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Household Beliefs about Fiscal Dominance

Philippe Andrade, Erwan Gautier, Eric Mengus, Emanuel Mönch and Tobias Schmidt[1]

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ABSTRACT

We study beliefs about fiscal dominance in a survey of German households. We first use a randomized controlled trial to identify how fiscal news impact individual debt-to-GDP and inflation expectations. We document that the link between debt and inflation crucially depends on individuals' views about the fiscal space. News leading individuals to expect higher debt-to-GDP ratios make them more likely to revise upward their inflation expectations. These average effects are due to individuals who think that fiscal resources are more stretched than others. In contrast, individuals who think there is fiscal space do not associate debt with inflation. We then rationalize these results in a New Keynesian model where agents have heterogeneous beliefs about the fiscal space. We show that the heterogeneity of beliefs implies a policy trade-off for the central bank. Agents who expect fiscal dominance in the future exert upward pressure on inflation. An active central bank may choose to partially tolerate this higher inflation due to the real costs of completely stabilizing prices.

Keywords: Inflation Expectations, Fiscal and Monetary Policy, Heterogeneous Beliefs, Randomized Control Trial, Survey Data.

JEL classification: E31, E62

[1] Andrade: Federal Reserve Bank of Boston. Gautier: Banque de France and Université Paris-Dauphine. Mengus: HEC Paris and CEPR. Mönch: Frankfurt School of Finance and Management 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. We thank Marios Angeletos, Agnès Bénassy-Quéré, Roberto Billi, Tobias Broer, Olivier Coibion, Gabe Chodorow-Reich, Wei Cui, Francesco D'Acunto, Stefano Eusepi, Renato Faccini, Yuriy Gorodnichenko, Leonardo Melosi, Ricardo Reis, Concetta Rondinelli, Sebastian Schmidt as well as participants at T2M (2023), the Franco-German Fiscal Policy Seminar (2023), the 13th IFO Conference on Macroeconomics and Survey Data, the IFO Venice Summer Institute 2023, the 2023 CEBRA Annual Conference, the 4th Joint BOC-ECB-FRBNY Conference on Expectations Surveys, the NBB Workshop on Macroeconomics and Survey Data (2023), the 2024 SNB Annual Research Conference, ESCB Research Cluster on Monetary Economics, and seminar participants at Boston Fed, Cleveland Fed, Heidelberg, UT Austin. All remaining errors are ours.

NON-TECHNICAL SUMMARY

Debt-to-GDP ratios have increased substantially in advanced economies since the onset of the Covid-19 pandemic, raising concerns that these elevated levels of public debt may pose a threat to price stability. An increasing debt-to-GDP ratio can become inflationary when a central bank, confronted with a substantial public debt, is less willing to raise rates sufficiently to fight inflationary pressures, as such an increase could endanger public debt sustainability. This phenomenon is referred to as fiscal dominance. The risk of fiscal dominance can influence households' inflation expectations, which can subsequently affect current inflation (through their impact on wages and aggregate demand). In this paper, we use individual survey data to provide evidence that a share of households have beliefs consistent with a fiscal dominance mechanism. Testing whether the data support this relation is challenging since it requires an exogenous shock to debt-to-GDP ratio, a causal response of inflation expectations to this shock, and a measure of perceived stretched fiscal resources. We propose the use of survey data to meet these requirements and we design a customized survey administered to a representative sample of about 6,000 German households in November 2021.

First, we elicit individuals' perceptions of how much the euro-area fiscal capacity is stretched by asking them about the likelihood of a sovereign default of at least one euro-area member occurring in the coming years. We also elicit individuals' views on whether fiscal capacity will constrain monetary policy by asking them about the likelihood of the European Central Bank (ECB) keeping interest rates low to help fiscal authorities roll over their debt. We find that about 75 percent of households in the sample believe that either of these scenarios is likely or very likely. Moreover, the respondents do not perceive the two scenarios as mutually exclusive: About 65 percent of households report that both scenarios are likely or very likely.

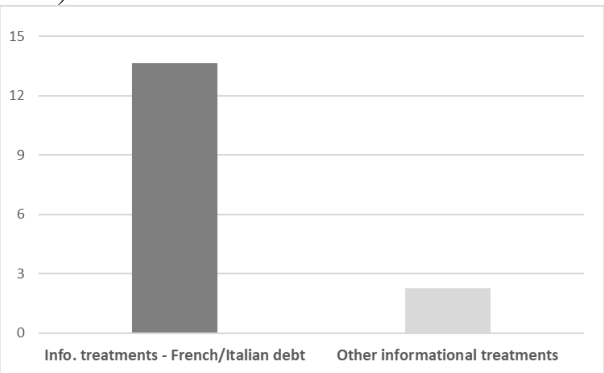
Second, we examine whether, consistent with the fiscal dominance view of inflation, news signalling an increase in public debt leads to higher inflation expectations. A key challenge in identifying the reaction of expectations to fiscal news is measuring an exogenous fiscal shock and a causal reaction of inflation expectation to that shock. We address this issue by conducting a randomized controlled trial using information treatments on fiscal variables. We provide randomly selected groups of respondents with public information from the European Commission about future debt-to-GDP ratios projected for Germany, France, and Italy over a three-year horizon. In addition, we consider two treatments providing information about the interaction between monetary and fiscal policies. We then ask individuals about their euro-area debt-to-GDP ratio expectations and German inflation expectations, allowing us to identify the effects of each treatment on both variables. We find that information on public debt in France and Italy significantly increases the expected euro-area debt-to-GDP ratio by approximately 13 percentage points (Fig. 1a). In addition, we find that the French and Italian debt treatments, which significantly increase debt expectations, also lead individuals to significantly increase the average inflation rate they expect over the next five to ten years. The impact is quantitatively modest, about 8 basis points (Fig. 1b). Conversely, the other treatments have small and non-significant impacts on debt-to-GDP and inflation expectations.

Third, we investigate how these aggregate effects vary across individuals with different views on the euro-area fiscal space. Focusing on treatments informing about the French and Italian fiscal situations, we find that individuals who think that a default in the euro area is very likely increase their debt-to GDP ratio by about 11 percentage points and their inflation expectations by 16 basis points. For these households, an increase in debt cannot be fully funded, and, consistent with the fiscal dominance mechanism, this lack of fiscal space implies some partial need to inflate debt away.

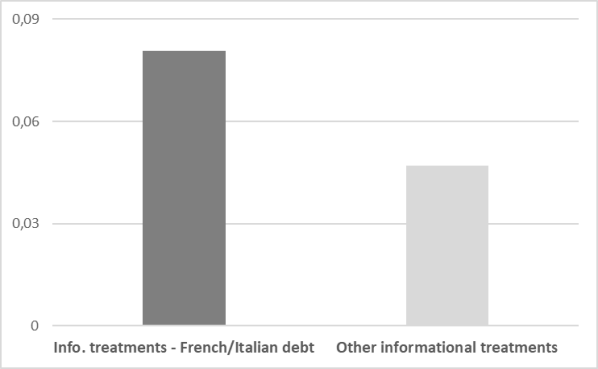
In a last section, we rationalize these empirical results with a New Keynesian model in which agents have heterogeneous beliefs about whether the economy will move from a monetary dominance regime to a fiscal dominance regime. We find that fiscal news can exert inflationary pressures even when the central bank follows an optimal policy. This heterogeneity introduces a policy trade-off, as the inflationary impact of such beliefs requires a negative output gap to be offset.

Figure 1. Impact of information treatments on debt expectations and inflation expectations (in percentage points)

a) Debt



b) Inflation



Note: the figure plots the causal impact of informational treatments on debt expectations and inflation expectations. Dark grey bars depict the impact of providing information to households about Italian or French public debt. Light grey bars depict the impact of other informational treatments (German debt, ECB quantitative easing policies, J. Weidmann statement about the interaction between fiscal and monetary policies.

Croyances des ménages sur la dominance fiscale

RÉSUMÉ

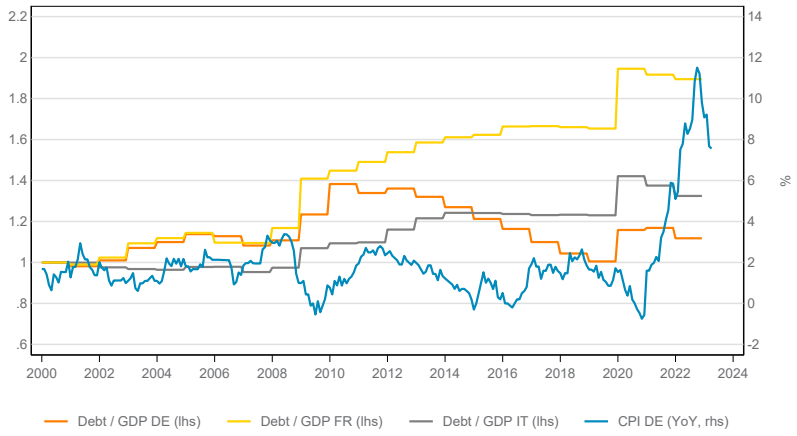
Nous étudions les croyances sur la dominance fiscale à partir d'une enquête menée auprès des ménages allemands. Nous utilisons d'abord un essai randomisé contrôlé pour identifier l'impact d'informations fiscales sur le ratio dette/PIB et les anticipations d'inflation. Nous montrons que le lien entre dette et inflation dépend essentiellement des opinions des individus sur les marges de manœuvre budgétaires. Les informations qui conduisent les individus à s'attendre à des ratios dette/PIB plus élevés les rendent plus susceptibles de réviser à la hausse leurs anticipations d'inflation. Ces effets moyens sont dus aux individus qui pensent que les ressources budgétaires sont plus limitées que les autres. En revanche, les individus qui pensent qu'il existe une marge de manœuvre budgétaire n'associent pas la dette à l'inflation. Nous rationalisons ensuite ces résultats dans un modèle néo-keynésien où les agents ont des croyances hétérogènes sur l'espace budgétaire. Nous montrons que l'hétérogénéité des croyances implique un arbitrage pour la banque centrale. Les agents qui s'attendent à une dominance fiscale dans le futur exercent une pression à la hausse sur l'inflation. Une banque centrale active peut choisir de tolérer partiellement cette inflation plus élevée en raison des coûts réels d'une stabilisation complète des prix.

Mots-clés : inflation anticipée, politique monétaire et fiscal, croyances hétérogènes, essai randomisé contrôlé, données d'enquêtes

1 Introduction

Debt-to-GDP ratios increased substantially in advanced economies during the COVID-19 pandemic. As Figure 1 illustrates, this is the case for the three largest euro-area economies: Germany, France, and Italy. That surge in debt-to-GDP was followed by a spike in inflation across the euro area as well as in Germany. There are concerns that this inflation surge was at least partly triggered by the large increases in debt-to-GDP ratios (e.g. Barro and Bianchi, 2023). In line with this view, some central bankers called for more fiscal discipline to help achieve price stability (e.g. Schnabel, 2022).

Figure 1: Public Debts in Some Euro-Area Countries and German Inflation



Note: Debt-to-GDP ratios in Germany, France, and Italy (compared with their January 2000 level) and Harmonized Consumer Price Index inflation (HCPI, year-over-year) in Germany.

An increasing debt-to-GDP ratio can become inflationary when a central bank, faced with large public debts, is less willing to raise rates sufficiently to fight price pressures, as these increases could endanger public debt sustainability.[1] This latter mechanism is associated with the so-called risk of fiscal dominance and can affect household views about the inflation the central bank is targeting. Such views can, in turn, affect current inflation through their impact on wages and aggregate demand. Research supporting the empirical relevance of this mechanism and the role of the expectation channel—notably Bianchi and Melosi (2017) and Bianchi et al. (2023)—relies on indirect evidence inferred from macroeconomic data. In this paper, we use individual survey data to provide direct micro-evidence that a share of households have beliefs that are consistent with a fiscal dominance mechanism.

[1] See Sargent and Wallace (1981), Leeper (1991), Sims (1994), Woodford (1994), Bassetto (2002), Cochrane (2001), Barthélemy et al. (2024), among many others.

We start by laying out some elements of theory that underpin our survey design. According to the intertemporal budget constraint of the government, an increase in debt-to-GDP should lead to higher inflation if it is not backed by future fiscal resources. We consider a version of this constraint in which agents have heterogeneous beliefs about the probability that the debt-to-GDP ratio will not be funded in the future. We show that individuals who think that the fiscal capacity is relatively more stretched compared with others should also expect relatively more inflation after an unexpected increase in debt-to-GDP. We also highlight the challenges of testing whether the data support this relation, which is at the heart of fiscal dominance. Such testing requires the observation of an exogenous shock to debt-to-GDP and a causal reaction of inflation expectations to this shock, as well as a measure of the extend to which fiscal resources are perceived to be stretched. We propose to use survey data to meet these requirements.

We design a customized survey administered to a representative sample of about 6,000 German households in November 2021. Studying German individuals is of particular interest, as Germany may be exposed to the risk of fiscal dominance resulting from the decisions of other euro-area sovereign fiscal authorities. That is, in a monetary union, a common monetary policy interacts with national fiscal policies and their associated heterogeneous and sovereign yield curves. Thus, monetary policy could be consistent with both stable inflation and sustainable public debt for the average euro-area country but, at the same time, destabilize public debt for countries with the least sustainable debt-to-GDP. This could lead to aggregate effects that the central bank may want—or be forced—to avoid at the cost of higher inflation.

First, we elicit individuals' perceptions of how much the euro-area fiscal capacity is stretched by asking them about the likelihood of a sovereign default of at least one euro-area member occurring in the coming years. We also elicit individuals' views on whether fiscal capacity will constrain monetary policy by asking them about the likelihood of the European Central Bank (ECB) keeping interest rates low to help fiscal authorities roll over their debt. We find that about 75 percent of households in the sample believe that either of these scenarios is likely or very likely. Moreover, the respondents do not view the two scenarios as exclusive: About 65 percent of households report that both scenarios are likely or very likely.

Our investigation finds that such individual views on fiscal capacity depend on characteristics such as income, asset holdings, age, gender, and location. We also find a strong correlation with political leaning: Individuals who voted for the center-left party (SPD) in the September 2021 elections (which took place about one month before the survey) report that these scenarios are less likely compared with other survey respondents. We find a similar result for individuals who

trust the ECB or the German government more than the average respondent. Finally, we find that individuals who think the risk of a default is very likely expect higher inflation and lower growth compared with other respondents. Notably, previous research identifies several of these individual characteristics as determinants of cross-sectional differences in inflation expectations. We find that these characteristics also affect the differences in the perceived risk of unsustainable fiscal stance which, according to the fiscal dominance view, should eventually show up in cross-sectional differences in inflation expectations.

Second, we examine whether, consistent with the fiscal dominance view of inflation, news signaling an increase in public debt leads to higher inflation expectations. A key challenge in identifying the reaction of expectations to fiscal news is measuring an exogenous fiscal shock and a causal reaction of inflation expectation to that shock. Following Coibion et al. (2021), we address this issue by conducting a randomized controlled trial using information treatments on fiscal variables. We provide randomly selected groups of respondents with public information from the European Commission about future debt-to-GDP ratios projected for Germany, France, and Italy over a three-year horizon.[2] In addition to these fiscal treatments, we consider two treatments providing information about the interaction between monetary and fiscal policies. The first provides the quantity of government debt assets that the ECB holds due to its quantitative easing policy. The second is a public statement made during an interview by former Bundesbank President Jens Weidmann reiterating that the ECB's mandate is to ensure price stability, not to help governments finance their debt. We then ask individuals about their euro-area debt-to-GDP ratio expectations and German inflation expectations, allowing us to identify the effects of each treatment on both variables.[3]

We find that information on public debt in France and Italy clearly and significantly increases the expected euro-area debt-to-GDP ratio by about 13 percentage points. In addition, we find that the French and Italian debt treatments, which significantly increase debt expectations, also lead individuals to significantly increase the average inflation rate they expect over the next five to ten years. The impact is quantitatively small, about 8 basis points, implying a moderate 0.8 percent cumulative increase in prices over the next 10 years. This implies that, for the average household, while an increase in euro-area debt can be eroded by some additional inflation, most of that increase will be funded by fiscal resources. By contrast, the other treatments have small

[2] As mentioned earlier, in a monetary union, the fiscal capacity of other economies can impact the common monetary policy and therefore inflation in each member of the union.

[3] We ask individuals about the euro-area debt-to-GDP ratio they expect in five years and the expected German inflation, on average, over the next five to ten years, therefore capturing the expected persistent impact of the treatments we consider.

and mostly non-significant impacts on debt-to-GDP and inflation expectations.

Third, we investigate how these aggregate effects vary across individuals with different views on the euro-area fiscal space. As discussed earlier, a fiscal-dominance logic implies that news leading to an increase in public debt ratios should be perceived as more inflationary by individuals who think that fiscal capacity is more stretched. Focusing on treatments informing about the French and Italian fiscal situations, we find that individuals who think that a default in the euro area is very likely increase their debt-to GDP ratio by about 11 percentage points and their inflation expectations by 16 basis points. For these households, an increase in debt cannot be fully funded, and, consistent with the fiscal dominance mechanism, this lack of fiscal space implies some partial need to inflate debt away. By contrast, in response to the same treatments, individuals who think that a default is less than very likely report a larger increase in debt-to-GDP ratios, of about 14 percentage points, and a non-significant increase in their inflation expectations of about 4 basis points. For these households, an increase in debt can be accommodated by fiscal space, potentially because public spending generates resources due to non-Ricardian effects, leading to little or no supplementary inflation.

In sum, the positive mapping between debt-to-GDP ratios and inflation observed at the aggregate level is stronger for households that think a default is very likely, which should capture their view that euro-area fiscal capacity is more stretched than other households think. Notably, although individuals who think it is very likely that the ECB will not raise rates to help governments also expect higher debt-to-GDP ratios in reaction to the fiscal treatments, they do not significantly increase their inflation expectations. Therefore, households do not associate the potential inflationary impact of larger public debts with conventional interest rate decisions that the central bank would make to help governments relax their budget constraints.

