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Social Capital and Monetary Policy

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Abstract

The U.S. have experienced a significant decline in generalized trust over the past three decades. Has this secular trend impacted central banking? Empirically, we document that states with high levels of institutional and interpersonal trust are robustly more responsive to monetary policy shocks. Theoretically, we embed a *circle of trust* block into the New Keynesian framework in continuous time. The calibrated model predicts that monetary policy has become 20% less effective due to the decline in trust. Our findings firm up the social capital channel of monetary non-neutrality and warn that crises of trust could lead to crises of policy inefficacy.

Keywords: Monetary policy, trust, social capital
JEL Codes: E5, E7, Z1

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First version: October 26, 2021.

Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence. (Arrow, 1972)

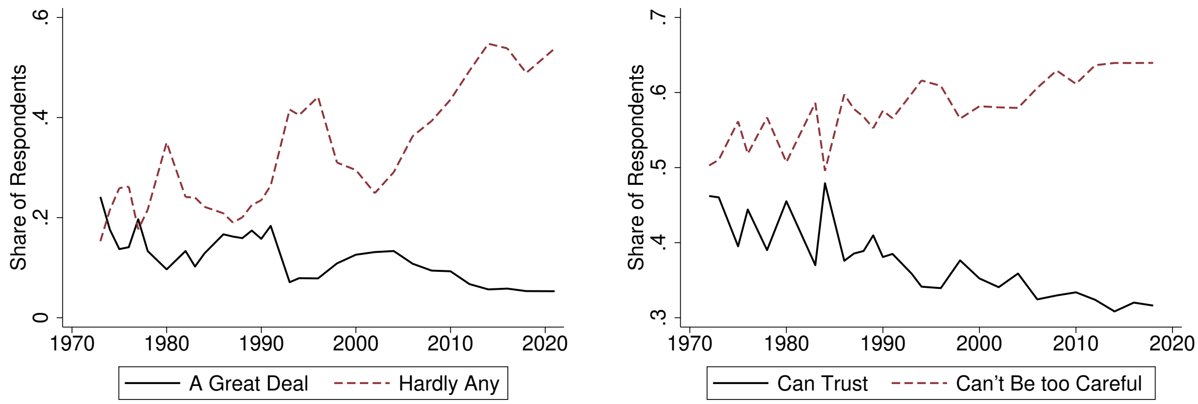
It is trust, more than money, that makes the world go round. (Stiglitz, 2013)

1 Introduction

Social capital and generalized trust have been declining in the United States since at least the late 1980s (Figure 1). Social capital, broadly defined, is an essential component of a networked society that summarises civicness, trust towards individuals and institutions, and transactional reciprocity that enables the society to function effectively (Banfield, 1958), Coleman (1974), Ostrom (1990), Fukuyama (1996), Putnam (1993, 2000). Its influence on fundamental economic forces, ranging from growth and development to financial market participation, have been well documented. In high-level policy circles, research on social capital is becoming increasingly integral for informed government regulations.[1] The relationship between social capital and central banking, however, is extremely poorly understood. What is the impact of social capital on monetary policy-making? Has the collapse of trust diminished monetary policy effectiveness? This paper investigates these questions empirically and theoretically for the case of the United States. To the best of our knowledge, this is the first such investigation for the U.S. context.

In order to establish a credible and potentially causal relationship between social capital and monetary policy, we propose a novel empirical approach that goes beyond country-level analyses and builds on recent advances in the literature on identification in macroeconomics, particularly the use of cross-sectional indentification strategies (Nakamura and Steinsson, 2018; Chodorow-Reich, 2020) and especially in relation to monetary policy (Beraja et al., 2019). The approach consists of two basic steps. First, we run regional Jorda (2005)-style local projections of indicators of local economic activity on monetary policy shocks at the level of an individual U.S. state. We compute and store cumulative responses under some lead-lag configuration and label them *impact elasticities*. In the second step, we run OLS regressions of impact elasticities on measures of local trust capital that we obtain from reliable third-party surveys such as the World Value Survey. Identification is achieved if three conditions are satisfied. First, monetary surprises in the first step are

[1] One very salient instance is the "Social Capital Project" of the United States Congress Joint Economic Committee. The Project was initiated in May 2017 and is currently in Phase III. Details on this important initiative, including reports and data, can be found at https://www.jec.senate.gov/public/index.cfm/republicans/socialcapitalproject.



