
Debt - Italy			0.938*
			(0.498)
Debt - Germany			-2.878***
			(0.467)
ECB purchases		-1.546***	-1.557***
		(0.491)	(0.486)
Weidmann statement		-1.249***	-1.245***
		(0.476)	(0.472)
Constant	101.6***	101.6***	101.7***
	(2.280)	(2.280)	(2.345)
Observations	5,265	5,264	5,250
R^2	0.045	0.047	0.059

this table reports estimates of ordered probit where the endogenous variable is a qualitative variable on the likelihood of different debt evolution scenarios. Controls include age, region, gender, city size, income, education, employment status, vote at Parliament. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Statistics on Long-Term Inflation Expectations Revisions

	Share of Revisions (%)			Mean Revision		
	Upward	No Revision	Downward	All	Positive	Negative
All	37.8	45.0	17.2	0.31	2.24	-3.22
No Treatment	35.3	45.5	19.2	0.14	2.02	-3.05
All treatments	38.3	44.9	16.8	0.34	2.28	-3.26
Debt - France	38.6	45.6	15.8	0.43	2.25	-2.98
Debt - Italy	39.7	42.6	16.9	0.36	2.39	-3.35
Debt - Germany	38.5	44.6	16.9	0.33	2.23	-3.05
ECB purchases	37.5	44.1	18.4	0.25	2.31	-3.55
Weidmann statement	37.2	47.4	15.4	0.33	2.21	-3.36

Note: for average, we have excluded revision lower than -25% and higher than +20% (p1 and p99 of the distribution of inflation revisions).

Table 7: Information Treatment Effects on Long-Term Inflation Expectation Revisions

Endogenous variable	Quantitative Expectation Revision			Positive Revision	Negative Revision
	(1)	(2)	(3)	(4)	(5)
Treatment	0.0648**				
	(0.0261)				
Treatment - Debt		0.0733***			
		(0.0275)			
Debt - France			0.0921***	0.0355	-0.0320*
			(0.0337)	(0.0219)	(0.0171)
Debt - Italy			0.0764**	0.0422*	-0.0149
			(0.0337)	(0.0219)	(0.0174)
Debt - Germany			0.0512	0.0345	-0.0176
			(0.0337)	(0.0220)	(0.0174)
ECB purchases		0.0504	0.0503	0.0232	-0.0106
		(0.0338)	(0.0338)	(0.0219)	(0.0175)
Weidmann statement		0.0549	0.0547	0.0198	-0.0342**
		(0.0337)	(0.0337)	(0.0218)	(0.0170)
Constant	0.0528	0.0580	0.0542		
	(0.191)	(0.191)	(0.191)		
Observations	5,772	5,771	5,771	5,771	5,771
R^2	0.580	0.015	0.015		

Note: this table reports estimates of Huber regressions relating long-term inflation revisions to information treatment dummies (4 first columns). In the last two colums, we report marginal effects of Probit regressions relating dummy variables for positive / negative inflation revisions to the information treatment dummies. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections are included. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Information Treatment Effects on EA Debt Expectations - Marginal Effects -

	EA Country default			ECB unable to raise interest rates		
	Very likely	Likely	Not Likely	Very likely	Likely	Not Likely
Debt FR	0.0332	0.00446	0.0104	0.0862***	-0.0171	-0.00143
	(0.0344)	(0.0226)	(0.0296)	(0.0324)	(0.0247)	(0.0271)
Debt IT	-0.0111	0.00507	0.00686	0.0190	-0.0365	0.0264
	(0.0346)	(0.0225)	(0.0283)	(0.0319)	(0.0243)	(0.0281)
Debt DE	-0.0155	-0.0314	0.0125	0.0219	-0.0520**	-0.0305
	(0.0346)	(0.0219)	(0.0281)	(0.0318)	(0.0238)	(0.0258)
ECB purchases	-0.0411	-0.0699***	-0.0290	-0.0472	-0.0852***	-0.0299
	(0.0342)	(0.0207)	(0.0265)	(0.0310)	(0.0228)	(0.0263)
Weidmann statement	-0.0445	-0.0527**	-0.0257	-0.0655**	-0.0703***	-0.0102
	(0.0349)	(0.0211)	(0.0260)	(0.0313)	(0.0232)	(0.0264)
Observations	1,971	2,818	1,142	2,210	2,488	1,236

Note: this table reports estimates of Huber regressions relating long-term inflation revisions to information treatment dummies (4 first columns). In the last two colums, we report marginal effects of Probit regressions relating dummy variables for positive / negative inflation revisions to the information treatment dummies. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections are included. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 9: Information Treatment Effects on Long-Term Inflation Expectation Revisions - by Scenario

	EA Country default			ECB unable to raise interest rates		
	(1)	(2)	(3)	(4)	(5)	(6)
	Very likely	Likely	Not Likely	Very likely	Likely	Not Likely
Debt - France	0.0117	0.104**	0.188**	0.155**	0.0610	0.0233
	(0.0598)	(0.0459)	(0.0849)	(0.0781)	(0.0467)	(0.0412)
Debt - Italy	0.000584	0.104**	0.129	0.183**	0.0476	0.00268
	(0.0609)	(0.0457)	(0.0828)	(0.0780)	(0.0471)	(0.0409)
Debt - Germany	0.0592	0.0300	0.109	0.203***	0.00860	-0.0462
	(0.0605)	(0.0465)	(0.0807)	(0.0770)	(0.0471)	(0.0417)
ECB purchases	0.0635	0.0605	0.0328	0.0521	0.0504	0.0336
	(0.0605)	(0.0461)	(0.0827)	(0.0770)	(0.0469)	(0.0426)
Weidmann statement	-0.0205	0.0544	0.207**	0.0806	0.0783*	-0.0118
	(0.0616)	(0.0459)	(0.0802)	(0.0784)	(0.0467)	(0.0409)
Constant	0.299	-0.0637	-0.0856	1.288***	-0.308	0.374*
	(0.489)	(0.279)	(0.327)	(0.461)	(0.272)	(0.217)
Observations	1,921	2,737	1,098	2,133	2,424	1,202
R^2	0.854	0.034	0.089	0.745	0.030	0.236

Note: this table reports estimates of Huber regressions relating long-term inflation revisions to information treatment dummies (4 first columns). In the last two colums, we report marginal effects of Probit regressions relating dummy variables for positive / negative inflation revisions to the information treatment dummies. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections are included. *** p<0.01, ** p<0.05, * p<0.1.