One may wonder whether beliefs about the likelihood of a default capture other perceptions besides those related to euro-area fiscal capacity. As household surveys make clear, some individuals associate a worse economic outlook with higher inflation; as noted, we observe that households that think a default is very likely expect lower growth and higher inflation compared with those that believe default is less likely. Thus, households that think a default is more likely might interpret the fiscal news as bad macroeconomic news, leading to a lower growth rate, a higher debt-to-GDP ratio, and higher inflation. Indeed, as we show, the fiscal treatments have a positive impact on the probability of a respondent indicating that a lower growth rate will be the main reason why public debt increases. However, evidence still suggests that the fiscal treatments lead households that think a default is very likely to increase their debt-to-GDP and inflation expecta-

tions, even when we control for their macroeconomic outlook. Therefore, the positive mapping between debt and inflation that we find does not stem from just pessimistic macroeconomic beliefs and a bad-news interpretation of the fiscal treatments.

Overall, our empirical results underscore that the same fiscal news can be interpreted differently, depending on how individuals think about the fiscal space. In a last section, we rationalize these empirical results by introducing a New Keynesian model in which agents have heterogeneous beliefs about whether the economy will move from a monetary dominance regime to a fiscal dominance regime. We find that fiscal news can be inflationary even when the central bank follows an optimal policy because individuals who believe in a switch to a fiscal dominance regime in the future expect more inflation tomorrow, and such expectations are inflationary today. This heterogeneity introduces a policy tradeoff, as the inflationary impact of such beliefs requires a negative output gap to be offset. We discuss several dimensions that may modulate the quantitative relevance of such a tradeoff, including the possibility that households may not associate fiscal dominance with lower interest rates as we find in the survey.

Literature review. Our paper is connected to four strands of the literature. First, our work contributes to the literature investigating the determinants and the macroeconomic consequences of heterogeneous beliefs about aggregate variables. Mankiw et al. (2003), Coibion and Gorodnichenko (2012), Andrade and Le Bihan (2013), and Andrade et al. (2016) analyze how differences in information sets can account for disagreement about future macroeconomic outcomes observed in various surveys of expectations. Other works find that experience and memory from historical episodes (Malmendier and Nagel, 2016) or from shopping (D'Acunto et al., 2021) explain the heterogeneity of household inflation expectations. Andre et al. (2021) document that individuals form their macroeconomic expectations according to different narratives about the macroeconomy. Andrade et al. (2019) show that the forward guidance around interest rates that the Federal Reserve implemented in the wake of the Great Recession increased disagreement about future inflation and growth because that policy was interpreted differently. Binetti et al. (2024) show that individuals have different understandings of the causes of the post–COVID-19 inflation surge and that government spending decisions are viewed as one of its major causes. We also emphasize that the same economic event can be interpreted differently, as the same fiscal news has different expected inflationary effects depending on individuals' views on the fiscal space.[4]

Our paper also aligns with an expanding literature that uses randomized controlled trials to study how individuals' economic expectations react to new information (see Armantier et al., 2016,

[4]See Weber et al. (2022) for a survey of the determinants of inflation expectations.

Armona et al., 2019, Coibion et al., 2018, 2019, among many others). Within this literature, only a few papers investigate agents' reactions to fiscal news. Roth et al. (2022) study how information about the US government debt-to-GDP ratio affects US households' attitudes toward government spending and taxation. Coibion et al. (2021) investigate the effects of information about future debt on inflation expectations of a survey of US households. Grigoli and Sandri (2024) find similar results when surveying households in the United States, the United Kingdom, and Brazil, emphasizing that the inflationary impact declines with the perceived credibility of their country's central bank.[5] We also build on Coibion et al. (2021) to design our fiscal treatments and show that, in a survey of German households, fiscal news leading to an increase in expected debt-to-GDP ratio also increases their inflation expectations. We make several contributions compared to these previous works. We investigate how households connect fiscal variables and inflation expectations depending on their views about the fiscal space and find that, for a subset of households, this connection is consistent with fiscal dominance. We also investigate what drives these different perceptions of the fiscal space. Finally, we rationalize our empirical results with a New Keynesian model that incorporates heterogeneous beliefs and use this model to analyze the optimal monetary policy reaction to such heterogeneity.

Our work also contributes to the literature assessing how fiscal variables affect inflation. Inflation can result from fiscal policy when fiscal expansions lead to a boom due to deviations from Ricardian equivalence induced by financially constrained agents (Angeletos et al., 2023, Galí et al., 2007) or cognitive constraints (Eusepi and Preston, 2018). Fiscal variables can also affect inflation when the fiscal–monetary policy interaction is such that inflation is used to meet the government budget constraint rather than to achieve the central bank inflation target (Leeper, 1991). Bianchi and Ilut (2017), Bianchi and Melosi (2017), and Bianchi et al. (2023) conduct extensive quantitative evaluation of the second mechanism, relying on macro models estimated to match features of US macroeconomic data.[6] Barro and Bianchi (2023) look at cross-country differences in fiscal stimulus during COVID-19 and post–COVID-19 inflation. We contribute to this literature by providing direct micro evidence that some households connect fiscal variables to inflation expectations through the government's budget constraint, which is consistent with fiscal dominance. Our evidence is also consistent with households having different views on the link between fiscal policy and inflation.

Finally, several recent papers extend the New Keynesian model to introduce disagreement be-

[5] See also the cross-country evidence on debt surprises by Brandao-Marques et al. (2024).

[6] See also Schmidt (2024), who investigate how monetary policy should react to prevent fiscal dominance risk in a model in which the central bank is forced to fiscal dominance because of an upper bound on nominal interest rates.

tween agents. Angeletos and Lian (2018) and Andrade et al. (2019) show how disagreement about what forward guidance conveys impacts the effectiveness of that guidance. Caballero and Simsek (2022) analyze how disagreement between financial markets and the central bank affects the transmission of monetary policy. Lorenzoni and Werning (2023) show how disagreement between firms and workers can be inflationary. We consider household disagreement about whether the economy will enter a fiscal dominance regime in the future.

2 Some theoretical background

In this section, we present some motivation and guidance related to the design of our survey, which relies on the intertemporal budget constraint of the government.

2.1 Households' beliefs and the budget constraint of the government

The intertemporal budget constraint of a fiscal authority. Our starting point is the intertemporal budget constraint of the government, which is central to fiscal dominance. Time is discrete and indexed by $t \in \{0, 1, ...\}$. At date t, the intertemporal budget constraint of the government with one-period nominal debt and in the absence of default[7] is

$$\frac{B_{t-1}}{P_t} = \underbrace{\sum_{\tau=t}^{\infty} E_t \xi_{t,\tau} \left(T_\tau - G_\tau\right)}_{\text{PV of future surpluses}} + \underbrace{\lim_{H\to\infty} E_t \xi_{t,H} \frac{B_{H-1}}{P_H}}_{\text{Bubble term}}, \tag{1}$$

where B_t is date-t nominal debt, P_t the price level, G_t real government expenditures, T_t real taxes, $\xi_{t,\tau}$ the discount factor, and E_t the expectation operator. The right-hand term of equation (1) is the fiscal resources of the government, comprising the present discounted value of future surpluses and a potential bubble term.[8]

In what follows, we focus on debt-to-GDP ratio. To make this quantity apparent in (1), we divide both sides by real GDP at date $t-1$ to obtain

$$D_{t-1} = (1 + \pi_t) S_t, \tag{2}$$

[7] Here we assume away default, as is standard in the fiscal dominance literature. Note that a default on current debt is a substitute for inflation, and a default in the future limits the extent to which future surpluses back current debt.

[8] This bubble term was investigated by, for example, Bassetto and Cui (2018) and Brunnermeier et al. (2020) and appears in models featuring dynamic inefficiency or uninsurable income risk, or when debt provides liquidity services. In these cases, no transversality condition forces the bubble term to be zero, as is the case in standard models.

where $D_{t-1} = \frac{B_{t-1}}{P_{t-1}Y_{t-1}}$ the debt-to-GDP ratio maturing at date t, π_t the inflation rate between $t-1$ and t, and $S_t = \frac{1}{Y_{t-1}} E_t\{R_t\}$ with R_t the fiscal resources of the government.

What is the effect of an exogenous shock to the debt-to-GDP ratio? Let $d_{t-1} = \log D_{t-1}$, and consider an exogenous shock ϵ_{t-1} that increases the belief about debt-to-GDP ratio by $\frac{\partial d_{t-1}}{\partial \epsilon_{t-1}} \epsilon_{t-1}$. The intertemporal budget constraint of the government, equation (2), gives rise to a response of inflation given by

$$\frac{\partial \pi_t}{\partial \epsilon_{t-1}} = \left(1 - \frac{\partial s_t}{\partial d_{t-1}}\right) \frac{\partial d_{t-1}}{\partial \epsilon_{t-1}}. \tag{3}$$

Overall, the intertemporal budget constraint of the government implies that any increase in debt-to-GDP that is not fully backed by additional fiscal resources will have to be at least partly eroded by inflation.

Additional comments. Several additional comments are in order. First, an important element in the analysis is that, in (2) and (3), debt is expressed in percentage of GDP. In general, this debt-to-GDP ratio can increase for several reasons, including due to endogeneity. To see this, consider two polar cases, in both of which ϵ_{t-1} is a shock to the issuance of nominal debt at date $t-1$. In one polar case, this issuance is unbacked, so fiscal resources are constant ($s_t = 0$). The price level at date $t-1$ is unchanged, as nominal debt maturing at this date is unchanged, and so are fiscal resources. Thus, the increase in nominal debt leads to an increase in the debt-to-GDP ratio. This increase in nominal debt also requires an increase in the price level at date t and, therefore, in the inflation rate π_t. In the second polar case, this issuance is fully backed by fiscal resources: $\partial s_t / \partial d_{t-1} = 1$, and, as a result, π_t remains unchanged. Note that, in equilibrium, the increase in future surpluses also reduces the date $t-1$ price level, thus further increasing the debt-to-GDP ratio. The equilibrium variation of the debt-to-GDP ratio at date $t-1$ is the sum of the increase in nominal debt and the decrease in the price level due to increased future surpluses.

Second, note that larger fiscal resources also include the bubble term in equation (1). When interest rates are low, the increase in debt-to-GDP can be fully compensated by an increase in fiscal resources in the form of a shift in the bubble term. Conversely, a negative shift in the bubble term, or even an increase in the interest rate required by markets that eliminates the bubble term, corresponds to negative shocks to fiscal resources (that is, a negative shock to s_t). These shifts in fiscal resources may well be a function of government policies and, in particular, the debt level.

Households' beliefs and the budget constraint. We now turn to households' beliefs about debt and inflation. Individually, households may have different beliefs about not only current, but also future debt, inflation, and fiscal resources.[9] These beliefs align with the budget constraint of the government when

$$D_\tau^i = (1 + \pi_{\tau+1}^i) S_{\tau+1}^i, \tag{4}$$

with $\tau \geq t-1$ and X_t^i denoting the belief of individual i regarding variable X_t.

Households may also experience shocks that lead them to revise their expectations regarding these different variables. Consider an exogenous shock ϵ_τ with $\tau \geq t-1$, which moves the belief about debt-to-GDP ratio at date τ by $\frac{\partial d_\tau^i}{\partial \epsilon_\tau}\epsilon_\tau$ and the belief about inflation at date $\tau+1$ by $\frac{\partial \pi_{\tau+1}^i}{\partial \epsilon_\tau}\epsilon_\tau$. These revisions align with the budget constraint of the government, equation (3), when they satisfy

$$\frac{\partial \pi_{\tau+1}^i}{\partial \epsilon_\tau} = \left(1 - \frac{\partial s_{\tau+1}^i}{\partial d_\tau^i}\right) \frac{\partial d_\tau^i}{\partial \epsilon_\tau}. \tag{5}$$

Challenges to identifying the inflationary effect of public debt. Equation (5) illustrates two empirical challenges to identifying the effect of public debt on inflation expectations. First, one needs to observe the response of inflation and debt-to-GDP to the same exogenous shock: $\frac{\partial \pi_t^i}{\partial \epsilon_{t-1}}$ and $\frac{\partial d_{t-1}^i}{\partial \epsilon_{t-1}}$.

Second, the inflation response to a shock that increases debt depends on the reaction of the expected present and future fiscal resources to the change in debt-to GDP resulting from the shock $\frac{\partial s_t^i}{\partial d_{t-1}^i}$. This term may vary depending on agents' beliefs about how an increase in public debt affects fiscal resources as well as about how fiscal and monetary authorities will react in funding such an increase in public debt.

The literature tends to rely on the structure of a model to back out unobserved exogenous shocks and beliefs about how the shocks will be compensated by an increase in fiscal resources from observed time series of macroeconomic variables (see, e.g., Bianchi et al., 2023, Bianchi and Ilut, 2017, Bianchi and Melosi, 2017, Eusepi and Preston, 2018).

In this paper, we use individual survey data to identify such an impact.

[9] Section 7 introduces a model in which such heterogeneous beliefs may arise in equilibrium, but for now, we take such heterogeneity of beliefs as given.

2.2 The monetary union case.

In a monetary union with no fiscal transfers between fiscal authorities, the intertemporal budget constraint, equation (2), has to hold for each member j of the union. Summing the country-level constraints yields

$$\frac{D_{t-1}}{S_t} = (1 + \pi_t)u_t,$$

with $D_{t-1} = \frac{\sum_j B^j_{t-1}}{P_{t-1}Y_{t-1}}$ the debt-to-GDP ratio of the union, $S_t = \sum_j S^j_t$ the sum of expected current and future surpluses of each union member, π_t the inflation rate common across union members and determined by the monetary authority, and $u_t = 1/\sum_j \omega_j (1 + \tilde{\pi}^j_t)^{-1}$ a term averaging the country-specific components of inflation $(1 + \tilde{\pi}^j_t) = (1 + \pi^j_t)(1 + \pi_t)^{-1}$ with weights $\omega_j = D_j/D$.

Therefore, the intertemporal budget constraint of the fiscal authorities holds in a monetary union, as emphasized in Bassetto and Caracciolo (2021). An increase in debt-to-GDP in a country of the union D_j that is not funded by an increase in its own future fiscal resources S_j can be accommodated by an increase in inflation at the level of the union π, which will therefore also show up in other countries. However, as Maćkowiak and Schmidt (forthcoming) note, in a monetary union, this effect of an increase in an individual country's debt on inflation also depends on the reaction of all the other countries' fiscal authorities. What matters for the price level then is the monetary union's public debt level.

Another aspect of the link between public debt and inflation in a monetary union is that a local shock ϵ_k that affects debt in a country k can also a inflation in another member h through its impact on the common monetary union inflation rate, π, namely

$$\frac{\partial \pi^h_t}{\partial \epsilon^k_{t-1}} = \frac{\partial \pi_t}{\partial \epsilon^k_{t-1}} = \left(1 - \frac{\partial s_t}{\partial d_{t-1}}\right) \frac{\partial d_{t-1}}{\partial d^k_{t-1}} \frac{\partial d^k_{t-1}}{\partial \epsilon^k_{t-1}}, \tag{6}$$

where, for simplicity, we assume that $\frac{\partial \tilde{\pi}^h_t}{\partial \epsilon^k_{t-1}} = 0$; that is, the shock affecting country k has no direct impact—for instance, because it increases demand for exports of country h—on inflation in country h.

Analyzing the domestic inflationary effects of a public debt increase in a foreign monetary union member poses empirical challenges similar to those that arise when estimating the inflationary effects of an increase in a country's own public debt, as discussed earlier. First, one needs to observe the response of country h's inflation to a shock that increases debt in another country

k as the response of the monetary union's debt-to-GDP ratio to the same exogenous shock: $\frac{\partial \pi_t^k}{\partial \epsilon_{t-1}^k}$ and $\frac{\partial d_{t-1}}{\partial \epsilon_{t-1}^k}$.

Second, the inflation response to a shock that increases debt depends on the reaction of both the expected present and aggregated monetary union future fiscal resources to the change in debt-to-GDP that results from that shock, $\frac{\partial s_t}{\partial d_{t-1}}$. This term may vary depending on agents' beliefs about how an increase in public debt generates fiscal resources as well as about how fiscal and monetary authorities will react in funding such an increase in public debt.

In this paper, we use individual survey data to identify these unobserved terms.

2.3 Identifying the impact of debt on inflation using survey data.

We rely on survey data to proxy the terms involved in equations (5) and (6).

To start, following Coibion et al. (2021), we implement a randomized controlled trial to observe how individuals update their beliefs about debt-to-GDP and inflation after an exogenous shock. Individuals are randomly selected to receive an information treatment T. Survey questions are also used to observe beliefs about future debt-to-GDP, d^i, and inflation, π^i. These beliefs are compared with those of individuals in a control group, C. Formally, we estimate average treatment effects, defined as the difference between the average outcome for households receiving the information treatment and the average outcome for households in the control group:

$$E\left(\frac{\partial d^i}{\partial \epsilon}\right) = E\left(d^i|\epsilon = T\right) - E\left(d^i|\epsilon = C\right) \text{ and } E\left(\frac{\partial \pi^i}{\partial \epsilon}\right) = E\left(\pi^i|\epsilon = T\right) - E\left(\pi^i|\epsilon = C\right).$$

Once we derive these estimates, we verify whether, in line with the theoretical predictions of equation (3), a shock that increases an individual's expected debt-to-GDP ratio also increases their inflation expectation:

$$E\left(\frac{\partial d^i}{\partial \epsilon}\right) > 0 \Rightarrow E\left(\frac{\partial \pi^i}{\partial \epsilon}\right) > 0,$$

unless every individual expects the increase will be fully funded, that is, $\frac{\partial s^i}{\partial d^i} = 1 \; \forall i$.

As in Coibion et al. (2021), we consider treatments related to conditions in respondents' *domestic* economy. In addition, we exploit the fact that our survey is conducted in a monetary union and consider how individuals react to treatments that are related to conditions in other *foreign* monetary union economies. This allows us to assess if—consistent with the logic of a consolidated budget constraint of fiscal authorities in a monetary union, and equation (6)—a shock to a foreign

union member k that increases the debt-to-GDP ratio at the monetary union level also increases inflation in another monetary union member h:

$$E\left(\frac{\partial d^i}{\partial \epsilon^k}\right) > 0 \Rightarrow E\left(\frac{\partial (\pi^h)^i}{\partial \epsilon^k}\right) > 0,$$

unless it is expected to be fully funded by every individual; that is, $\frac{\partial s^i}{\partial d^i} = 1 \; \forall i$.