(a) Do you have confidence in congress? **(b)** Would you say that most people can be trusted?

Source: General Social Survey, United States.

Figure 1: A Crisis of Trust

truly exogenous. Second, regional variation in trust is influenced only by deep socio-economic, cultural, and demographic factors that are slow-moving across time, immobile across space, and thus "pre-determined" with respect to monetary surprises. Third, the trust channel is robust to the inclusion of alternative mechanisms such as risk aversion, political beliefs, or the legacy of slavery.

Our main empirical finding is that monetary policy is more potent in regions with high levels of trust. In particular, cross-state heterogeneity in institutional (interpersonal) trust can explain around 10% (15%) of the regional distribution of local GDP responses to identified monetary policy surprises. An obvious concern for identification is that local trust indicators are potentially confounded by a plethora of correlates. We therefore obtain and control for numerous state-level characteristics that could influence our finding. In particular, we control for regional heterogeneity in social preferences (e.g. risk aversion and patience), economic indicators (e.g. real personal income), demographics, inflation attention (as measured by data from Google Trends), education, political beliefs, populism intensity (proxied by the Trump vote shares in 2016 and 2020), wealth inequality, unauthorized immigrant share, legacy of slavery (as measured by the slave shares in 1860), religiousity, the legal code, exposure to the China shock, stock market wealth, financial literacy, urbanization, coal production, and banking access. We also control for alternative indices of social capital such as the Putnam (2000) and Alesina and La Ferrara (2002) indicators.[2] Both the institutional and interpersonal trust channels are robust to all of the aforementioned factors and continue to influence monetary policy transmission.

[2]Every data source employed in the paper is publically available through the Internet.

We thus provide a robust empirical account of trust being essential for monetary policy effectiveness: dis-trust dampens the potency of monetary shocks. Policy implications of this finding are immediate and emphasize the role of credibility and trustworthiness of the central bank and government as a whole.

To complement our empirical findings we also develop a theoretical model. We enrich the canonical New Keynesian framework in continuous time with a novel "circle of trust" block. As in Gabaix (2020), households are behavioral and assign a positive probability that nominal interest rates that they observe are equal to exogenous, pre-defined behavioral *default rate* heuristics. The subjective interest rate conditional on which the agent optimizes is a weighted average of the objective and the default rates. The weight, i.e. the reduced-form perceived probability of being cheated, is micro-founded as a probability that a Brownian motion hits a sphere of a given diameter from a certain distance. Intuitively, the agent operates from the center of that sphere and is metaphorically speaking surrounded by a *circle of trust*. Probability of the motion hitting the sphere (ξ) symbolizes an act and is proportional to the radius of the sphere R (which proxies inter-personal trust) and to the distance from the motion's origin α (which proxies institutional trustworthiness). Inter-personal and institutional trust components then determine generalized distrust in the economy. The appeal of this model is that it allows us to simultaneously calibrate the institutional and interpersonal trust indicators with, for example, readily available survey data.

Introducing (dis)trust into the standard NK model yields three results. First, the macroeconomic response to transitory monetary policy shocks depends explicitly on generalized trust ξ and monetary policy efficacy is generally high when trust is high. This is in line with our empirical findings. Second, distrust changes the traditional Taylor principle. It can be shown that determinate equilibria are possible if and only if $\phi_\pi \xi > 1$, where ϕ_π is the familiar Taylor rule loading on inflation. Any deviation from the perfect-trust economy, i.e. $\xi < 1$, requires a more aggressive monetary policy stance. The possibility of determinate equilibria is thus strictly lower than in the standard model. Finally, we perform an aggregate state-dependency exercise: we compare the potency of transitory monetary shocks in the high-trust and low-trust regimes, loosely corresponding to the 1990s and 2020s. An attractive feature of our approach is that the two essential parameters that we need to feed into the model - institutional and interpersonal trust - are *measurable* and are easily computed from survey data on trust. When taken to the data and calibrated to match the decline of trust in the United States, the model predicts that monetary policy effectiveness in impacting output and prices may have declined by as much as 20%. The crisis of trust has weakened central bank effectiveness by one fifth.