Finally, another novelty of our survey entails eliciting individuals' views on how much fiscal resources are constrained, that is, how small the term $\frac{\partial s}{\partial d}$ in equation (3) is. Using this information, we categorize respondents as individuals who believe it is very unlikely that fiscal resources will be adjusted to compensate for an increase in debt-to-GDP—that is, individuals with a relatively low $\frac{\partial s}{\partial d}$—or as individuals who think such an adjustment is more likely to happen and therefore exhibit a relatively high $\frac{\partial s}{\partial d}$. As discussed earlier, the adjustment can take place either through fiscal surpluses or through the bubble term. Notably, what is critical for our analysis is not the level of deficits or surpluses *per se* but rather the extent to which the government can adjust the deficits in response to changes in debt levels.

We then check whether, in line with equation (3), individuals with a smaller adjustment of fiscal resources to the shock that increases debt-to-GDP also expect a larger adjustment of inflation in response to the same shock; that is,

$$E\left(\frac{\partial \pi^i}{\partial \epsilon} \middle| \frac{\partial s}{\partial d} = \text{high}\right) < E\left(\frac{\partial \pi^i}{\partial \epsilon} \middle| \frac{\partial s}{\partial d} = \text{low}\right).$$

We detail the survey's design in the next section.

3 Survey design

3.1 General description.

The microdata we use to address our research questions are from the Bundesbank Online Panel Households (BOP-HH). The survey is administered every month to a sample of individuals, who are at least 16 years old and have used the internet at least once in the past month.[10] A large number of the 2,000 to 7,000 individuals per wave responded to the survey more than once. The BOP-HH collects information on individuals' expectations regarding inflation and other macroeconomic variables and their income expectations and consumption patterns, as well as sociode-

[10] See Beckmann and Schmidt (2020) for a detailed description.

mographic variables such as age, gender, income, location of residence, size of municipality of residence, education, employment status, and which party they voted for at the 2021 parliamentary elections.

We added a special module to the BOP-HH questionnaire that was administered in November 2021. Specifically, we set up a randomized control trial (RCT) with the objective of creating exogenous variations in the perception of debt-to-GDP and inflation. A total of 6,023 respondents completed the survey .

3.2 Treatments

We split our sample into six randomly selected groups of equal size, with five groups receiving different information treatments, T, and a control group, C, receiving no treatment. The first group received a fiscal information treatment, T_1, pertaining to information about the current as well as projected debt level and debt-to-GDP-ratio in their own country, Germany. The second and third groups received the same type of fiscal information but for two foreign euro-area members, France, T_2, and Italy, T_3, respectively. The fourth and fifth groups received information related to the interaction between monetary and fiscal policy. More specifically, the fourth group received information about the ECB's purchases of sovereign debt, T_4, and the fifth group received a statement from the former Bundesbank President Weidmann, asserting that the ECB has a price-stability mandate and should not help governments, T_5. The exact formulation of the treatments is as follows:[11]

Treatment 1 ("Debt–Germany") : *Germany's government debt is currently €2,398 billion, amounting to 70 percent of its gross domestic product. According to the European Commission, it is expected that this figure will total more than €2,680 billion in 2024, probably amounting to 72 percent of gross domestic product.*

Treatment 2 ("Debt–France") : *France's government debt is currently €2,762 billion, amounting to 115 percent of its gross domestic product*[12]*. According to the European Commission, it is expected that this figure will total more than €3,240 billion in 2024, probably amounting to 118 percent of gross domestic product.*

Treatment 3 ("Debt–Italy") : *Italy's government debt is currently €2,696 billion, amounting to 156 percent of its gross domestic product. According to the European Commission, it is expected that*

[11] The survey sent to individuals is written in German; that version is available in the appendix.

[12] Respondents could call up an information box containing 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."

this figure will total more than €2,800 billion in 2024, probably amounting to 153 percent of gross domestic product.

Treatment 4 ("ECB Purchases") : *According to information provided by the European Central Bank (ECB), it has purchased about 30 percent 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.*

3.3 Post-treatment questions

We assess the effects of treatments on individuals' expectations of future public debt and future inflation. We also elicit individuals' perceptions of how stretched fiscal resources are.

Debt expectations. Individuals are surveyed about their perception of the expected evolution of the euro-area debt-to-GDP ratio after the treatments to obtain estimates of

$$E\left(\frac{\partial d^i}{\partial \epsilon}\right) = E\left(d^i|\epsilon = T\right) - E\left(d^i|\epsilon = C\right)$$

for the different treatments T considered. As Roth et al. (2022) show, households generally have an uninformed view of the typical range of debt-to-GDP-ratio values. We first elicit their qualitative views with the following question:

Question 1. *At present, total government debt of all euro-area member states amounts to 100 percent of euro-area gross domestic product. 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*

In addition to the qualitative question, survey participants are asked a quantitative question. Following Roth et al. (2022), we provide respondents with an explicit anchor (the current level of euro-area debt-to-GDP) to help them express their beliefs in a quantitatively meaningful response:

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

Appendix Table C.5 illustrates that about 80 percent of households believe the debt-to-GDP ratio will be higher or much higher over the coming years, while only 14 percent believe it will remain the same, and 8 percent believe it will decrease. Appendix Table C.4 shows that the average expected debt-to-GDP ratio is about 70 percent, which is below the initial anchor we provide to households, due to the fact that answers are very dispersed, with a relatively large mass of answers between 0 and 20 percent. This dispersion of answers highlights households' difficulty in forming expectations about a ratio of two macro variables that are not so well known.

In our baseline analysis, we consider all household responses. In robustness checks, we assume that some households, who give very small answers, may have misinterpreted the question and provided a growth rate rather than a debt-to-GDP ratio. For these individuals, we impute an expected debt-to-GDP ratio given by the actual euro-area debt-to-GDP ratio that we provide multiplied by the individual growth rate. We do that for different thresholds of small response values (5, 10, 20 percent). If we do so, the average quantitative response is, by construction, larger and closer to 100 percent.

Reason for debt evolution. In addition to the reaction of debt-to-GDP to a shock, we elicit the main reason underlying individuals' views on future change in euro-area debt-to-GDP by asking:

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).*

This allows us to assess whether individuals relate the evolution of debt primarily to fiscal policy choices p (responses 1 and 2) or to another change in macroeconomic conditions x (responses 3 and 4):

$$E\left(\frac{\partial d^i}{\partial \epsilon}\right) = E\left(\frac{\partial d^i}{\partial p^i}\frac{\partial p^i}{\partial \epsilon}\right) + E\left(\frac{\partial d^i}{\partial x^i}\frac{\partial x^i}{\partial \epsilon}\right).$$

Inflation expectations. We survey individuals about their average inflation expectations over the next five years or the next 10 years using both qualitative and quantitative questions. Re-

sponses to these two questions allow us to obtain estimates of

$$E\left(\frac{\partial \pi^i}{\partial \epsilon}\right) = E\left(\pi^i | \epsilon = T\right) - E\left(\pi^i | \epsilon = C\right)$$

for the different treatments T considered. We also ask these questions before the treatments to examine how information treatments lead individuals to revise their inflation expectations. The specific question is as follows:

Question 4. *What value do you think the inflation rate or deflation rate will take on average over the next five/ten years?* [13]

As illustrated in Appendix Table C.7 , about 38 percent of respondents revise their inflation expectations upward, 45 percent of households do not revise their long-term inflation expectations, and only 17 percent revise them downward. The average revision is equal to 0.3 percentage point, comparable to the standard deviation of the average long-term average inflation expectations observed since the start of the survey in 2020.

Perceptions of stretched fiscal resources. As explained in the previous section, a key determinant of the connection between debt and inflation expectations is how likely it is that households think fiscal resources will be expanded to fund most of the increase in public debt, in which case $\frac{\partial s}{\partial d}$ is 'high' and potentially close to one, or whether they think that fiscal capacity is already stretched so much that most of the additional debt-to-GDP will be unfunded; that is, $\frac{\partial s}{\partial d}$ is 'low' and potentially close to zero.

To elicit this belief, we ask households about their qualitative assessment of the likelihood of a scenario associated with stretched public finances, whereby $\frac{\partial s}{\partial d}$ is "low" when this scenario is deemed to be likely. The scenario we use is that of a sovereign default within 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*

We think that default risk as measured by Question 5 is a good proxy for stretched public finances. Indeed, a debt crisis is a consequence of a government's inability to raise more fiscal resources through both surpluses and the bubble term. Because our analysis points to the

[13] The question intends to capture the expected reaction of inflation averaged over the next five to ten years and that is induced by a fiscal shock initially shifting the debt-to-GDP profile upward at least over the next five years. Note that half the respondents are asked about their five-year-ahead inflation expectation, while the other half are asked about their 10-year-ahead expectation.

importance of how individuals think fiscal resources can be adjusted in response to debt levels, individuals' perception of the probability of a debt crisis is a more relevant measure of stretched public finances than, for example, levels of deficits or interest rates. A default is often viewed as a substitute for inflation, since both can erode the nominal value of public debt and hence relax the government's budget constraint. However, inflation and default risks are positively correlated because they can be caused by the same thing: stretched public finance. Indeed, default and inflation usually occur together, and both are associated with situations in which public finances are stretched (see Reinhart and Rogoff, 2011).[14]

Perceptions of monetary actions in cases of stretched fiscal resources. To further investigate how households think about fiscal dominance, we ask them about a scenario describing the central bank's potential actions in response to stretched public finance. More precisely, we ask them about their perceptions of whether the central bank will increase interest rates to help the government fund its debt.

Question 6. *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*

With Questions 5 and 6, we are equipped to elicit both how households think about the budget constraint of the public sector and whether they expect monetary policy to help the public sector satisfy its budget constraint.

4 Individual beliefs about public debt sustainability

In this section, we document several characteristics of individuals' belief about fiscal space. As Section 2 illustrates, this perception is key to determining how individuals connect public debt and inflation expectations. We also look at some characterisitics of individuals' views about how the central bank could respond in that situation.

Fiscal–monetary scenarios associated with stretched fiscal resources are viewed as likely or very likely. Table 1 shows the likelihood that individuals associate to the scenario of a sovereign de-

[14] Galli (2020) finds such a positive correlation between default risk and inflation risk in financial derivatives data. He also shows that they are both correlated with realized inflation.

fault in the euro-area (Question 5) and the scenario of a constrained ECB policy rate (Question 6). Overall, 79.7 percent of households believe that the default of a euro-area country is either very likely or likely. Similarly, 79.8 percent of households believe it is likely or very likely that the ECB will be constrained in setting its interest rate policy. At the individual level, expecting a default is usually associated with the expectation of a constrained interest rate policy: About 90 percent of households believing it is very likely that the ECB will be constrained in raising rates think that a euro-area country default is likely or very likely over the next five years. This proportion is about 80 percent for households believing it is likely the ECB will be constrained.

Views on the likelihood that fiscal resources will be stretched vary with individual characteristics. We first show that the information treatments do not change individuals' broad assessment of whether euro-area fiscal capacity is stretched. Let *Stretched* be a dummy equal to one when an individual sees a scenario associated with stretched fiscal resources as very likely—that is, a euro-area default scenario is very likely—and zero otherwise. We then estimate the following Probit regression:

$$Stretched = \alpha + \sum_{k} \beta_k Treatment_k + Controls + Error, \tag{7}$$

with T_k dummy variables equal to one when an individual is treated with the information k and zero otherwise and '*Controls* a set of individual characteristics. Results are presented in Table 2. We find that none of the treatments has a significant effect on the likelihood that a default happens in at least one euro-area member over the next five years. Table 2 shows similar results when considering a dummy equal to one if an individual thinks it is likely or very likely that the ECB will be constrained in raising rates. The treatments we consider do not change households' broad assessment of the likelihood of strained fiscal capacity and a central bank being constrained in helping governments fund their debt.

We also explore how these views vary with individual characteristics and report the results in Figure 2. Individuals expecting a default in the euro area are more likely to be female, be older than 35, earn a lower income, live in southern Germany, vote for the AfD or FDP, hold no securities, and perceive inflation as being higher than 5 percent. Individuals expecting that the ECB will be constrained in raising rates are somewhat different: They are more likely to be male, be older than 45, earn a high income, live in southern Germany, vote for a party other than the SPD, hold no debt, and perceive inflation as being closer to realized inflation compared with individuals who

think default is very likely.[15] Figure 3 also shows that these scenarios are perceived as more likely by individuals who report a lower level of trust in the German government and the ECB.

Fiscal–monetary scenarios and macroeconomic expectations. How do individuals' beliefs about future fiscal–monetary scenarios correlate with their macroeconomic expectations? Table 3 shows that households that think a euro-area country default is very likely expect higher inflation and lower growth compared with those that think a default is less likely. By contrast, their (saving) interest rate expectations are relatively similar to that of other households. Thus, higher inflation is not associated with lower interest rates. These households also expect higher euro-area debt-to-GDP and tax increases compared with others. Table 3 also reveals that households that think it is very likely the ECB will be constrained in raising rates expect broadly similar inflation and growth compared with others but lower (saving) interest rates. Lower interest rates are therefore not associated with higher inflation. These households also expect higher euro-area debt-to-GDP and tax increases compared with others.

Overall, individuals who think it is very likely that either there will be a sovereign default in the euro-area or that the ECB will be constrained in helping governments have worse fiscal prospects compared with others. Individuals expecting that a default is very likely also have a more deteriorated macroeconomic outlook. One question to consider is whether expecting a default and/or a constrained ECB is redundant with a pessimistic macroeconomic outlook. Appendix Table C.1 shows that households that believe a default and/or a default combined with a constrained ECB are highly probable expect higher inflation, even when we control for their other macroeconomic expectations.[16] Therefore, expecting stretched fiscal resources or a constrained central bank has an impact on inflation expectation that goes beyond the worse macroeconomic prospects associated with these pessimistic scenarios.

[15] As we show later, individuals with different fiscal-monetary scenarios in mind revise differently their inflation expectations after the same fiscal news. The evidence that political leaning is a clear determinant of the likelihood of such fiscal-monetary scenarios can thus explain why such political differences matter in how individuals interpret the link between fiscal policy and inflation as documented for instance in Coibion et al. (2021) or Binetti et al. (2024).

[16] We provide additional evidence that views on fiscal–monetary outlook add additional variables using other macroeconomic variables in Appendix Tables C.2 and C.3.

5 The effect of treatments on households' debt-to-GDP and inflation expectations

We first investigate the effects of treatments on debt and inflation expectations. We establish that some of the treatments have a positive impact on debt expectations and that these treatments have a positive impact on inflation expectations.

Debt expectations. We investigate the effect of information treatments on households' expectations about the change in euro-area debt-to-GDP, $\Delta Debt$. When looking at simple averages for the different groups (Appendix Table C.4), we see that the expected average debt-to-GDP ratio is larger than the control group for the treatments providing information about French and Italian debts, whereas it is smaller for the treatment providing information about ECB purchases. For treatments providing information about the German debt or the Weidmann statement, the difference with the control group is smaller and is not robust to the way we handle responses with very small debt-to-GDP ratios.[17] To assess more precisely the quantitative impact of treatments on debt-to-GDP ratio, we regress these individual views on the various information treatments and a set of individual characteristics, namely

$$\Delta Debt = \alpha + \sum_k \beta_k Treatment_k + Controls + Error. \tag{8}$$

Table 4 shows the results obtained with the baseline quantitative measure of $\Delta Debt$.[18]

The French and Italian debt treatments have a clear and robust positive impact on quantitative euro-area debt-to-GDP expectations compared with the control group (12 to 13 percentage points). This result is robust to the imputation of small response values (see Appendix Table C.8).[19] Regarding qualitative measures, these treatments lead respondents to answer more frequently that euro-area debt-to-GDP will increase and less frequently that the euro-area debt-to-GDP will decrease in the future. However, coefficients are not significantly different from zero. Since a large majority of households believe that the debt-to-GDP ratio will increase, this suggests that, overall, the intensive margin of adjustment is more important than the extensive margin in explaining the

[17] Appendix Table C.5 shows how qualitative debt expectations vary with the treatments: While the treatment providing information about ECB purchases seems to be associated with a smaller proportion of households expecting higher debt compared with the control group, differences are less clear for the other treatments.

[18] Appendix Table C.6 shows the impact on the qualitative debt-to-GDP expectations.

[19] We also tested that the results are robust when only considering households that respond that the debt-to-GDP ratio will not be the same as it is now (see Table C.9), since for households expecting the ratio to remain the same, we assume this ratio will be equal to 100 percent, as mentioned in the question.

reaction of the debt-to-GDP ratio to the treatments.

The effects of the other treatments are less clear-cut. The German debt treatment has a positive effect when using our baseline measure of quantitative debt-to-GDP expectations, but this effect turns out to be negative when we use a different method to deal with very small response values. The impact is also negative when we look at quantitative answers. The ECB purchase treatment leads to a negative but non-significant effect in our baseline analysis but when imputing the small response values, this effect becomes significantly negative. When receiving this treatment, more households expect the debt-to-GDP ratio to decline and fewer expect it to increase, and results are significantly different from zero (see Appendix Table C.6). Finally, the Weidmann treatment has a somewhat positive effect on the quantitative debt expectation (which is not robust to alternative ways of handling the small response values) but results in a significantly lower share of respondents expecting debt to increase.

Based on these results, we group the French and Italian debt treatments, which have clear positive effects on euro-area debt expectations, and we gather the three other treatments together (which have smaller and more negative effects on debt expectations). We report the effects of the corresponding bundles in the last columns of Table 4. Consistently with the effects of individual treatments, we find that the French and Italian debt treatments lead to an increase in expected debt, while there are no overall effects of the other treatments.[20]

Effects of treatments on inflation expectations. To investigate the effects of treatments on inflation expectations, we regress individual revisions in long-run inflation expectations on the different treatment dummies:[21]

$$\pi^{expost} - \pi^{exante} = \alpha + \sum_k \beta_k Treatment_k + Controls + Error. \tag{9}$$

Note that, in our survey, we have access to expected inflation both before and after treatments. This contrasts with fiscal variables that we ask about only after treatments (See Coibion et al., 2021, for a similar survey design). The estimates are reported in Table 4 for quantitative measures and Table C.6 for qualitative measures.

[20] In our robustness analysis, the overall effect of the three other treatments becomes significantly negative, driven mostly by treatments on the German debt and ECB purchases.

[21] We report summary statistics of individuals' revisions in long-term inflation expectations as a function of the treatment they received in Appendix Table C.7. We find that the French and the Italian debt treatments lead to higher average inflation revisions than the control group, while this is less or not the case for other treatments. Qualitatively, the French debt treatment leads to relatively less downward revisions and the Italian debt treatment to relatively more upward revisions.

We find that the information treatments on the debt evolution of France and Italy have a significantly positive effect on inflation revisions and that this effect is larger, on average, than the information treatment of German debt, ECB purchases, or Weidmann (Table 4). Overall, the treatments with a clear positive and larger effect on debt expectations also have a larger impact on inflation expectations. Notably, the fact that German households positively revise their (German) inflation expectation in response to information about other countries' public debt confirms that households understand that, in a monetary union, fiscal dominance risk goes beyond the scope of their own country's fiscal stance. These findings are consistent with Bassetto and Caracciolo (2021) and Maćkowiak and Schmidt (forthcoming) as well as the evidence from Barro and Bianchi (2023), who show that, in the euro area, inflation reacts to the area-wide government spending variable. These results thus extends the findings of Coibion et al. (2021), who focused on the effects of treatments about US fiscal policy on US inflation, to a monetary union case. When grouping debt treatments separate from other treatments, we also find that debt treatments that lead to higher debt expectations result in higher (and statistically significant) revisions in inflation compared with other treatments.

However, while significant, the impact of information treatments is small. At most, they lead to a revision of about 0.08 percentage point of the average inflation expected over the next five to ten years in response to the treatment providing information about French debt, which increases debt-to-GDP by about 13 percent. This implies that the average household believes that most of the increase in debt-to-GDP should be funded so that the inflation needed to erode debt is small by comparison. Though small, this impact is of a comparable order of magnitude to the standard deviation of the average long-term inflation expectation over time, which is about 12 basis points in the sample available in the survey.[22]

Overall, on average, treatments increasing households' expected debt ratios also increase their long-run inflation expectations. This is consistent with fiscal-dominance logic. As Coibion et al. (2021) note, this inflationary effect could also be triggered by the expansionary effects of public deficits: An increase in expected euro-area debt-to-GDP induced by the French and Italian fiscal treatments could be associated with an increase in spending or a decline in taxes, which, because of non-Ricardian effects, could be viewed as expansionary. Such expansionary effects would also create some supplementary inflation because of a positive output gap or, more generally, an excess

[22]Treatments also have an effect on the extensive margin of expected inflation. In Table C.6, we report marginal effects of Probit regressions relating dummy variables for positive and negative inflation revisions to the information treatment dummies. We find that treatments either increase the share of upward revisions or decrease the share of downward revisions, although these effects are often non-significant. Thus, fiscal news can move the extensive margin of inflation, which is key in household consumption choices, as emphasized in Andrade et al. (2023).

demand. Our survey design allows us to go further than the evidence in Coibion et al. (2021) and to investigate whether non-Ricardian effects is the main mechanism through which households connect inflation and debt. Tables 5 and 6 show that this is not the case. Indeed, while most households think that euro-area debt-to-GDP will increase, they do not relate that increase to a decline in taxes or an increase in government spending. The increase in debt-to-GDP is primarily associated with a worsening of economic growth. This is particularly true for the French and Italian fiscal treatments. We further investigate whether a pessimistic outlook explains the results in the next section.

6 Treatment effects for individuals with different fiscal–monetary outlook

In this section, we further investigate the extent to which households' connection between debt and inflation follows fiscal-dominance logic. Using the insights from Section 2, fiscal dominance implies that higher debt expectations are perceived to be inflationary by households that also perceive that fiscal resources are so stretched that an increase in debt-to-GDP cannot be fully funded. We investigate if this is verified by the data using Question 5 to measure whether an individual thinks that fiscal resources are more stretched compared with others. We also use Question 6 to investigate how individuals' connection between debt and inflation varies with their perception of the likelihood that monetary policy actions will be constrained in helping the fiscal authority.[23]

Households that think the fiscal capacity is stretched view debt as inflationary; the others do not. We start by looking at how debt and inflation expectations move depending on the answer to Question 5, related to the likelihood of a debt crisis. As discussed previously, we use this question as a measure of whether households perceive the budget constraint to be tight. We report the results in the left part of Table 7, both for quantitative (panel (a)) and qualitative (panel (b)) variables.

We first observe that debt treatments increase debt expectations for all households, regardless of their views about a debt crisis. If anything, households that believe scenarios of a sovereign default or of a constrained central bank are highly probable expect slightly lower levels of debt compared with other households.[24] By contrast, the other treatments do not lead to variations in

[23] We note that the responses to these two questions are unaffected by treatments, as documented in Section 4.

[24] As a potential explanation, households more concerned about fiscal outcomes may pay more attention, in general, to debt levels, and, therefore, information treatments are slightly less informative for them. Note that treated house-

debt expectations.

Turning to inflation expectations, we obtain two results. First, households that expect a debt crisis to be very likely revise their inflation expectations positively and statistically significantly after they receive debt treatments. Second, this revision is larger than it is for households receiving the same treatment but viewing a debt crisis as less likely. The revision is also larger than it is for households receiving the other treatments, no matter their views on the risk of a debt crisis. Similar conclusions hold when looking at the qualitative survey questions and the probability of an increase in debt or inflation, as shown in Panel (b) in Table 7.

Overall, households that expect that euro-area fiscal resources will be stretched interpret fiscal news leading to an increase in debt-to-GDP as more inflationary. Following Section 2, we interpret this finding as indicating that some households connect debt and inflation expectations consistently using the logic of fiscal dominance.[25]

The role of monetary policy. We further investigate the connection between inflation and debt expectations to determine whether households associate the inflationary effect of unfunded debt with the actions of the central bank. To this end, we conduct the same exercise as described previously but now use Question 6, related to whether they expect the ECB to be constrained in its interest rate policy. The results are reported in the right part of Table 7. We also find that debt treatments increase debt expectations regardless of households' views on the constraints faced by the ECB. However, we find that households expecting these constraints to be very likely do not revise inflation, in contrast to households expecting such constraints to be, at most, likely.

How does one explain why households do not connect constraints on ECB actions with inflation? One potential explanation, consistent with the findings in Binetti et al. (2024), is that households tend to associate lower interest rates with lower inflation rates—a "Fisherian" view of the connection between nominal interest rates and inflation that is supported by the correlation between these two variables.[26] By contrast, households that expect a default to be very likely do not expect lower interest rates (see Appendix Table C.1).

holds expecting a default also expect relatively lower debt levels compared with treated households not expecting a default. In Appendix Table C.10 we show that the results related to debt expectations are robust to the imputation of small response values, but with a larger effect for households expecting a default than for those expecting no default. Notice that, according to Section 2, lower debt expectations for these households mean lower inflation revisions.

[25]We provide further analysis of the connection between debt and inflation depending on views on fiscal–monetary scenarios in Tables C.11 and C.12. We obtain that the expectation of a EA country default contributes to more than 40% of the Italian and French debt treatments, in particular by increasing the share of positive revisions in inflation expectations. We find that this holds especially true for the Italian debt treatment in Tables C.13 and C.14.

[26]That households do not associate the inflationary effects of debt with monetary policy decisions is also consistent with Grigoli and Sandri (2024), who find that households do not perceive debt monetization as a key driver of the connection between fiscal variables and inflation.

Overall, even when households' reasoning is consistent with the arithmetic of inflation (a higher price level is needed to reduce the real value of unfunded public debt), which is at the core of fiscal dominance, they do not fully grasp the mapping between monetary policy and inflation. In Section 7.3, we argue that such a imperfect understanding has only a quantitative, not qualitative, impact on the implications of fiscal dominance risk in household expectations.

The role of pessimism. As we document, households expecting a default are also more pessimistic about macroeconomic conditions. We now investigate if such a pessimistic view of macroeconomic conditions is what explain the link between debt and inflation for households expecting a debt crisis. To this end, we include different proxies for pessimism—-qualitative expectations regarding unemployment, economic growth, and the qualitative assessment of the overall economic situation—both as a control and as an interaction term with debt treatments. We report the results in Table 8.

Adding these other variables has a limited effect on the connection between debt and inflation expectations. In some cases, it may even strengthen the result we find in inflation expectation revisions. Such findings hold true when looking at both the intensive margin of revisions and the extensive margin of revisions—that is, the probability of an increase of inflation expectations. If inflation is also connected to a pessimistic macroeconomic outlook in our survey, consistent with Binetti et al. (2024)'s findings, the connection between inflation and debt expectations does not only stem from pessimism in general but goes through the views on the budget constraint of the government (which can be viewed as a specific form of pessimism on public finances).

The role of trust. Finally, we also investigate whether our results are driven by trust in public institutions (we report the result in Appendix Table C.15).[27] We find that the connection between inflation and debt is stronger for households expecting a default when we control for trust, even interacted with treatments. These results suggest that, in the minds of households, fiscal dominance is not about confidence in either the government's or the central bank's willingness to act—which is connected to trust—but results from the budget constraint of the government.

[27] We have access to measures of trust only for a subset of our samples. To have a meaningful subset, we consider trust both in the ECB and in government. We run our baseline regression and the subset and observe whether this regression is modified once we control for trust interacted with treatments.

7 A model of heterogeneous beliefs

In this section, we introduce a standard New Keynesian model featuring heterogeneous beliefs. We show that private agents can sustain different views on the future policy regime despite agreeing on all the current macroeconomic variables. We then show that the mere presence of private agents expecting that fiscal dominance will prevail in the future leads to an inflation-output stabilization tradeoff for the central bank, similar to what happens with a cost-push shock. The higher the share of agents expecting fiscal dominance and/or the higher the level of debt these agents expect, the more inflationary the fiscal dominance risk. We discuss some policy implications of this heterogeneity as well as potential determinants of the quantitative relevance of such a mechanism.

7.1 The environment

Time is discrete and indexed by $t \in \{0, 1, ...\}$.

Households. There is a unit mass of homogeneous atomistic agents indexed by $i \in [0, 1]$. Their consumption decisions follow the standard Euler equation, in log-linear deviations from the steady-state:

$$c_{i,t} = -\frac{1}{\sigma}\left(r_t - E_{i,t}\pi_{t+1}\right) + E_{i,t}c_{i,t+1}, \tag{10}$$

where $E_{i,t}$ is agent i's expectation operator, conditional on their beliefs, $c_{i,t}$ the date-t consumption of agent i, r_t the date-t nominal interest rate and π_{t+1} the date-$t+1$ inflation rate, and σ the coefficient of relative risk aversion.

Different beliefs about the path of the real interest rates may lead agents to adopt different consumption-saving decisions; thus, they may obtain different wealth outcomes. We focus on the effects of the heterogeneity of beliefs on the outcomes of monetary policy decisions, and, as in Andrade et al. (2019), we include a risk-sharing mechanism in the microfoundations of the model so that agents equalize their wealth when they agree on future policy regimes.[28]

Firms. The optimal pricing decisions by firms lead to a New-Keynesian Phillips curve (NKPC):

$$\pi_t = \beta E_t^f \pi_{t+1} + \kappa y_t, \tag{11}$$

[28] We provide the microfoundations of the model in Appendix B.1.

with E_t^f the expectation operator for firms and $\beta \in (0,1)$ the discount factor.

Fiscal and monetary policies. Monetary policy is set as follows:

$$r_t = \phi^k \pi_t, \tag{12}$$

where the coefficient of the response to inflation ϕ^k depends on the policy regime. At date-t, the evolution of the debt-to-GDP rate is

$$b_t = \beta^{-1} \left(r_{t-1} - \pi_t + b_{t-1} - (1-\beta)\tau_t \right), \tag{13}$$

where b_t is the debt-to-GDP ratio and τ_t the deficit in proportion to GDP. As it is standard, we obtain this equation from the budget constraint of the government.[29] The fiscal rule is

$$\tau_t = \gamma^k b_{t-1} + \xi_t, \tag{14}$$

with ξ_t an exogenous fiscal shock and the parameter γ^k depends on the policy regime.

We consider two potential regimes k in this environment: $k \in \{M, F\}$. In the fiscal-policy regime, $\phi^F < 1$ and $\gamma^F < \beta^{-1} - 1$. In the monetary-policy regime, $\phi^M > 1$ and $\gamma^M > \beta^{-1} - 1$.

Information and beliefs. The economy starts in the monetary dominance policy regime. Each agent can perfectly observe the current policy regime as well as the macroeconomic variables. However, agents may disagree about future policy regimes and future macroeconomic variables. We assume that agents can be of two types: one share $\theta \in [0,1]$ expects the policy regime to shift to fiscal dominance at some date $T > 1$, and the other share $1 - \theta$ expects the economy to remain in a monetary dominance dominance regime forever. In our benchmark scenario, we assume that firms share the same beliefs as households. This can be rationalized by mechanisms through which household inflation expectations affect wages, which then affect firms' expected prices (see, e.g., Lorenzoni and Werning, 2023). We further discuss this assumption in Section 7.3.

7.2 Equilibrium

We now turn to the description of the equilibrium outcome. We proceed backwards, starting with dates after date T, and then we consider the full equilibrium path.

[29] See Appendix B.1 for the derivation of (13) from the budget constraint of the government.

After date T. At date T, all agents observe and agree on the policy regime, either fiscal or monetary dominance.

Monetary dominance. If the policy regime is monetary dominance, then, as $\phi^M > 1$, the central bank controls inflation, with $\pi_t = 0$ for any $t \geq T$. Taking into account this path for inflation, we find that the debt-to-GDP ratio evolves as

$$b_t = \beta^{-1}(1 - (1-\beta)\gamma^M)b_{t-1} - \beta^{-1}(1-\beta)\xi_t. \tag{15}$$

Iterating this equation forward, we obtain

$$b_{t-1} = \sum_{k \geq t} \left(\frac{\beta}{1 - (1-\beta)\gamma^M} \right)^{k-t} (1-\beta)\xi_k. \tag{16}$$

Several comments are in order. First, notice that equation (16) is the intertemporal budget constraint of the government expressed in deviations from the steady state, which holds under monetary dominance, that is, when deficits respond sufficiently to past public debt. Indeed, the left-hand term, b_{t-1}, is the debt-to-GDP ratio, and the right-hand term is the present value of future government's resources. In addition, the budget constraint is satisfied independently of the price level (or inflation). Second, under monetary dominance, agents may have different views about future fiscal variables, but they all expect the same path for inflation: No matter their different expected paths of deficits and debt-to-GDP ratios, agents all expect the central bank to perfectly stabilize prices so that inflation stays at 0 percent.

Fiscal dominance. When the policy regime is fiscal dominance, given b_{T-1} and r_{T-1}, the equilibrium is a path $\{b_t, \pi_t, y_t\}$ that, for any $t \geq T$, solves

$$\begin{aligned}
\pi_t &= \beta\pi_{t+1} + \kappa y_t \\
y_t &= y_{t+1} - \frac{1}{\sigma}(\phi^F \pi_t - \pi_{t+1}) \\
b_t &= \beta^{-1}\left(r_{t-1} - \pi_t + b_{t-1}(1 - (1-\beta)\gamma^F) \right).
\end{aligned}$$

The solution to this problem implies a positive level of inflation π_t at any date $t \geq T$ whenever public debt is positive, that is, $b_{T-1} > 0$ and $r_{T-1} \geq 0$. Moreover, the higher the debt level, the higher the inflation rate.[30]

[30] See Proposition 1 in Appendix B.2 for formal proof.

Before date T. Before date T, agents have heterogeneous expectations regarding post date-T inflation rates. Agents anticipating fiscal dominance also anticipate inflation at date T. This contrasts with agents anticipating monetary dominance who expect zero inflation: $E_1^i \pi_T = 0$. As they can observe all the current variables but not future ones, they agree on current variables, but they agree to disagree on their future evolution.

The equilibrium inflation path. The following proposition summarizes our findings.

Proposition 1. *After date T:*

(i) *Agents expecting monetary dominance expect zero inflation at any future maturity $E_0 \pi_t = 0$ for any $t \geq T$. In their case, any increase in future debt b_{T-1} leads to no additional inflation.*

(ii) *Agents expecting fiscal dominance expect positive inflation at date T: $E_t^i \pi_T > 0$ for $t < T$. Their inflation expectation is increasing in their expectation of date-T debt-to-GDP.*

Before date T, whenever $b_{T-1} > 0$ and $\theta > 0$, $\pi_{T-1} > 0$, and this inflation rate is increasing in b_{T-1} and in θ.

Proof. See Appendix B.2. □

Agents expecting fiscal dominance make the connection between debt and inflation, while agents expecting monetary dominance do not make this connection. As a result, the more agents expect fiscal dominance to hold in the future, the more an increase in debt is is expected to be inflationary. Notice that despite such an heterogeneity of beliefs about the future policy regime, agents agree on the path of macroeconomic variables until date T. Furthermore, this happens no matter the central bank's own beliefs about what the policy regime will be in the future.

Figure 4 makes this proposition more palatable. In the top panel of the figure, we plot the path for inflation (panel (a)) and output gap (panel (b)) expected by households expecting fiscal dominance (dashed line) and households expecting monetary dominance (solid line) when monetary policy is active before date T ($\phi > 1$). After date T ($T = 20$ in the figure), the two types of households disagree on the path of inflation. Households expecting a shift toward fiscal dominance also expect positive inflation after this date—and consistent with our findings, a higher debt expectation leads to a higher inflation expectation. In this figure, we report the responses to a shock of 1 percent of the debt-to-GDP ratio and to a shock of 10 percent of this ratio. Inflation then is generated by a sequence of positive output gaps. By contrast, households expecting monetary dominance expect no inflation and no output gaps as well.

Before date T, both types of households agree on inflation, and, thus, the two lines overlap. As shown in the figure, active monetary policy limits the inflationary effects of the expectation by some agents to shift to fiscal dominance at date T, but this comes at the cost of negative output gaps.

The picture is somewhat different when monetary policy is passive before date T (panels (c) and (d)).[31] In this case, monetary policy does not respond sufficiently to inflation, which leads to positive output gaps and even higher inflation.

Then, the response of monetary policy to fiscal dominance risk is between Scylla and Charybdis: Either it responds sufficiently to the inflation resulting from fiscal dominance risk but at the cost of negative output gaps or it does not respond sufficiently to avoid the output cost but at the expense of current inflation. To further examine this tradeoff, the next paragraph considers optimal policy when facing fiscal dominance risk.