Literature The elusive notion of social capital has attracted great interest from academics in various fields. Existing research has established that social capital is an important determinant of economic performance (Knack and Keefer, 1997), growth (Algan and Cahuc, 2010, 2014), financial development and stock market participation (Guiso et al., 2004, 2008), labor markets (Algan and Cahuc, 2009), and insurance markets (Gennaioli et al., 2020). We have a qualitative understanding of how trust behaves over the business cycle (Stevenson and Wolfers, 2011). There are vast political economy considerations when one links social capital with the global rise of populism (Algan et al., 2018; Guriev and Papaioannou, 2021). And the secular decline in trust is intimately consistent with a broader cultural divide along the political, racial, and financial lines (Bertrand and Kamenica, 2020).

Why and how would trust and *monetary policy* be conceptually related? First, (perceived) regulatory capture since central banks regularly and closely operate with financial sector agents. Second, trust towards institutions may affect the agents' inflation expectations formation mechanism (Ehrmann et al., 2013). Third, inequity aversion: central banking policies may be perceived to be favoring the elite, potentially through asset price inflation (Pastor and Veronesi, 2020). Finally, central bank independence and pressure from the government and populists (Alesina and Summers, 1993). For example, U.S. President Donald Trump regularly criticized the Federal Reserve. Camous and Matveev (2021) and Bianchi et al. (2021) provide causal evidence that Trump's engagements on the social media platform "Twitter" had negative and significant effects on the expected federal funds rate. Despite all these motivating points, the relationship between social capital and monetary policy remains understudied.

A paper that is closest to ours is Bursian and Faia (2018). Authors focus on the Euro Area, develop a monetary model with trust, and test its implications using VARs and Eurobarometer survey data aggregated to the level of a country. Our paper differs from Bursian and Faia (2018) in four general ways. First, our empirical approach relies on within-country state-level data from the United States, which considerably ameliorates endogeneity issues since country-level factors that could influence trust are all accounted for. Second, we measure monetary shocks with the high-frequency method, which further improves identification. Third, our empirical analysis shows robustness to numerous potential confounding factors, ranging from behavioral to political and socio-demographic. Finally, our theoretical model is very different and offers a simple and portable "circle of trust" block that can be embedded into standard quantitative frameworks, such as the behavioral New Keynesian model.

Our paper builds on the long-standing literature on the economic and financial *con-*

sequences of social capital (Nunn and Wantchekon (2011) Glaeser et al. (2000), Gambetta (1988), Stiglitz et al. (2009), Helliwell et al. (2016), Zak and Knack (2001), Thakor and Merton (2018), Galiani et al. (2020), Algan et al. (2021), Faia et al. (2021)). Algan (2018) provides an excellent review of the recent literature. There is also a thriving literature trying to identify and understand the *determinants* of social capital and trust (Alesina and La Ferrara (2002), Aghion et al. (2010), Butler et al. (2015b), Campante et al. (2021), and Ang et al. (2021).) Our paper adds to the first strand, in particular with novel implications for monetary policy transmission.