Optimal policy. We now endogenize the central bank's monetary policy decision at date 0. To this end, we endow the central bank with a loss function:

$$L_t = \sum_{k \geq t} (\pi_t)^2 + \lambda (y_t)^2,$$

with $\lambda \geq 0$.[32] We then consider the problem of the central bank at date 0 regarding its monetary policy from date 0 to date $T-1$, taking as given private-sector expectations at that date. The problem solved by the central bank is

$$\begin{aligned} &\min \sum_{0 \leq k \leq T-1} (\pi_t)^2 + \lambda (y_t)^2, \\ &\pi_t = \beta \pi_{t+1} + \kappa y_t \text{ for } 0 \leq t \leq T-2, \\ &\pi_{T-1} = \beta E_{T-1} \pi_T + \kappa y_{T-1}, \end{aligned}$$

where $E_{T-1}\pi_T$ is given. Notice that the Euler equation is not a constraint in the central bank's problem, as the central bank can always adjust the nominal interest i_t.[33] We relegate the derivation

[31] Note that the expectation that the future policy mix is either fiscal or monetary leads the economy to be determined even if monetary and fiscal policies are passive before date T.

[32] Agents are heterogeneous, as they do not share the same beliefs and therefore do not take the same actions. For simplicity, we omit the terms in the loss function resulting from heterogeneity. We refer the interested reader to Andrade et al. (2019) and, in particular, to Section 3 of the online appendix for the derivation and the implications of the welfare loss function with heterogeneous beliefs.

[33] The Euler equation is a potential constraint for the central bank only when adding a constraint on the nominal interest rate as the Effective Lower Bound. However, in our case, the optimal policy features monetary tightening so

of the optimal solution to Appendix B.3.

In panels (e) and (f) in Figure 4, we plot the optimal inflation path for different shares of households expecting fiscal dominance (panel (e)) and for different weights λ attached to output stabilization (panel (f)). A larger share of households expecting fiscal dominance leads the central bank to accept positive levels of inflation in the present. Fighting inflation expectations requires negative output gaps: A larger share of households expecting fiscal dominance leads to a higher average inflation expectation $E_{T-1}\pi_T$, thus requiring larger negative output gaps to reduce inflation. The extent to which fiscal dominance households are inflationary then depends on the weight attached by the central bank to output stabilization: As illustrated by panel (b), the larger this weight, the costlier it is to run negative output gaps and the less the central bank stabilizes inflation.

Overall we find that, optimally, monetary policy trades off inflation with output gap stabilization in the presence of households expecting fiscal dominance risk. This tradeoff is made more difficult to solve the larger the share of private agents expecting fiscal dominance and the larger the level of debt these agents expect.

7.3 Policy implications and determinants of quantitative relevance

Inflation-output tradeoff. Our findings illustrate that the mere presence of fiscal dominance expectations leads the central bank to accept higher current inflation—even though monetary policy is not constrained by fiscal policy, either currently, or even in the future. The expectation of fiscal dominance is thus akin to a cost-push shock, as it leads inflation and output in two different directions. As for cost-push shocks, monetary policy cannot fully stabilize the economy; if anything, the central bank would prefer no expectation of fiscal dominance. This resembles the results of Caballero and Simsek (2022), who found that a similar tradeoff appears when the central bank and the market disagree about future aggregate demand. In our case, the policy tradeoff comes from a disagreement between private agents about how the fiscal constraint will be met in the future. This disagreement, in turn, contributes to different beliefs about future aggregate demand.

Such an inflation-output tradeoff depends on households' expectations about the future policy regime and future debt levels,[34] both of which can be influenced by policy or, at least, policy communication.

that a lower bound on interest rates is not likely to be relevant.

[34] In principle, agents may disagree on any future shock, which may also lead to an inflation-output tradeoff.

Why not directly fight fiscal dominance beliefs? In our model, current monetary policy cannot prevent fiscal dominance expectations: a fraction of agents disagree with the central bank about the future policy regime. This can happen even when agents observe that current monetary policy is active and that the current policy regime is monetary dominance. Thus, current monetary dominance does not, per se, rule out future fiscal dominance.[35] Such a finding is consistent with some policymakers' view as reflected, for instance, in Schnabel (2024)'s speech and, more specifically, in the following quotes:

> The determined monetary policy response to the steepest rise in inflation in the history of the euro area convincingly demonstrates that the ECB has by no means deviated from its price stability mandate as predicted by the fiscal dominance theory.

> In future, it will mostly be up to fiscal policy to protect central bank independence by advancing fiscal consolidation in line with the new European fiscal rules while not neglecting investments [...].[36]

Our analysis emphasizes that, even if the central bank is credibly perceived as being currently active, inflation can emerge when fiscal dominance risks do. Eventually, those risks result from agents' beliefs about the budget constraint and fiscal space, which an active central bank cannot perfectly control.[37]

Extensions: How much inflation fiscal dominance risk generates? To what extent is fiscal dominance risk inflationary? Our analysis is meant to be qualitative, but we can also highlight some determinants of the quantitative inflationary impact of fiscal dominance risk.

Firms' expectations. In our benchmark case, we assume that firms share the same beliefs as households. Our survey provides evidence only for households, and a natural question about the quantitative role of firms arises. In Appendix Figure B.1, we consider the alternative situation in which firms all expect monetary dominance, while some households may still expect fiscal dominance. We find that, in this situation, active monetary policy almost perfectly stabilizes inflation

[35] Of course, current monetary policy actions may potentially provide signals on future ones so that private agents may learn on future fiscal dominance risk but notice that this link is far from obvious. Modeling such learning would require, for example, to embed asymmetric information in a model in which fiscal dominance is the endogenous outcome of strategic interactions as in Barthélemy et al. (2024). See, among others, Barthélemy and Mengus (2018) for a model of signalling using monetary policy decisions.

[36] We thank Sebastian Schmidt for pointing out this quote to us.

[37] This is consistent with our empirical evidence that low trust in the central bank does not fully explain the positive association between debt and inflation that some households make.

before date T, thus showing the critical role of firms' expectations in the transmission of fiscal dominance risk to current inflation.

What is the role of interest rate expectations? What happens when, consistent with our empirical findings, households do not link fiscal dominance to the central bank's interest rate decisions? In our model, shutting down the effect of fiscal dominance through the expectation of lower nominal interest rates has only a quantitative impact. The qualitative effects remain, as an increase in expected inflation still lowers the real interest rate in the Euler equation (10), propagates through the NKPC equation (11), and reduces the real value of public debt in equation (13). In sum, the risk of fiscal dominance risk can be inflationary even when households only have a partial understanding of its mechanism.

Incomplete markets. Another determinant of the quantitative inflationary impact of fiscal dominance risk relates to an additional form of household heterogeneity resulting from incomplete markets, as studied in the heterogeneous agent New Keynesian (HANK) literature. In such models, public debt may have an effect on inflation and real activity beyond fiscal dominance as Ricardian equivalence fails. Notably, as Angeletos et al. (2023) emphasize, in such a setup, non-Ricardian agents boost output and therefore fiscal resources so that a given fiscal expansion is more easily funded and less inflationary than in setups with a representative agent. The heterogeneity of beliefs that we emphasize also mitigates the inflationary effect of fiscal dominance risk, as some households believe there is fiscal space to fund a fiscal expansion. Our analysis could be extended to combine the two forms of heterogeneity. In such a setting, for a given level of expected debt, households expecting fiscal dominance will still expect more inflation than households expecting monetary dominance.

8 Conclusion

In this paper, we provide a methodology for investigating whether households consistently connect debt and inflation expectations with fiscal dominance theories. We apply this methodology to German survey data, introducing new questions to elicit households' views on fiscal policy and information treatments to generate exogenous shocks to households' debt expectations. We find evidence that some households make the connection between debt and inflation and that, consistent with fiscal dominance, these households believe that fiscal resources are more stretched compared with others. That said, these households do not view the link between the level of debt and

inflation as an outcome of constrained monetary policy. We then build a model of heterogeneous beliefs in which agents disagree on the future fiscal–monetary policy regime that reproduces important features of our results. We highlight that, because of its effect on inflation expectation, the risk of fiscal dominance leads to an inflation-output tradeoff for the central bank.

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Table 1: Beliefs about fiscal constraints

	(% of households)	**ECB unable to raise rate** very likely	likely	neutral	unlikely/ very unlikely	Total
Default in the EA	very likely	18.1	15.7	2.4	1.0	37.2
	likely	10.9	22.4	6.8	1.8	41.9
	neutral	2.3	5.0	4.0	0.6	11.9
	unlikely/very unlikely	1.9	4.4	1.3	1.5	9.0
	Total	47.5	14.4	4.9	33.2	100

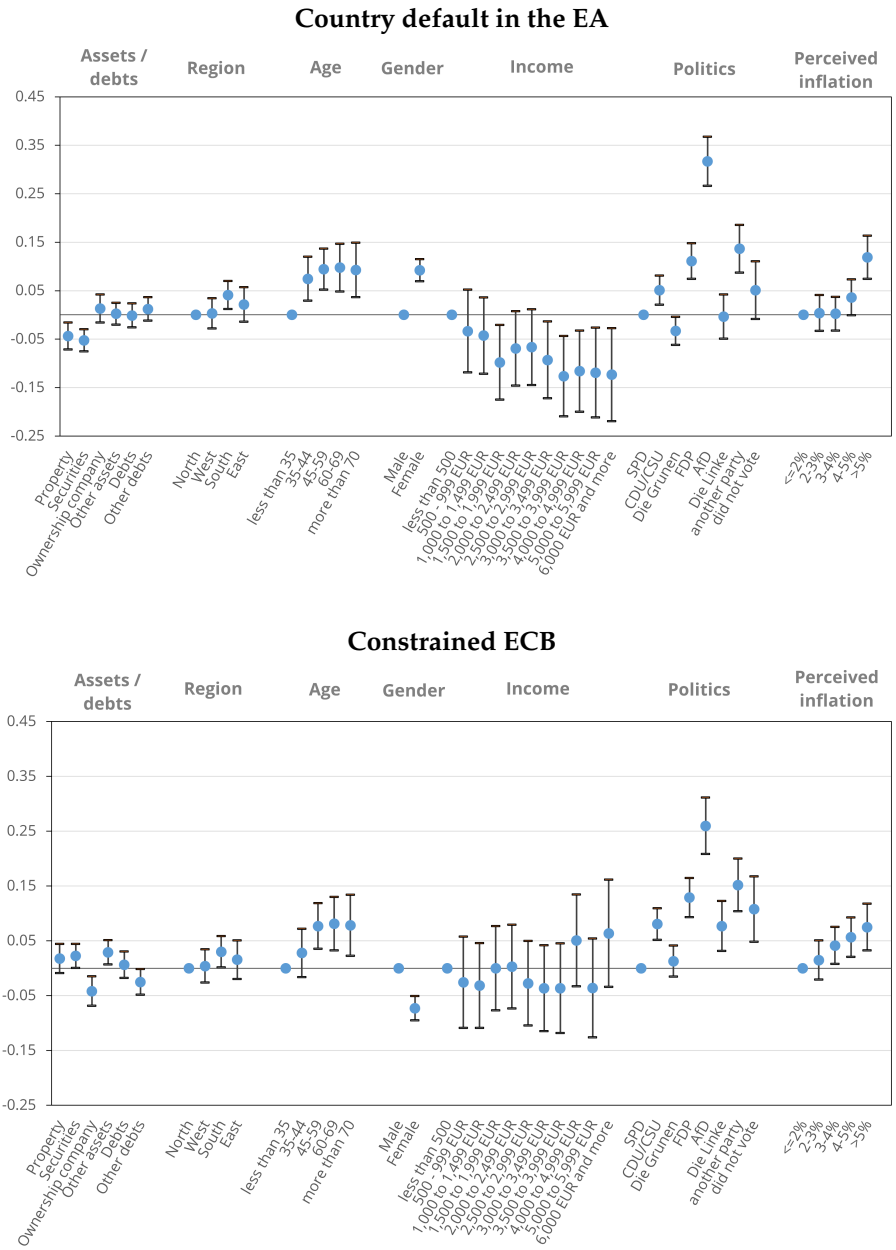
Note: This table reports the share of households (in percents) for the different answers to the questions "How likely is it that within the next five years at least one country in the euro area will be unable to repay its government debt on time?" and "How likely is it that within the next five years 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?"

Table 2: Marginal effects of informational treatments on responding "very likely" to the fiscal and monetary scenarios

	(1) EA country default	(2) Constrained ECB
Debt France	0.0192	0.0076
	(0.0206)	(0.0209)
Debt Italy	-0.00454	0.0116
	(0.0206)	(0.0209)
Debt Germany	0.0052	0.0316
	(0.0205)	(0.0212)
ECB purchase	0.0148	0.0164
	(0.0208)	(0.0210)
Weidmann statement	-0.0184	-0.0046
	(0.0204)	(0.0208)
Observations	5,957	5,962

Note: This table reports the marginal effects of a Probit model in which the endogenous variable is a dummy variable equal to one when a household answers that it is "very likely" that "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" or "within the next five years, at least one country in the euro area will be unable to repay its government debt on time." We report results associated with the treatment variable, but several control variables are included: age, gender, income, region, political leaning, asset/debt holdings, city size, education, and employment status. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

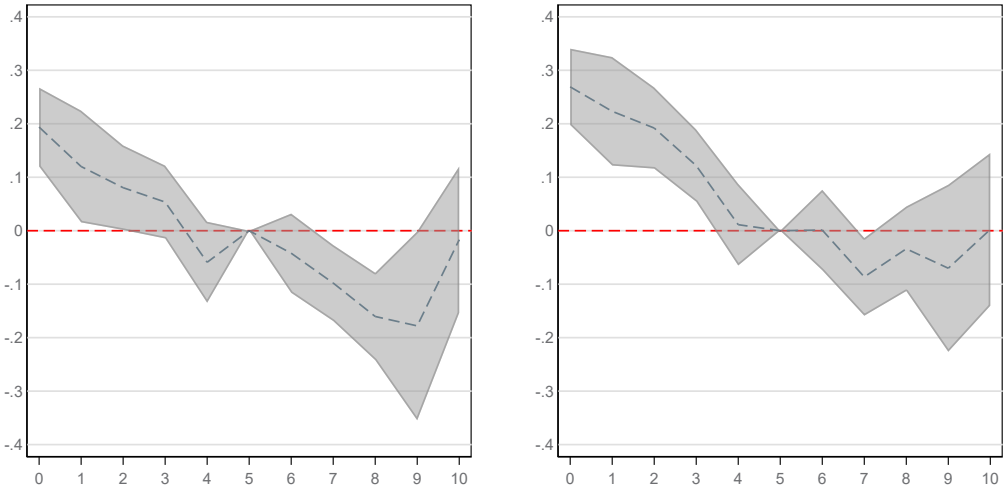
Figure 2: Determinants of responding "very likely" to the scenario



Note: This figure reports the marginal effects from a Probit regression in which the endogenous variable is a dummy variable equal to one when a household reports that it is very likely that 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. "Assets/debts" correspond to dummy variables equal to one when a given household reports non-zero holdings of a given type of asset/loans or advances; "Property" corresponds to "Real estate"; "Securities" correspond to shares and bonds including funds/ETFs; "Ownership company" corresponds to ownership of/equity in unlisted businesses or companies; "Other assets" correspond to all other types of assets; "Debts" corresponds to outstanding loans secured by real estate (mortgage loans); "Other debts" correspond to other outstanding loans (for example, overdraft facilities, consumer credit/loans for goods and services, loans to finance an enterprise or a professional activity, loans from friends or family). Additional controls are included for city size, education, and professional status; results are not reported since most parameters are not statistically significant.

Figure 3: Marginal effect of trust in the ECB/the German government on responding "very likely" to the fiscal and monetary scenarios

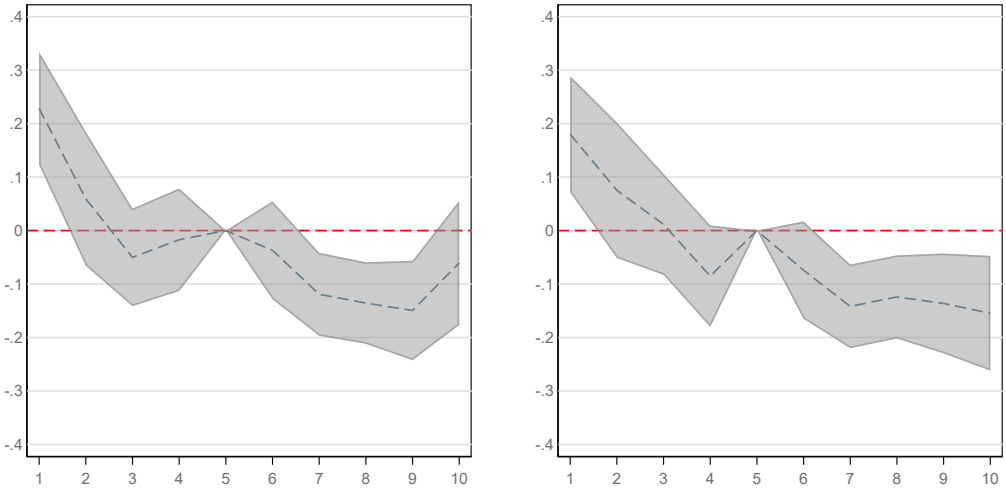
Effect of trust in the ECB



(a) Country Default in the EA

(b) ECB Constrained

Effect of trust in German government



(c) Country Default in the EA

(d) ECB Constrained

Note: This figure reports the marginal effects of the score of trust in the ECB or the German government on the probability that a respondent will indicate that it is very likely that one euro-area country will be in default (left panel) and that it is very likely that the ECB will be constrained (right panel). The reference is a score equal to five. Additional controls are included for age, gender, voting party, uncertainty, city size, education, and professional status.

Table 3: Beliefs about fiscal constraints and macroeconomic outlook

	Quantitative answers (in %)				% of HHs expecting an increase	
	Perceived inflation	Expected Infl. 1Y	Expected Infl. LT	Saving IR	Econ. growth	Tax
Default in EA						
Very likely	4.43	5.86	5.61	0.31	32.2	44.6
Likely	4.05	4.81	4.57	0.30	41.4	24.2
Other answers	3.89	4.62	3.90	0.36	51.5	15.5
ECB constrained not to raise rate						
Very likely	4.24	5.39	5.00	0.21	37.7	41.6
Likely	4.11	4.91	4.66	0.36	42.0	25.0
Other answers	4.15	5.40	4.87	0.39	39.3	22.2

Note: Inflation rates and saving interest rates are in percents. For Economic growth and taxes: shares of individuals expecting an increase in the variables. Observations below the 1st percentile and above the 99th percentile have been dropped.

Table 4: Information treatment effects on euro-area debt expectations and inflation expectations revisions

	Debt (1)	Debt (2)	Inflation (3)	Inflation (4)	Debt (5)	Debt (6)	Inflation (7)	Inflation (8)
Debt France	13.60***	12.73***	0.0924***	0.0884***				
	(2.518)	(2.427)	(0.0352)	(0.0333)				
Debt Italy	13.41***	12.86***	0.0697**	0.0702**				
	(2.520)	(2.428)	(0.0352)	(0.0333)				
Debt Gemany	4.362*	3.676	0.0421	0.0521				
	(2.520)	(2.430)	(0.0353)	(0.0334)				
ECB QE	-3.698	-3.359	0.0448	0.0482				
	(2.525)	(2.433)	(0.0353)	(0.0334)				
Weidmann Statement	5.604**	5.455**	0.0542	0.0566*				
	(2.520)	(2.428)	(0.0352)	(0.0333)				
Debt France+Italy					13.65***	12.80***	0.0807***	0.0792***
					(2.204)	(2.104)	(0.0302)	(0.0288)
Other treatments					2.238	1.929	0.0471*	0.0525*
					(2.078)	(1.983)	(0.0285)	(0.0271)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	5,740	5,740	5,773	5,772	5,740	5,739	5,773	5,770
R^2	0.013	0.084	0.001	0.590	0.010	0.082	0.001	0.023

Note: This table reports the results of Huber regressions in which the endogenous variable is the debt-to-income ratio reported by households after the treatment or inflation expectations revisions. Controls for age, region, gender, city size, income, education, employment status, voting in parliamentary elections, and other macro expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, and taxes) are included. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Main reason for expected debt-to-GDP evolution

% of answers	All	Constrained ECB		EA country default	
		Others	Very likely	Others	Very likely
Debt/GDP increase (78.2%)					
Decrease taxes	0.7	0.7	0.6	0.7	0.6
Increase public expenditures	55.6	55.7	55.2	59.9	49.2
Economic growth weaker	40.1	39.7	40.8	36.0	46.1
Increase interest rates	3.7	3.9	3.4	3.4	4.1
Debt/GDP decrease (7.5%)					
Increase Taxes	23.5	20.9	31.8	19.6	33.9
Decrease public expenditures	12.5	13.0	11.2	12.9	11.6
Economic growth stronger	46.5	49.9	35.5	47.6	43.8
Low interest rates	17.5	16.2	21.5	19.9	10.7

Note: Conditional on reporting an increase or a decline in debt-to-GDP ratio (78.2 percent and 7.5 percent of households, respectively), this table reports the percentage of households for each main explanation for the increase/decline in debt-to-GDP ratio. The list of reasons is given in the questionnaire, and households had to choose only one among the different options. The percentages sum to 100 percent over the different options conditional on reporting an increase or a decline of the debt-to-GDP ratio. In column (1), we report the percentage for all households reporting an increase/decline in the debt-to-GDP ratio; in columns (2) and (3), we split the sample according to whether households think it is very likely that within the next five years the ECB will be unable to sufficiently raise its key rates to control inflation; in columns (4) and (5), we split the sample according to whether households think it is very likely that at least one country in the euro area will be unable to repay its government debt on time.

Table 6: Treatment effects on the main reason for expected increase in debt-to-GDP ratio

Reason	Tax decrease	Increase in public expenditures	Weaker econ. growth	Higher interest rate
Debt France	-0.00214	-0.0545**	0.0501**	0.00757
	(0.00389)	(0.0244)	(0.0242)	(0.00910)
Debt Italy	0.00680	-0.0470*	0.0440*	-0.00158
	(0.00477)	(0.0245)	(0.0243)	(0.00852)
Debt Germany	0.00634	-0.0446*	0.0342	0.00599
	(0.00515)	(0.0247)	(0.0245)	(0.00911)
ECB purchases	-0.000773	-0.0431*	0.0385	0.00693
	(0.00432)	(0.0252)	(0.0249)	(0.00941)
Weidmann	-0.00185	-0.000819	0.000368	0.00280
	(0.00374)	(0.0249)	(0.0246)	(0.00918)
Observations	3,370	4,640	4,640	4,638

Note: This table reports the marginal effects of treatments on the main reasons why public debt-to-GDP will increase in the euro area. Each column corresponds to a Probit regression in which the endogenous variable is equal to one if a household provides the answer as the main reason for a debt-to-GDP increase. Controls for age, region, gender, city size, income, education, employment status, voting in parliamentary elections, and other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, and taxes) are included. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: Information treatment effects on euro-area debt expectations and inflation expectations revisions—by fiscal and monetary scenario

	EA country default				Constrained ECB			
	Likely+others		Very likely		Likely+others		Very likely	
	Debt	Inflation	Debt	Inflation	Debt	Inflation	Debt	Inflation
	Panel (a) : Quantitative variables							
Debt France+Italy	14.28***	0.0397	10.72***	0.154**	13.83***	0.112***	9.633**	0.000160
	(2.597)	(0.0276)	(3.769)	(0.0681)	(2.530)	(0.0342)	(3.888)	(0.0525)
Other treatments	3.523	0.0443*	0.0210	0.0976	3.825	0.0695**	-1.414	0.0271
	(2.450)	(0.0260)	(3.543)	(0.0639)	(2.376)	(0.0322)	(3.687)	(0.0497)
Observations	3,594	3,626	2,135	2,131	3,810	3,835	1,913	1,919
R-squared	0.095	0.152	0.087	0.494	0.084	0.093	0.115	0.807
	Panel (b): Qualitative - Proba. of increase							
Debt France+Italy	-0.0118	0.0182	0.0612***	0.0678**	0.00619	0.0473**	0.0229	0.0131
	(0.0200)	(0.0235)	(0.0221)	(0.0320)	(0.0197)	(0.0231)	(0.0215)	(0.0331)
Other treatments	-0.0635***	0.0155	-0.0190	0.0409	-0.0582***	0.0244	-0.0284	0.0313
	(0.0192)	(0.0221)	(0.0224)	(0.0299)	(0.0189)	(0.0216)	(0.0215)	(0.0314)
Observations	3,713	3,618	2,187	2,118	3,952	3,828	1,950	1,911

Note: This table reports in panel (a) the results of Huber regressions in which the endogenous variable is the debt-to-income ratio reported by households after the treatment or inflation expectations revisions for different subgroups of households depending on their answers to Questions 5 and 6. In panel (b), we report the marginal effects of Probit regressions in which the endogenous variable is a dummy variable equal to one if the household after the treatment expects that the debt-to-income ratio will increase (zero otherwise) and a dummy variable equal to one if the household after the treatment expects a positive revision in inflation expectations (defined based on the quantitative revision). Controls for age, region, gender, city size, income, education, employment status, voting in parliamentary elections, and other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, and taxes) are included. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

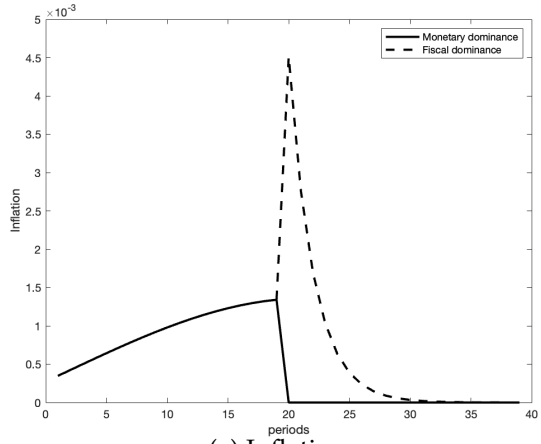
Table 8: Information treatment effects on euro-area debt expectations and inflation expectations revisions: robustness on pessimism—households answering that euro-area country default is very likely

	Baseline		Unemployment		Econ. Growth		Bad Eco situation	
	Debt	Inflation	Debt	Inflation	Debt	Inflation	Debt	Inflation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a) : Quantitative variables							
Debt France+Italy	10.72***	0.154**	9.876*	0.115	9.186*	0.152*	9.125	0.204**
	(3.769)	(0.0681)	(5.285)	(0.0959)	(4.833)	(0.0874)	(5.557)	(0.100)
Other treatments	0.0210	0.0976	0.922	0.0768	-1.832	0.0926	-1.666	0.0943
	(3.543)	(0.0639)	(4.958)	(0.0899)	(4.553)	(0.0822)	(5.262)	(0.0950)
Observations	2,132	2,130	2,130	2,128	2,133	2,129	2,131	2,128
R-squared	0.091	0.844	0.090	0.748	0.091	0.843	0.091	0.841
	Panel (b): Qualitative - Proba. of increase							
Debt France+Italy	0.0612***	0.0678**	0.0613***	0.0677**	0.0610***	0.0678**	0.0611***	0.0673**
	(0.0221)	(0.0320)	(0.0221)	(0.0320)	(0.0221)	(0.0320)	(0.0221)	(0.0320)
Other treatments	-0.0190	0.0409	-0.0186	0.0409	-0.0199	0.0409	-0.0192	0.0409
	(0.0224)	(0.0299)	(0.0224)	(0.0299)	(0.0224)	(0.0299)	(0.0224)	(0.0299)
Observations	2,189	2,120	2,189	2,120	2,189	2,120	2,188	2,119

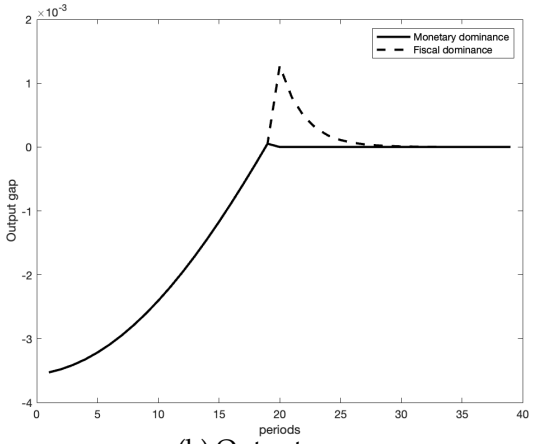
Note: This table reports (panel a) the results of Huber regressions in which the endogenous variable is the debt-to-income ratio reported by households after the treatment (columns 1, 3, 5, and 7) or inflation expectations revisions (columns 2, 4, 6, and 8) and (panel b) the marginal effects from Probit regressions in which the endogenous variable is a dummy variable equal to one if the household after the treatment expects that the debt-to-income ratio will increase (zero otherwise) (columns 1, 3, 5, and 7) and a dummy variable equal to one if the household after the treatment expects a positive revision in inflation expectations (defined based on the quantitative revision) (columns 2, 4, 6, and 8). "Unemployment" (columns 1 and 2): we include as control and in interaction with treatments a dummy variable equal to one if the household expects the unemployment rate to increase over the coming months. "Econ. Growth" (columns 3 and 4): we include as control and in interaction with treatments a dummy variable equal to one if the household expects economic growth to decline over the coming months. "Bad eco situation" (columns 5 and 6): we include as control and in interaction with treatments a dummy variable equal to one if the household believes that the economic situation is a major issue (on a range of possible responses between zero and ten, the dummy is equal to one for responses higher than six (median of responses)). Estimates for these additional controls are not reported. Controls for age, region, gender, city size, income, education, employment status, voting in parliamentary elections, and other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, and taxes) are also included. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 4: Expected inflation and output gap in the model

Active monetary policy

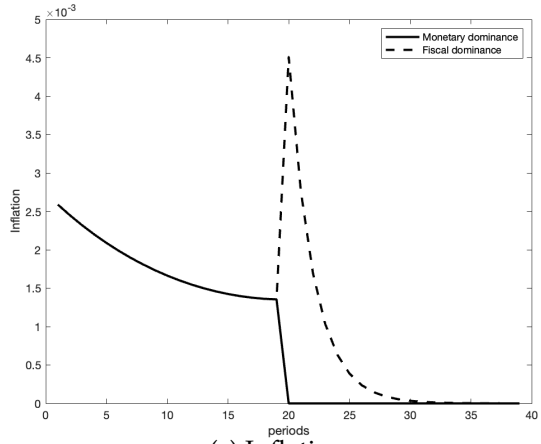


(a) Inflation

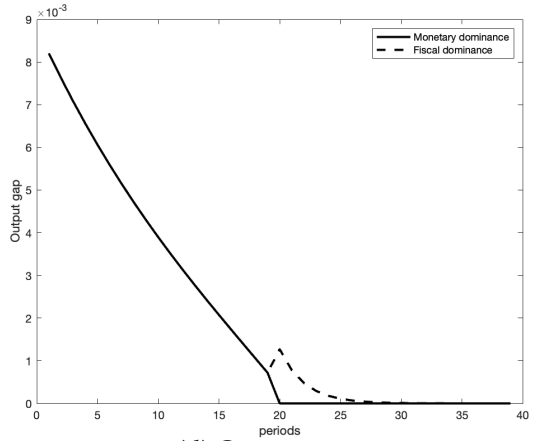


(b) Output gap

Passive monetary policy

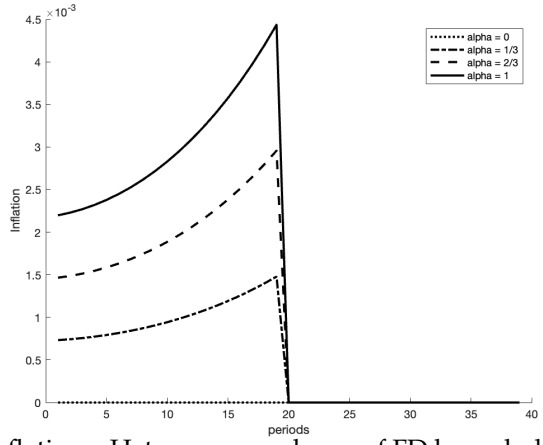


(c) Inflation

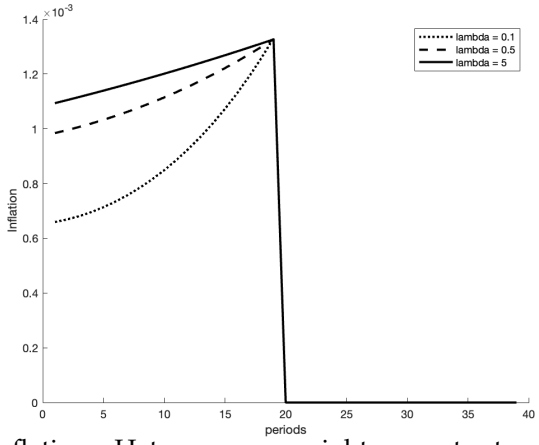


(d) Output gap

Optimal policy



(e) Inflation – Heterogenous shares of FD households (α)



(f) Inflation – Heterogenous weights on output gap (λ)

Note: In the two upper panels, we calibrate the share of fiscal dominance households to be $\alpha = 30\%$, the discount factor is $\beta = .99$, the policy reaction to inflation is $\phi^M = 1.5$ under monetary dominance and $\phi^F = .5$ under fiscal dominance, the fiscal reaction to debt is $\gamma^M = 1.5$ under monetary dominance and $\gamma^F = 0.5$ under fiscal dominance. The elasticity of intertemporal substitution is 0.5. The shock to debt-to-GDP is calibrated at 1 percent. In the lower panel, we take the same calibration after date T. By default, the weight on the output gap is calibrated to $\lambda = 0.2$.

Online Appendix – Household beliefs about fiscal dominance

Andrade-Gautier-Mengus-Moench-Schmidt

(Not for publication)

A Questionnaire

A.1 Treatments

Treatment 1 ("Debt – Germany") *Germany's government debt is currently €2,398 billion, amounting to 70% of its gross domestic product. 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 2 ("Debt – France") *France's government debt is currently €2,762 billion, amounting to 115% of its gross domestic product*[38]*. 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 3 ("Debt – Italy") *Italy's government debt is currently €2,696 billion, amounting to 156% of its gross domestic product. 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 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.*

A.2 Post-treatment questions

At present, total government debt of all euro area Member States amounts to 100% of euro area gross domestic product (Info box (i): Gross domestic product (GDP) is the value of all goods and services produced within the national borders of an economy in a given year).

Question: Do you think the ratio of government debt to gross domestic product will be higher or lower in five years' time than at present?

[38] 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."

- Far lower
- Somewhat lower
- Roughly the same
- Somewhat higher
- Far higher

Question: In your opinion, to what level will the ratio of euro area government debt to gross domestic product fall or rise in five years' time? xxx %

[For households having answered that debt-to-GDP will decrease]

Countries have various options for reducing their ratio of government debt to gross domestic product. Question: What do you think will be the main reason behind a reduction in the ratio of government debt to gross domestic product?

- Governments will raise taxes.
- Governments will reduce expenditure.
- The euro area economy will grow to a greater extent than government debt.
- Interest rates on government debt will remain low.

[For households having answered that debt-to-GDP will increase]

There are various reasons why the ratio of government debt to gross domestic product (i) can rise. Question: What do you think will be the main reason behind a rise in the ratio of government debt to gross domestic product?

- Governments will lower taxes.
- Governments will increase expenditure.
- The euro area economy will grow to a lesser extent than government debt.
- Interest rates on government debt will be high.

Question: In your opinion, how likely are the two following scenarios?

- Very likely

- Fairly likely
- Neither likely nor unlikely
- Fairly unlikely
- Very unlikely

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

B Model and Proofs

B.1 Microfoundations

We first provide microfoundations to the model presented in the main text. The household's side closely follows Andrade et al. (2019). The budget constraint of the government follows Leeper (1991) and, more precisely, Bianchi et al. (2023).

The Euler equation under heterogeneous beliefs. A family of households is constituted by a continuum of mass 1 of agents indexed by $i \in [0,1]$. Each agent decides to consume and save in order to maximize:

$$U = \int_0^1 \sum_{t=0}^{\infty} E_{i,0} \beta^t \frac{(C_{i,t})^{1-\sigma}}{1-\sigma} di.$$

in which $E_{i,t}$ is agent i's expectation operator, $C_{i,t}$ denotes date-t consumption of agent i. $\beta \in (0,1)$ is the discount factor, $\sigma > 0$ is the inverse of the intertemporal elasticity of substitution. Each agent faces the budget constraint:

$$P_t C_{i,t} + Q_t B_{i,t} + P_t T_t = P_t y + B_{i,t-1} + Z_{i,t}$$

where $B_{i,t}$ denotes her holdings of bonds, P_t denotes date-t price level, Q_t the unit price of a bond, T_t lump sum taxes paid by households and $Z_{i,t}$ denotes a nominal intra-family transfer.