Methodologically, our paper adds to the rich and extensive literature on monetary non-neutrality (Bernanke and Blinder, 1992; Lawrence et al., 2005). In particular, we discover - through a series of empirical approaches - a separate channel of monetary policy transmission: the social capital channel.[3] Empirically, we build on the literature that assesses the impact of high-frequency financial market surprises around key monetary policy announcements on the economy and asset prices (Kuttner, 2001; Gurkaynak et al., 2005; Bernanke and Kuttner, 2005; Campbell et al., 2012; Gertler and Karadi, 2015; Gorodnichenko and Weber, 2016; Nakamura and Steinsson, 2018; Jarocinski and Karadi, 2020; Bauer and Swanson, 2022). This approach is related to the methods that assess the extent of information asymmetry about the economy between the central bank and the public (Romer and Romer, 2000; Miranda-Agrippino, 2016; Miranda-Agrippino and Ricco, 2021) and proxies created from analyzing the texts and language of announcements (Hansen and McMahon, 2016; Hansen et al., 2018; Aruoba and Drechsel, 2022). Theoretically, our framework builds on models from behavioral macro-economics, particularly behavioral monetary economics (Woodford, 2010; Adam and Marcet, 2011; Adam and Woodford, 2012; Butler et al., 2015a; Adam et al., 2017; Eusepi and Preston, 2018; Angeletos and Lian, 2018; Woodford, 2019; Gabaix, 2019, 2020; Broer et al., 2021; Adam and Woodford, 2021; Laibson et al., 2021). In its reduced-form representation, the model is very similar to Gabaix (2020) and also to the way Guiso et al. (2008) lay out the optimization problem of their distrustful investor. Finally, our paper highlights the role institutions and their credibility have on effective functioning of monetary policy, thus adding to the long-lasting literature which argues that institutions are the backbone of economic development (North (1990), Acemoglu et al. (2001, 2005), Acemoglu and Robinson (2012), Michalopoulos and Papaioannou (2013)).

[3]Social capital is a very persistent and sticky component of the fabric of society and can also add to the list of explanations of why information is absorbed slower in some regions of the country (Sims, 2003; Mankiw et al., 2003).

2 Social Capital and Monetary Policy in the Data

This section describes the empirical component of the paper. We begin by discussing the data and the empirical approach. The section proceeds by presenting main results and concludes by summarizing additional results which are detailed in the Appendix.

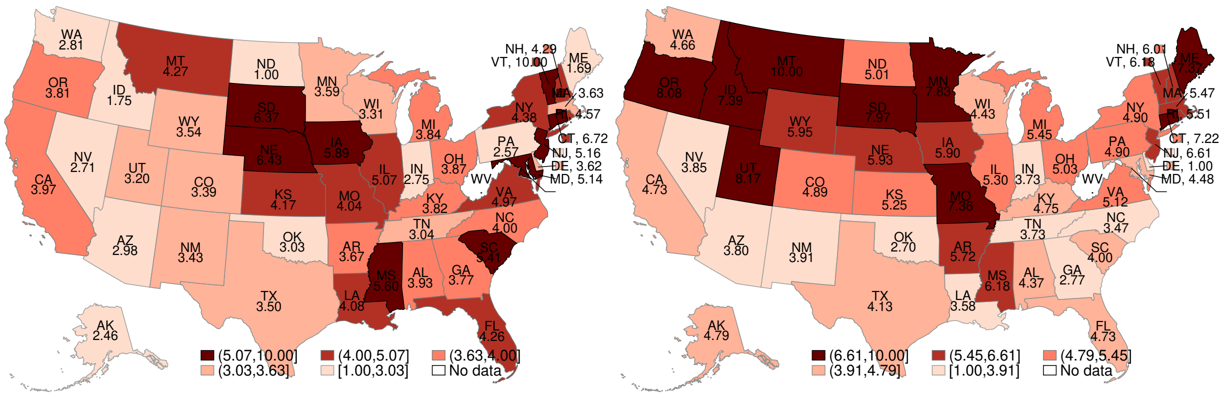
2.1 Data and Measurement

Trust We measure regional variation in social capital with geo-coded survey-based trust indicators from the World Values Surveys (WVS).[4] Surveys can be a useful measurement tool for the study of information rigidities, the pass-through of policy interventions, and elicitation of first-order social concerns (Coibion and Gorodnichenko, 2012, 2015; Stantcheva, 2021, 2022; Ferrario and Stantcheva, 2022). In WVS, participants are asked a variety of questions that try to elicit their social and economic preferences. Of particular interest to us are questions with an overarching theme of trust and confidence in institutions, other persons, and society in general. The richness of the questionnaire in WVS allows us to distinguish between three general themes. First, questions that measure trust and confidence in *institutions*. These ask the respondents to evaluate their confidence in the government, parliament, banks, major companines, etc. Second, questions that measure *inter-personal* trust. These include questions such as "Most people can be trusted" or "How much do you trust your neighbourhood?" All survey questions of interest are listed in Table A1 of the Online Appendix A.1, which also includes further details and additional summary statistics.[5]