Agents may decide to implement transfers within the family, once they have observed shocks. We assume that agents decide sequentially on these transfers. A transfer $\{Z_{i,t}\}_{i\in[0,1]}$ should be budget-balanced, that is:

$$\int_0^1 Z_{i,t} di = 0. \tag{17}$$

We assume that a transfer is implemented if and only if every agent agrees to implement it. An agent i agrees with a transfer scheme whenever:

$$E_{i,t}\left[U_t | \{\hat{Z}_{i,t}\}_{i\in[0,1]}\right] \geq E_{i,t}\left[U_t | \{Z_{i,t}\}_{i\in[0,1]}\right]$$

for all budget-balanced $\{Z_{i,t}\}_{i\in[0,1]}$.

The Euler equation. Given the scheme of transfers, the individual path for consumption solves:

$$\max \sum_{t=0}^{\infty} E_{i,0}\beta^t \frac{(C_{i,t})^{1-\sigma}}{1-\sigma},$$
$$\text{s.t. } P_t C_{i,t} + Q_t B_{i,t} + P_t T_t = P_t y + B_{i,t-1} + Z_{i,t}.$$

The maximization yields:

$$(C_{i,t})^{-\sigma} = E_{t,i}\beta(C_{i,t+1})^{-\sigma}\frac{P_t}{Q_t P_{t+1}}$$

Denoting by π_t the date-t inflation rate and by $r_t = -\log Q_t$ the nominal interest rate, we obtain the standard log-linearized Euler equation:

$$c_{i,t} = -\frac{1}{\sigma}(r_t - E_{i,t}\pi_{t+1}) + E_{i,t}c_{i,t+1}. \tag{18}$$

Intra-Family transfers. First, note that, at any date $t \geq T$, all agents expect to share the same beliefs on future policy regimes. As a result, if they face any difference in wealth, e.g., due to difference in bondholdings $B_{i,t}$, they all agree to reshare wealth equally so as to maximize U_t. Second before T, agents disagree to make transfers, so that $Z_{i,t} = 0$ for all $i \in [0,1]$. Indeed, agents are not ready to make transfers to agents with which they disagree as this would translate into a suboptimal use of resources.

Budget constraint of the government. The budget constraint is:

$$B_t = D_t + R_{t-1}B_{t-1}$$

Dividing this constraint by the price level P_t, we obtain:

$$\frac{B_t}{P_t} - \frac{D_t}{P_t} = \frac{R_{t-1}}{\Pi_t}\frac{B_{t-1}}{P_{t-1}}$$

with $\Pi_t = P_t/P_{t-1}$ the gross inflation rate.

b_t is the deviation from the steady state of real debt:

$$\frac{B_t}{P_t} = b(1+b_t)$$

with b the steady state value. Similarly, we have

$$\frac{D_t}{P_t} = d(1+\delta_t)$$
$$R_t = R(1+r_t)$$
$$\Pi_t = \Pi(1+\pi_t)$$

The development at order 0 of the budget constraint then yields:

$$b - d = \frac{R}{\Pi} b$$

and the order 1 yields:

$$bb_t - d\delta_t = \frac{R}{\Pi} b \left(r_t - \pi_t + b_{t-1}\right) \tag{19}$$

In the model the long term real interest rate R/Π is equal to the inverse of the discount factor $\beta \in (0,1)$, which describes the relative preference for the present of the private sector. This connection stems from the Euler equation that is the first order condition of the consumption-saving problem solved by households in standard macroeconomic models. The basic standard Euler equation writes:

$$(C_{i,t})^{-\sigma} = \beta R_{t-1}/\Pi_t (C_{i,t+1})^{-\sigma}.$$

In steady state, $C_{i,t} = C_{i,t+1}$ for all $i \in [0,1]$, and $1 = \beta R/\Pi$, which we use here.

Thus, from the order 0, we have $\beta(b-d) = b$ and, thus, $d = b\beta^{-1}(1-\beta)$. (19) can then be rewritten, after simplifying by b:

$$b_t = \beta^{-1}\left(r_t - \pi_t + b_{t-1} + (1-\beta)\delta_t\right)$$

As GDP Y is constant, b_t also denotes the debt-to-GDP ratio.

B.2 Proof of Proposition 1

Combining the New-Keynesian Philips Curve and the Euler equation

$$y_t = y_{t+1} - \frac{1}{\sigma}\left(\phi^F \pi_t - \pi_{t+1}\right)$$
$$\pi_t - \beta\pi_{t+1} = \kappa y_t$$

we obtain the following second order difference equation for the inflation rate:

$$\left(1 + \frac{\kappa\phi^F}{\sigma}\right)\pi_t - \left(1 + \beta + \frac{\kappa}{\sigma}\right)\pi_{t+1} + \beta\pi_{t+2} = 0$$

The discriminant for this equation is:

$$\Delta = \left(1 + \beta + \frac{\kappa}{\sigma}\right)^2 - 4\beta\left(1 + \frac{\kappa\phi}{\sigma}\right) = (1-\beta)^2 + 2(1 + \beta(1-2\phi))\frac{\kappa}{\sigma} + \frac{\kappa^2}{\sigma^2}$$
$$\left(1 - \beta - \frac{\kappa}{\sigma}\right)^2 + 4(\beta(1-\phi))\frac{\kappa}{\sigma} > 0$$

when $\phi < 1$. The two roots then satisfy:

$$\rho_1 = \frac{(1 + \beta - \frac{\kappa}{\sigma}) - \sqrt{\Delta}}{2\beta} < 1 \rho_2 = \frac{(1 + \beta + \frac{\kappa}{\sigma}) + \sqrt{\Delta}}{2\beta} > 1$$

The only non-explosive solution is of the form: $\pi_t = \lambda r_1^t$. By iterating the budget constraint forward, we then obtain that:

$$b_{t-1} = \lambda \sum_{k=1}^{\infty} \left(\frac{\beta}{1 - (1-\beta)\gamma^F}\right)^k \rho_1^{t-1}\left(\rho_1 - \phi\right). \tag{20}$$

As $\rho_1 - \phi \geq 0$ (to be checked but true when $\phi = 0$ and true when $\phi = 1$), we obtain that λ is increasing in b_{t-1}.

The inflation rate at date $T-1$. From:

$$y_t + \frac{1}{\sigma}\phi^M \pi_t = E_t y_{t+1} + \frac{1}{\sigma} E_t \pi_{t+1}$$
$$\pi_t - \kappa y_t = \beta E_t \pi_{t+1}$$

we infer that:

$$\pi_t \left(1 + \frac{\kappa}{\sigma}\phi^M\right) = \kappa E_t y_{t+1} + \left(1 + \frac{\kappa}{\sigma}\right) E_t \pi_{t+1}$$

Thus, π_t increases in θ and in b_{t-1}.

B.3 Derivation of optimal monetary policy

The first order conditions from the central bank's problem are as follows:

$$\begin{aligned}
&\pi_t = -\mu_t + \beta\mu_{t-1} \text{ for } 0 \leq t \leq T-1, \\
&\lambda y_t = \kappa\mu_t \text{ for } 0 \leq t \leq T-1.
\end{aligned}$$

with μ_t the Lagrange multiplier associated with the date-t NKPC with the convention that $\mu_{-1} = 0$. The optimal solution then solves the following system of equations for $0 \leq t \leq T-2$:

$$\begin{aligned}
\pi_t &= \beta\pi_{t+1} + \kappa y_t \\
\pi_t &= -\mu_t + \beta\mu_{t-1}, \\
y_t &= \kappa/\lambda\mu_t.
\end{aligned}$$

with two boundary conditions: $\mu_{-1} = 0$ and $\pi_{T-1} = \beta E_{T-1}\pi_T + \kappa y_{T-1}$.

Combining these equations together, we find that μ_t solves the following differential equation:

$$\mu_{t+1} - \left(\beta^{-1} + \beta + \kappa^2/\lambda\beta^{-1}\right)\mu_t + \mu_{t-1} = 0$$

The characteristic polynomial admits two real roots r_1 and r_2 as:

$$\left(\beta^{-1} + \beta + \kappa^2/\lambda\beta^{-1}\right)^2 - 4 = \left(\beta^{-1} + \beta + \kappa^2/\lambda\beta^{-1} - 2\right)\left(\beta^{-1} + \beta + \kappa^2/\lambda\beta^{-1} + 2\right) > 0$$

for any $\beta \in [0, 1]$.

The date-0 solution is then $\mu_t = A\rho_1^t + B\rho_2^t$ with (A, B) solution to:

$$\begin{aligned}
&(A\rho_1 + B\rho_2) - \left(\beta^{-1} + \beta + \kappa^2/\lambda\beta^{-1}\right)(A + B) = 0 \\
&\left(\frac{\kappa^2}{\lambda} - 1\right)\left(A\rho_1^{T-1} + B\rho_2^{T-1}\right) + \beta\left(A\rho_1^{T-2} + B\rho_2^{T-2}\right) = \beta E_{T-1}\pi_T
\end{aligned}$$

B.4 Flexible-price model

Before date T. At date $T-1$, we show that a Fisher equation holds:

$$r_{T-1} = \theta E_{F,T-1}\pi_T + (1-\theta)E_{F,T-1}\pi_T, \tag{21}$$

in which the right-hand term is average inflation expectation across households. Importantly, at date $T-1$, agents agree to disagree: they have different inflation expectations due to their different expectations regarding the future policy regime. This happens despite the fact that they all agree on current (observable) macroeconomic variables.

Using the policy rule, one can then compute the inflation rate in previous periods:

$$\pi_t = \left(\theta E_{F,T-1}\pi_T + (1-\theta)E_{M,T-1}\pi_T\right)\phi^{t-T} = \phi^{t-T}\theta E_{F,T-1}\pi_T \tag{22}$$

Summary. The following proposition summarizes our findings:

Proposition 2. **(i)** *Inflation satisfies* (22) *for any* $t < T$.

(ii) *Agents expecting monetary dominance expects 0 inflation at any future maturity* $E_0\pi_t = 0$ *for any* $t \geq T$. *In their case, any increase in future debt* b_t *leads to no additional inflation.*

(iii) *Agents expecting fiscal dominance expects 0 inflation before date T but positive inflation at date* $T-1$. *Their inflation expectation is increasing in their expectation of date-T debt-to-GDP.*

Proof. At date T, agents expect all agents to share resources so that their consumption satisfies $C_{i,T} = Y$, for all $i \in [0,1]$, and, thus, $c_{i,T}$. At date $T-1$, market clearing implies that:

$$\int c_{i,T-1}di = 0.$$

Plugging the Euler equation $c_{i,T-1} = -1/\sigma\left(i_{T-1} - E_{i,T-1}\pi_T\right)$ and the market clearing condition at date $T-1$, we then obtain that:

$$i_{T-1} = \int E_{i,T-1}\pi_T di.$$

The rest of the proposition is proven in the main text.

□

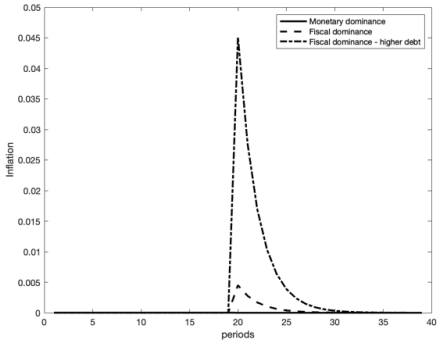
To sum up, agents may well agree in the short run despite their heterogeneity of beliefs regarding the future policy regime. The expected future level of debt has an impact on inflation expectations only through households expecting a shift to fiscal dominance.

Notice that, before date T, under monetary dominance ($\phi > 1$), inflation is lower than at the average expectation at date $T-1$: $\pi_t < (\theta E_{F,T-1}\pi_T)$. The presence of households expecting fiscal dominance is then weakly inflationary at date 0. This result may be quite different in the case where monetary policy is passive ($\phi < 1$) already before date T. In this case, $\pi_t > (\theta E_{F,T-1}\pi_T)$: the positive average inflation expectation in the future due to fiscal dominance risk leads to potentially large inflation levels currently.

We now simulate a sticky-price version of this model to confirm these findings.

B.5 The impact of firms' expectations

Figure B.1: Expected inflation when firms always expect monetary dominance



Note: We calibrate the share of fiscal dominance households to be 30%, the discount factor is $\beta = .99$, the policy reaction to inflation is $\phi^M = 1.5$ under monetary dominance and $\phi^F = .5$ under fiscal dominance, the fiscal reaction to debt is $\gamma^M = 1.5$ under monetary dominance and $\gamma^F = 0.5$ under fiscal dominance. The elasticity of intertemporal substitution is 0.5. The shock to debt-to-GDP is calibrated at 1% and 10%.

C Additional empirical evidence

C.1 Additional figures and tables

Table C.1: Expectation of fiscal constraints and expected inflation

	Inf. Percep.	Inf. Exp. 1Y	Inf. Exp. LT	Home prices	Saving rates
ECB constrained					
Very likely	0.149***	0.352***	0.0755	-0.0140	-0.0135**
	(0.0398)	(0.0486)	(0.0509)	(0.159)	(0.00601)
Likely	0.0567	0.115***	-0.0387	0.0343	0.0165***
	(0.0357)	(0.0439)	(0.0457)	(0.141)	(0.00585)
Other answers	Ref.	Ref.	Ref.	Ref.	Ref.
EA country default					
Very likely	-0.0182	0.221***	0.322***	0.668***	0.00477
	(0.0374)	(0.0458)	(0.0470)	(0.150)	(0.00648)
Likely	-0.0497	0.114***	0.0840**	0.436***	0.0117**
	(0.0334)	(0.0407)	(0.0408)	(0.133)	(0.00587)
Other answers	Ref.	Ref.	Ref.	Ref.	Ref.
Observations	5,518	5,597	5,381	5,641	1,996
R^2	0.093	0.247	0.280	0.273	0.998

Note: this table provides estimates of regressions linking inflation expectations to qualitative answers on fiscal and monetary scenarios. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections and for other macro expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes) are included. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.2: Expectation of fiscal constraints and expected macro variables (12-month horizon - qualitative) - Marginal effects - "Increase"

	Unemploy	Rents	Lending rates	Saving rates	Inflation
ECB constrained					
Very likely	0.0259*	0.00654	-0.00616	-0.00501	0.118***
	(0.0147)	(0.0122)	(0.00617)	(0.00535)	(0.0151)
Likely	0.00364	0.000299	0.00441	-0.00849*	0.0499***
	(0.0130)	(0.0108)	(0.00572)	(0.00476)	(0.0129)
Other answers	Ref.	Ref.	Ref.	Ref.	Ref.
EA country default					
Very likely	0.0453***	0.0238**	0.00148	-0.00972*	0.0651***
	(0.0143)	(0.0120)	(0.00613)	(0.00510)	(0.0147)
Likely	0.0283**	-0.00987	0.000406	-0.00644	0.0387***
	(0.0128)	(0.0108)	(0.00562)	(0.00476)	(0.0130)
Other answers	Ref.	Ref.	Ref.	Ref.	Ref.
Observations	5,914	5,914	5,914	5,914	5,914

Note: this table reports marginal effects of Probit regressions linking dummy variables equal to 1 when households expect the endogenous variable to increase (0 otherwise) to qualitative answers on country default and fiscal dominance scenarios. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections but also the answers to other qualitative macro expectations of unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes are included. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.3: Expectation of fiscal constraints and expected macro variables (12-month horizon - qualitative) - Marginal effects - "Increase"'

	Taxes	Home prices	Econ growth	Fuel prices	DAX
ECB constrained					
Very likely	0.0694***	0.0236*	-0.0245*	0.0146	0.0350
	(0.0130)	(0.0136)	(0.0148)	(0.0161)	(0.0284)
Likely	0.0119	0.00510	0.00285	0.0119	0.0315
	(0.0111)	(0.0121)	(0.0133)	(0.0142)	(0.0255)
Other answers	Ref.	Ref.	Ref.	Ref.	Ref.
EA country default					
Very likely	0.110***	0.00562	-0.0565***	0.0236	-0.0583
	(0.0123)	(0.0132)	(0.0148)	(0.0156)	(0.0418)
Likely	0.0618***	0.0127	-0.0219	-0.00563	-0.0385
	(0.0107)	(0.0120)	(0.0136)	(0.0139)	(0.0291)
Other answers	Ref.	Ref.	Ref.	Ref.	Ref.
Observations	5,914	5,914	5,914	5,914	5,914

Note: this table reports marginal effects of Probit regressions linking dummy variables equal to 1 when households expect the endogenous variable to increase (0 otherwise) to qualitative answers on country default and fiscal dominance scenarios. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections but also macro qualitative expectations of unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes are included. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.4: Quantitative Expectations about EA Public Debt GDP Ratio

	Imputation of the lowest values			
	Baseline - No	Lower than 5%	Lower than 10%	Lower than 20%
All	68.2	81.5	93.8	104.6
No Treatment	63.4	78.7	91.6	103.8
All treatments	69.1	82.0	94.3	104.8
Debt France	75.2	87.5	97.9	108.8
Debt Italy	76.7	87.9	100.2	111.0
Debt Germany	66.3	79.4	91.8	99.1
ECB purchases	59.7	74.5	88.7	101.3
Weidmann statement	67.6	80.7	92.6	103.7

Note: this table reports simple average of quantitative answers on expectations about the ratio public debt over GDP in the euro area. When the households answer "Roughly the same" to the qualitative question, we have imputed 100% which is the anchor we provide to all households on the current ratio in the euro area. The different columns report the results for different imputation assumptions of very small answers. When a very small answer is given, we assume that the household has provided an answer in terms of variation rate in % and we have imputed this variation to the initial level given to all households (100%). The first line reports results for all households and the following lines of the questionnaire report the results splitting the sample by treatment.

Table C.5: Qualitative Expectations about EA Public Debt GDP Ratio

(% of answers)	Much lower	Lower	Same	Higher	Much higher
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

Note: this table reports simple statistics on expectations about qualitative answers to the evolution of the ratio public debt over GDP in the euro area. The columns report the share of households (in %) answering the question "Do you think the ratio of government debt to gross domestic product will be higher or lower in five years' time than at present?", possible answers include "Far lower", "Somewhat lower"; "Roughly the same"; "Somewhat higher"; "Far higher". The first line reports results for all households and the following lines of the questionnaire report the results splitting the sample by treatment.

Table C.6: Information treatment effects on EA debt expectations and inflation expectations revisions – qualitative variables

	Debt			Inflation		
Marginal effects	Ordered	Positive	Negative	Ordered	Positive	Negative
	(1)	(2)	(3)	(4)	(5)	(6)
Debt France	0.0225	0.103	-0.151*	0.0407**	0.0991*	-0.130*
	(0.0163)	(0.0673)	(0.0914)	(0.0192)	(0.0589)	(0.0691)
Debt Italy	0.000583	0.0157	-0.0610	0.0361*	0.113*	-0.0683
	(0.0160)	(0.0662)	(0.0889)	(0.0192)	(0.0589)	(0.0680)
Debt Germany	-0.0150	-0.0521	-0.0475	0.0351*	0.100*	-0.0828
	(0.0158)	(0.0660)	(0.0891)	(0.0192)	(0.0591)	(0.0686)
ECB QE	-0.0595***	-0.265***	0.177**	0.0203	0.0597	-0.0458
	(0.0152)	(0.0645)	(0.0842)	(0.0191)	(0.0591)	(0.0679)
Weidmann statement	-0.0475***	-0.181***	0.0613	0.0344*	0.0572	-0.151**
	(0.0153)	(0.0646)	(0.0861)	(0.0191)	(0.0591)	(0.0692)
Observations	5,965	5,955	5,934	5,773	5,765	5,758

Note: this table reports the results of marginal effects of Probit and Ordered Probit regressions where the endogenous variable is the answers to debt to income ratio evolutions reported by households after the treatment (Ordered Probit: four qualitative answers "lower/much lower", "same", "somewhat higher", "far higher" (marginal effects are calculated for the category "far higher") for binary Probit, we group categories "somewhat higher" and "far higher" for "positive" and "less" and "much less" for negative) or the inflation expectations revisions (we have discretized the quantitative revision according to the sign of this revision (up/down/same)). Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections and for other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes) are included. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table C.7: 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: this table reports simple statistics on the revisions of long-run inflation expectations (measured as the difference between the answer given after the treatment and the one given before the treatment). We also compute a qualitative variable from the quantitative variable, equal to -1 if the revision is negative, 0 if no revision and +1 if the revision is positive. The table reports the shares of respondents having not revised and having revised positively/negatively and the average quantitative revisions for all households and for the ones revising upwards/downwards. For quantitative averages, we have excluded revisions lower than -25% and higher than +20% (the first and the 99th percentiles of the distribution of inflation revisions).

Table C.8: Information Treatment Effects on EA Debt Expectations (role of imputation of small answers)

Imputation case	Baseline (1)	$< 5\%$ (2)	$< 10\%$ (3)	$< 20\%$ (4)	Baseline (5)	$< 5\%$ (6)	$< 10\%$ (7)	$< 20\%$ (8)
Debt France	12.74***	11.10***	3.120***	2.576***				
	(2.427)	(2.276)	(0.645)	(0.575)				
Debt Italy	12.86***	7.106***	1.260*	0.935				
	(2.428)	(2.277)	(0.645)	(0.576)				
Debt Germany	3.677	1.247	-6.660***	-5.982***				
	(2.430)	(2.278)	(0.645)	(0.576)				
ECB QE	-3.358	-4.040*	-2.426***	-1.894***				
	(2.433)	(2.281)	(0.646)	(0.577)				
Weidmann Statement	5.456**	3.458	-0.678	-0.580				
	(2.428)	(2.276)	(0.645)	(0.576)				
Debt France+Italy					12.80***	9.268***	2.218***	1.786***
					(2.104)	(1.975)	(0.551)	(0.492)
Other treatments					1.931	0.261	-3.173***	-2.619***
					(1.983)	(1.862)	(0.520)	(0.464)
Observations	5,740	5,740	5,739	5,739	5,740	5,740	5,740	5,740
R-squared	0.084	0.075	0.109	0.105	0.082	0.073	0.096	0.089

Note: this table reports the results of Huber regressions where the endogenous variable is the debt to income ratio reported by households after the treatment. The different columns report the results for different imputation assumptions of very small answers. When a very small answer is given, we assume that the household has provided an answer in terms of variation rate in % and we have imputed this variation to the initial level given to all households (100%). Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections but also macro qualitative expectations of unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes are included. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table C.9: Information Treatment Effects on EA Debt Expectations (role of imputation - intensive margin)

	Baseline	$< 5\%$	$< 10\%$	$< 20\%$	Baseline	$< 5\%$	$< 10\%$	$< 20\%$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Debt France	14.62***	11.44***	4.205***	2.790***				
	(2.678)	(2.513)	(0.970)	(0.674)				
Debt Italy	14.19***	9.172***	4.381***	1.859***				
	(2.687)	(2.523)	(0.974)	(0.676)				
Debt Germany	3.100	0.646	-9.222***	-7.500***				
	(2.702)	(2.536)	(0.979)	(0.680)				
ECB QE	-7.761***	-7.395***	-3.538***	-1.612**				
	(2.726)	(2.559)	(0.988)	(0.686)				
Weidmann Statement	3.320	1.721	-0.368	-0.0351				
	(2.722)	(2.555)	(0.986)	(0.685)				
Debt France+Italy					14.01***	9.964***	8.216***	6.924***
					(2.309)	(2.139)	(1.823)	(1.393)
Other treatments					-1.142	-2.024	-1.447	-2.946**
					(2.190)	(2.028)	(1.729)	(1.321)
Observations	4,883	4,883	4,883	4,883	4,884	4,884	4,884	4,884
R-squared	0.111	0.088	0.135	0.120	0.098	0.076	0.057	0.047

Note: this table reports the results of Huber regressions where the endogenous variable is the debt to income ratio reported by households after the treatment, in this regression we only consider households reporting that the debt to income ratio will increase or decrease (ie. we dropped answers of households believing that the debt to income ratio will be roughly the same). The different columns report the results for different imputation assumptions of very small answers. When a very small answer is given, we assume that the household has provided an answer in terms of variation rate in % and we have imputed this variation to the initial level given to all households (100%). Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections but also macro qualitative expectations of unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes are included. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table C.10: Information Treatment Effects on EA Debt Expectations – By fiscal and monetary scenario, robustness for small values

	Baseline		Below 5%		Below 10%		Below 20%	
	Likely+others	Very likely	Likely+others	Very likely	Likely+others	Very likely	Likely+others	Very likely
Debt France+Italy	14.28***	10.72***	9.656***	7.951**	1.234**	6.736**	0.954*	3.166***
	(2.597)	(3.769)	(2.248)	(3.544)	(0.591)	(3.015)	(0.575)	(0.970)
Other treatments	3.523	0.0210	-0.350	-1.073	-2.573***	-1.894	-2.490***	-3.168***
	(2.450)	(3.543)	(2.120)	(3.332)	(0.557)	(2.834)	(0.542)	(0.912)
Observations	3,594	2,135	3,594	2,135	3,594	2,135	3,594	2,135
R-squared	0.095	0.087	0.080	0.076	0.117	0.077	0.093	0.121

Note: this table reports the results of Huber regressions where the endogenous variable is the debt to income ratio reported by households after the treatment, each column corresponds to a regression run on a subsample of households depending on their answers to the question about the likelihood of a EA country default. The different columns report the results for different imputation assumptions of very small answers. When a very small answer is given, we assume that the household has provided an answer in terms of variation rate in % and we have imputed this variation to the initial level given to all households (100%). Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections but also macro qualitative expectations of unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes are included. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

C.2 Further evidence on the connection between debt and inflation expectations

Table C.11: Information treatment effects on EA debt expectations and inflation expectations revisions – as a function of fiscal/monetary outlook – quantitative variables

	Debt (1)	Infla (2)	Debt (3)	Infla (4)	Debt (5)	Infla (6)
Debt France+Italy	14.95***	0.0967**	14.08***	0.0640*	14.06***	0.114***
	(2.885)	(0.0391)	(2.640)	(0.0360)	(2.580)	(0.0351)
Other treatments	4.559*	0.0570	3.224	0.0430	3.750	0.0662**
	(2.716)	(0.0369)	(2.490)	(0.0340)	(2.425)	(0.0330)
Country default	-1.062	0.00918	0.643	0.0210		
	(3.698)	(0.0501)	(3.628)	(0.0494)		
Debt France+Italy# Country default	-3.124	0.0668	-3.339	0.0457		
	(4.501)	(0.0610)	(4.392)	(0.0598)		
Other treatments#Country default	-2.819	0.0348	-3.350	0.0292		
	(4.243)	(0.0575)	(4.139)	(0.0564)		
ECB constrained	10.27***	0.0664			10.17***	0.0641
	(3.754)	(0.0510)			(3.681)	(0.0503)
Debt France+Italy#ECB constrained	-2.899	-0.115*			-3.677	-0.0994
	(4.581)	(0.0622)			(4.469)	(0.0609)
Other treatments#ECB constrained	-4.351	-0.0414			-5.140	-0.0315
	(4.331)	(0.0588)			(4.223)	(0.0576)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,724	5,754	5,729	5,759	5,724	5,754
R^2	0.083	0.051	0.079	0.600	0.081	0.051

Note: this table reports the results of Huber regressions where the endogenous variable is the debt to income ratio reported by households after the treatment or inflation expectations revisions. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections and for other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes) are included. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table C.12: Information treatment effects on EA debt expectations and inflation expectations revisions – as a function of fiscal/monetary outlook – qualitative variables

	Debt (1)	Infla (2)	Debt (3)	Infla (4)	Debt (5)	Infla (6)
Debt France+Italy	-0.00980	0.0290	-0.00926	0.0186	0.00796	0.0485**
	(0.0190)	(0.0261)	(0.0177)	(0.0239)	(0.0172)	(0.0232)
Other treatments	-0.0519***	0.0152	-0.0546***	0.0152	-0.0489***	0.0252
	(0.0182)	(0.0245)	(0.0170)	(0.0225)	(0.0167)	(0.0217)
Country default	0.0194	-0.00832	0.0312	-0.00542		
	(0.0278)	(0.0335)	(0.0273)	(0.0329)		
Debt France+Italy# Country default	0.0733**	0.0685	0.0797***	0.0563		
	(0.0307)	(0.0418)	(0.0299)	(0.0406)		
Other treatments# Country default	0.0170	0.0342	0.0238	0.0328		
	(0.0322)	(0.0389)	(0.0315)	(0.0379)		
ECB constrained	0.0833***	0.00776			0.0865***	0.00478
	(0.0275)	(0.0342)			(0.0271)	(0.0336)
Debt France+Italy#ECB constrained	0.0118	-0.0436			0.0276	-0.0264
	(0.0362)	(0.0404)			(0.0347)	(0.0399)
Other treatments#ECB constrained	0.000	-0.003			0.006	0.006
	(0.0341)	(0.0394)			(0.0335)	(0.0386)
Observations	5,920	5,748	5,926	5,751	5,922	5,750

Note: this table reports the results of marginal effects of Probit regressions where the endogenous variable is the answers to debt to income ratio evolutions reported by households after the treatment (qualitative question the evolution of the debt-to-GDP ratio) or the inflation expectations revisions (we have here discretized the quantitative revision according to the sign of this revision (up/down/same)). 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 C.13: Information treatment effects – as a function of fiscal/monetary outlook – quantitative variables - France-Italy

	(1) Debt	(2) Infla	(3) Debt	(4) Infla	(5) Debt	(6) Infla
Debt France	14.14***	0.122***	13.42***	0.0902**	13.68***	0.126***
	(3.335)	(0.0451)	(3.050)	(0.0417)	(3.006)	(0.0408)
Debt Italy	15.82***	0.0719	14.79***	0.0389	14.43***	0.102**
	(3.336)	(0.0452)	(3.057)	(0.0418)	(2.965)	(0.0404)
Other treatments	4.562*	0.0569	3.227	0.0426	3.746	0.0663**
	(2.717)	(0.0369)	(2.490)	(0.0341)	(2.426)	(0.0330)
Country default	-1.066	0.00910	0.649	0.0203		
	(3.700)	(0.0501)	(3.628)	(0.0495)		
Debt France#Country default	-1.634	0.0124	-1.628	-0.00740		
	(5.228)	(0.0708)	(5.063)	(0.0691)		
Debt Italy#Country default	-4.699	0.122*	-5.148	0.101		
	(5.173)	(0.0702)	(5.062)	(0.0692)		
Other treatments#Country default	-2.815	0.0347	-3.352	0.0299		
	(4.245)	(0.0575)	(4.140)	(0.0566)		
ECB constraint	10.27***	0.0660			10.17***	0.0639
	(3.756)	(0.0511)			(3.681)	(0.0503)
Debt France#ECB constraint	-2.476	-0.109			-2.949	-0.105
	(5.290)	(0.0718)			(5.124)	(0.0698)
Debt Italy#ECB constraint	-3.466	-0.120*			-4.472	-0.0953
	(5.306)	(0.0720)			(5.189)	(0.0707)
Other treatments#ECB	-4.351	-0.0412			-5.138	-0.0315
	(4.333)	(0.0589)			(4.223)	(0.0576)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,723	5,755	5,729	5,759	5,725	5,757
R-squared	0.085	0.601	0.082	0.596	0.084	0.600

Note: this table reports the results of Huber regressions where the endogenous variable is the debt to income ratio reported by households after the treatment or inflation expectations revisions. Controls for age, region, gender, city size, income, education, employment status, vote at Parliament elections and for other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes) are included. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table C.14: Information treatment effects – as a function of fiscal/monetary outlook – qualitative variables - France-Italy

	(1) Debt	(2) Infla	(3) Debt	(4) Infla	(5) Debt	(6) Infla
Debt France	-0.00433	0.0386	-0.00384	0.0308	0.0159	0.0468*
	(0.0220)	(0.0303)	(0.0204)	(0.0277)	(0.0198)	(0.0271)
Debt Italy	-0.0145	0.0182	-0.0146	0.00624	0.000300	0.0502*
	(0.0222)	(0.0302)	(0.0206)	(0.0276)	(0.0199)	(0.0268)
Other treatments	-0.0518***	0.0152	-0.0545***	0.0152	-0.0489***	0.0252
	(0.0182)	(0.0245)	(0.0170)	(0.0225)	(0.0167)	(0.0217)
Country default	0.0195	-0.00836	0.0313	-0.00553		
	(0.0278)	(0.0335)	(0.0273)	(0.0329)		
Debt France#Country default	0.0938***	0.0291	0.104***	0.0182		
	(0.0338)	(0.0477)	(0.0322)	(0.0459)		
Debt Italy#Country default	0.0556	0.107**	0.0579	0.0952**		
	(0.0364)	(0.0486)	(0.0360)	(0.0474)		
Other treatments#Country default	0.0169	0.0342	0.0236	0.0328		
	(0.0323)	(0.0389)	(0.0315)	(0.0379)		
ECB constraint	0.0832***	0.00766			0.0865***	0.00479
	(0.0275)	(0.0342)			(0.0271)	(0.0336)
Debt France#ECB constraint	0.0120	-0.0334			0.0375	-0.0262
	(0.0427)	(0.0468)			(0.0395)	(0.0456)
Debt Italy#ECB constraint	0.00844	-0.0508			0.0173	-0.0264
	(0.0418)	(0.0463)			(0.0408)	(0.0462)
Other treatments#ECB	0.000123	-0.00255			0.00557	0.00597
	(0.0341)	(0.0394)			(0.0335)	(0.0386)
Observations	5,920	5,748	5,926	5,751	5,922	5,750

Note: this table reports the results of marginal effects of Probit regressions where the endogenous variable is the answers to debt to income ratio evolutions reported by households after the treatment (qualitative question the evolution of the debt-to-GDP ratio) or the inflation expectations revisions (we have here discretized the quantitative revision according to the sign of this revision (up/down/same)). 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 C.15: Information treatment effects on EA debt expectations and inflation expectations revisions by fiscal and monetary scenario: role of trust

	Baseline		EA country default - VL		EA country default - VL	
Control for trust	No		No		Yes	
	Debt	Inflation	Debt	Inflation	Debt	Inflation
			Panel (a) : Quantitative variables			
Debt France+Italy	14.34***	0.0204	8.361*	0.132*	11.30	0.281**
	(2.772)	(0.0184)	(4.923)	(0.0729)	(8.753)	(0.130)
Other treatments	1.522	0.0331*	-4.655	0.123*	0.977	0.168
	(2.616)	(0.0174)	(4.669)	(0.0689)	(8.368)	(0.124)
Observations	3,395	3,417	1,238	1,237	1,238	1,238
R-squared	0.094	0.225	0.107	0.721	0.108	0.721
			Panel (b): Qualitative - Proba. of increase			
Debt France+Italy	0.0285	0.00168	0.0579*	0.0719*	0.0593*	0.0708*
	(0.0210)	(0.0249)	(0.0309)	(0.0415)	(0.0306)	(0.0414)
Other treatments	-0.0240	0.0184	-0.00612	0.0482	-0.00638	0.0477
	(0.0203)	(0.0235)	(0.0308)	(0.0390)	(0.0306)	(0.0389)
Observations	3,499	3,418	1,269	1,238	1,269	1,238

Note: this table reports in panel (a) the results of Huber regressions where the endogenous variable is the debt to income ratio reported by households after the treatment or inflation expectations revisions. In panel (b) we report marginal effects of Probit regressions where the endogenous variable is a dummy variable equal to 1 if the household after the treatment expects that the debt to income ratio will increase (0 otherwise) and a dummy variable equal to 1 if the household after the treatment expects a positive revision in inflation expectations (defined based on the quantitative revision). Columns (1) and (2) correspond to baseline regressions run on the subsample of households for which we have information on their level of trust either for the government or for the ECB. Columns (3) and (4) correspond to estimates of the regression run on the subsample of households answering very likely to the EA country default scenario (and for which we have information on trust). Columns (5) and (6) we report estimates of the same regression as in (3) and (4) but including trust as a control in interaction with the treatments. Additional controls include age, region, gender, city size, income, education, employment status, vote at Parliament elections and for other macro qualitative expectations (unemployment, rents, lending rates, saving rates, property prices, economic growth, fuel prices, stock prices, taxes) are included. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.