In order to construct our main low-dimension state-level measures of institutional and inter-personal trust, we first aggregate individual survey responses to the level of a state by taking weighted-averages across all individual respondents. We then construct first principal components (PCs) of the individual questions and form in total seven smaller-dimension indicators. TrustInstitutions is the baseline measure of institutional trust and is the first PC of all 20 questions listed in the top panel of Table A1. TrustPersonal is the baseline measure of inter-personal trust and is the first PC of all 7 questions listed in the bottom panel of Table A1. We also construct 5 additional theme-based institutional trust sub-indices: TrustMarket, TrustServices, TrustGovernment, TrustLiberties,

[4]There is no consensus among political theorists and social scientists on whether trust *is* social capital or merely one component thereof. In this regard, this paper is closest to Fukuyama's treatise on trust as a fundamental "primitive" of social engineering (Fukuyama, 1996).

[5]Throughout the paper we focus on the 6th wave of the WVS which was run over 2010-2014 and was last updated in 2018. We restrict the sample to U.S. only. For aggregation, we use the usual weighting approach that is suggested by the WVS and Knack and Keefer (1997).



(a) Trust towards Institutions

(b) Interpersonal Trust

Notes: This figure shows how the TrustInstitutions (panel A) and TrustPersonal (panel B) indicators vary across individual U.S. states. Numbers have been re-scaled to lie in the [1,10] interval where 1 indicates low and 10 indicates high trust. District of Columbia and Hawaii are not shown.

Figure 2: The Geography of Trust

and TrustInternational. TrustMarket is the first PC of trust in major companies and banks. TrustServices is the first PC of trust in churches, armed forces, police, justice system/courts, and charitable organizations. TrustGovernment is the first PC of trust in parliament, civil services, government, political parties, and major regional organizations. TrustLiberties is the first PC of trust in the press, labour unions, television, environmental protection movement, women's movement, and universities. Finally, TrustInternational is the first PC of trust in United Nations and NAFTA.

Figure 2 plots the regional distribution of TrustInstitutions and TrustPersonal - our baseline measures of trust towards institutions and other persons, respectively. For simplicity, all numbers have been re-scaled to lie on the [1,10] interval where 1 indicates lowest and 10 indicates highest trust. We see rich heterogeneity in institutional trust, ranging from low-trust states like North Dakota, Idaho, and Alaska to high-trust states like Vermont, Connecticut, and Nebraska. Likewise, dispersion in interpersonal trust is also remarkable. Interestingly, the coefficient of correlation between these two indicators (0.27) is low, implying that the two dimensions of trust are not identical. Table A2 in Appendix A.1 provides more details on all extracted principal components by state, including the underlying numbers from Figure 2. The table also provides the number of respondents per each state in WVS.

Alternative Channels of Causality The relationship between our regional trust measures and monetary policy could be contaminated by a number of alternative channels of causality. We therefore assemble a large array of socio-economic, demographic, and behavioral controls that could be correlated with the spatial distribution of trust. In order to ease the discussion, we group our controls by theme. We list and discuss all 20 themes below. Table 3 provides a compact list of variables' definitions and sources. Table 4 provides summary statistics.

First, *social preferences*. It is essential that we control for alternative behavioral and social factors. For example, heterogeneity in risk aversion can generate the same theoretical predictions in our model as distrust. We first construct a principal component of nine Schwartz social beliefs from the WVS. The nine questions gauge creativity, wealth in utility, sense of physical security, leisure preferences, ambition, risk aversion, obedience, climate/environmental awareness, and conservatism/traditionalism. We also obtain information on state-level degrees of patience, risk aversion, positive reciprocity, negative reciprocity, and altruism from the Global Preference Survey (Falk et al., 2018) and control for them directly (i.e. without reducing the dimensionality). Second, *local macro* indicators. Less economically developed regions could also develop low levels of trust towards the economy and the government. We control for real personal income and real personal consumption expenditures. Third, *demographics*. For a variety of historical and social reasons, trust could vary by race and age. We control for the local share of white population, black population, and citizens aged over 65. Fourth, *education*. The less educated could distrust the government on the account of feeling "left behind". We control for the percentage of civilians with no high school degree and with a bachelors degree only. Fifth, *political beliefs*. Clearly, voters who are fiscally conservative are possibly more likely to distrust the government and/or the central bank. We control for measures of policy liberalism from Caughey and Warshaw (2016) and citizen political ideology from Berry et al. (1998).

Sixth, *inflation attention*. Attention is costly, as is acquisition of information about signals on the macroeconomy. We control for attention to inflation by utilizing data from Google Trends. Seventh, *populism*. The relationship between populism and trust is very well documented.[6] We proxy regional variation in populism intensity with the Donald Trump vote shares in the 2016 and 2020 Presidential elections. We obtain the data from the MIT Election Lab. Eighth, *inequality*. The literature has also proposed a link between (dis)trust and inequality aversion. We therefore control for the local GINI coefficients using data from the U.S. census bureau, poverty rate using data from the University of Kentucky Center for Poverty Research, and the Top 1% wealth shares from Piketty and Saez (2018). Ninth, *immigration*. Immigration aversion could correlate with the degree of

[6] Intuitively, low-social-capital regions are assumed to be preyed upon by populists who promise drastic changes and prosperity. Giuliano and Wacziarg (2020) find a strong link between the Trump vote and various indicators of regional trust.

trust towards institutions, particularly the government's provision of defence and security services. We control for the share of unauthorized immigrant population with data from the Migration Policy Institute. Tenth, *religion*. Religiosity is a strong predictor of the feeling of belongingness, as well as a correlate of economic performance and development (Barro and McCleary, 2019). We control for the fraction of "highly religious" adults, using data from the PEW Research Center.

Eleventh, *slavery*. The legacy of slavery could have left unhealed scars in the psyche of the population and predict the distribution of trust across states. Nunn and Wantchekon (2011) show that current differences in trust levels within Africa can be traced back to the transatlantic and Indian Ocean slave trades. We therefore control for the slave to population and free colored to population ratios, based on Table 2 of the 1860 U.S. Census. Twelfth, *legal* aspects. Legal uncertainty and perception of the local jurisdiction could correlate and even predict trust towards institutions. We control for the state government integrity index, developed by the Center for Public Integrity. Thirteenth, the *China shock*. Job displacement and reallocation of activities caused by the "China shock" could influence the population's trust towards the government's ability to protect their interests. We directly control for the growth of Chinese imports per worker over 1990-2007 (Autor et al., 2013). Fourteenth, *stock market participation*. It is known that trust is a strong predictor of financial market participation (Guiso et al., 2004, 2008). To approximate willingness to participate in financial markets, we control for stock market wealth with the data made publically available by Chodorow-Reich et al. (2021). Fifteenth, *financial literacy*. Financial literacy could determine the degree of understanding central banking communication and thus confound the trust channel. We control for the local share of high school students that are required to take a personal finance course. The data comes from the 2021 Milken Institute Report on "Financial Literacy in the United States".

Sixteenth, *urbanization* rate. People living in rural areas may not find it necessary to pay attention to monetary announcements, since the nature of their economic activity does not demand it. At the same time, less urbanized areas could also exhibit low degrees of trust towards institutions and/or high degrees of interpersonal trust due to a greater community aspect. We control for the share of the urban population with U.S. Census data. Seventeenth, *mining* production. Coal production has been declining steadily in the United States; if substitution across professions and industries is low, then this trend could have fostered a decline in trust in the most affected areas. We control for the share of mining production with data from the BEA. Eightneeth, *banking access*. Motivated by the vast literature on the bank-lending (Bernanke and Blinder, 1992; Bernanke and Gertler, 1995) and, more recently, the deposit channels of monetary policy (Drechsler et al., 2017), both trust towards the economy and reactiveness to monetary shocks could be driven by banking access. We therefore control for the share of the population without a bank account with data from the Federal Deposit Insurance Corporation. And finally, *benchmark* indices. We control for two existing proxies of social capital - Robert Putnam's state-level index from Putnam (2000) and the Alesina and La Ferrara (2002) social capital index that the authors built from the General Social Survey.

Monetary Policy Shocks To identify monetary policy shocks we follow the high-frequency identification (HFI) approach which measures unexpected (surprise) variations in monetary policy by quantifying financial market reactions around key monetary policy announcements. Specifically, for our main monetary policy shock measure we follow Gurkaynak et al. (2005) and Gorodnichenko and Weber (2016) and use surprises in the three month ahead monthly fed funds futures. The series is aggregated to the quarterly frequency by summing over the daily shocks in each quarter and then standardized.

State and Macro Variables Our main state-level proxy of economic performance is quarterly real GDP growth, taken from the Bureau of Labour Statistics, and starting from 2005q1. Aggregate (nation-level) data includes the one-year constant-maturity Treasury yield, real GDP growth, GDP deflator growth, a proxy of financial market conditions - the excess bond premium (Gilchrist and Zakrajsek, 2012; Favara et al., 2016), and (log) returns on the S&P500 stock market index. The final quarterly sample is 2005:Q1-2016:Q4.

2.2 Identification

Our empirical strategy consists of two basic steps.

Step 1: Local Projections The first step of the approach involves running local projections in the spirit of Jorda (2005).[7] For each state $s = 1, \dots, S$ and horizon $h = 0, 1, 2, \dots$ the projection is:

$$logY_{t+h,s} - logY_{t,s} = \alpha_{h,s} + \beta_{h,s}\epsilon_t + \sum_{l=1}^{L} \delta'_{h,l,s}\mathbf{x}_{t-l} + \nu_{h,t,s} \tag{1}$$

where Y_t is state-level economic outcome (real GDP growth), ϵ_t is the monetary policy shock, $\mathbf{x}_t$ is a vector of controls. The main projection specification has L=3, i.e. three quarters. Our object of interest is the $Sx1$ vector of cumulative responses $\hat{\beta}_{\hat{h},s}$ and for

[7]In principle, one can run a panel VAR with a state fixed effect. Impulse responses should be identical in the lag limit (Plagborg-Moller and Wolf, 2021).

horizon $\hat{h} = 3$.[8] As mentioned previously, we refer to these estimates as *impact responses* for brevity and as opposed to long-run responses. We store the resulting Sx1 vector and proceed with the next step.

Step 2: Cross-sectional Regressions The second step of the empirical approach involves running OLS regressions of cumulative impact responses on indicators of social capital. The main specification is:

$$\hat{\beta}_s = \mu + \eta Trust_s + \varphi' Z_s + e_s \tag{2}$$

Where $\hat{\beta}_s$ are state-level impact estimates which we obtained in Step 1. $Trust_s$ is one of our seven regional trust measures. Z_s is a vector of controls that includes alternative channels of causality - we list them in section 2.1. Our main object of interest is the coefficient estimate $\hat{\eta}$, whose statistical and/or economic significance captures the importance of social capital for explaining the cross section of regional economic responses to identified monetary policy shocks. For example, if we are to conclude that monetary policy is more effective where social capital is high, then we should expect a negative $\hat{\eta}$. Recall that a positive innovation to ϵ_t signifies a monetary policy contraction.

Our identification strategy is credible for at least four reasons. First, within-country state-level analysis improves identification since nationwide (federal) factors that may influence trust and social capital are accounted for. Second, longitudinal data on social capital at high frequency is notoriously difficult to obtain, deeming any time-series application challenging[9]. Our approach offers a simple and replicable alternative: the time-series step does *not* require any information on social capital but is instead a standard method to compute impulse responses and relies only on widely accessible macro data. Step two of our approach requires a cross-sectional measure of social capital which could in principle come from data with no time dimension at all. This is convenient in situations where measurement has large N but little or no T, which is the case, for example, with WVS or GPS surveys. The underlying assumption here is that the cross-sectional and time dimensions of the two steps are not intertwined: regional dispersion in trust is "pre-determined" with respect to transitory monetary shocks. We defend this assumption by invoking a vast literature that documents *persistence* and stickiness of socio-cultural legacy and its impact on economic development (Allen and Donaldson, 2022). In other words, (dis)trust towards institutions or persons is far more likely to have been rooted in deep socio-demographic causes that took decades if not centuries to foster than monetary

[8]Main results are quantitatively robust to alternative lead-lag selections. We present evidence of this in Appendix A.

[9]For example, in Bursian and Faia (2018) the Eurobarometer trust data is biannual and authors are forced to work with a relatively short sample because of data limitations.

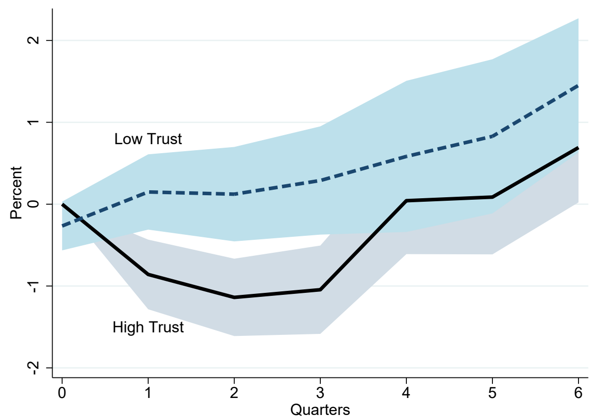
surprises.

Third, monetary policy shifts, if actually endogenous, may be correlated with trust and social capital through a missing factor such as inequality aversion. Suppose that high-social-capital regions perceive expansionary monetary policy stances as signals of future growth and improving economic equity. In this paper, we measure monetary policy with the high-frequency approach, which disentangles policy surprises from endogenous economic confounding factors in very tight windows surrounding central bank announcements. This allows us to establish a plausibly causal link between economic responses to monetary *shocks* and various proxies of social capital. In addition, we also control for the information content in central bank communications directly. Fourth and finally, there may exist numerous other social preference channels such as risk aversion or patience that potentially operate in the same direction as trust or social capital. We combat the problem of the omitted variable bias by controlling for a myriad of variables. Most importantly, for our purposes, we must control for other social preferences such as risk aversion or time preferences. In fact, it is possible to write a simple extension of the canonical New Keynesian framework with variation in risk aversion such that persistent risk aversion "shocks" would dampen the response to monetary shocks the same way was as dis-trust does in our model that follows. Thus, disentagling the trust channel from other behavioral channels is crucial.

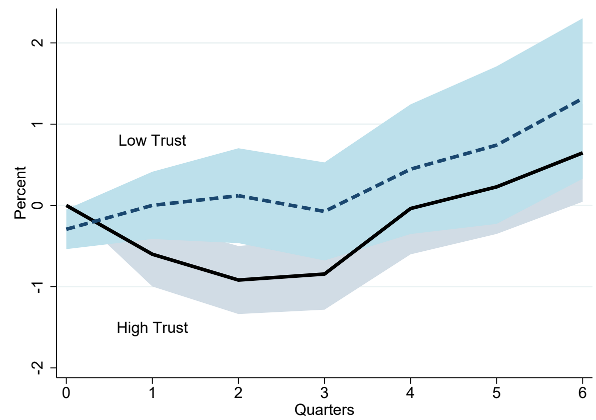
2.3 Main Empirical Results

We present the results in two blocks. We begin with the time-series step. In particular, we sort states by quintiles of either the TrustInstitutions or the TrustPersonal distributions. Then, we present impulse responses for the highest and lowest quintiles. The idea is to capture an economic and statistical degree of heterogeneity in the responsiveness to the same shock across high- and low-trust states. This exercise is akin a standard practice in, say, empirical asset pricing: computation of cumulative reactions to the same "factor" (monetary shock) of two "portfolios" (state groupings) that are built based on some characteristic (trust measure).

The result is reported in Figure 3. In panel (a) we see that states with high institutional trust are more responsive to monetary contractions, i.e. their GDP declines by more. The difference between high- and low- institutional trust states is stiatistically significant (at the 90% confidence level) for three quarters. In panel (b) we sort states by TrustPersonal and see that qualitatively high-trust states are still more responsive. The difference is statistically significant for the second quarter but not in other quarters. We thus obtain our first result: trust towards institutions is a predictor of economic responsiveness to



(a) Sorting States by TrustInstitutions



(b) Sorting States by TrustPersonal

Notes: results from Step 1 of our empirical approach. The figure plots average responses of state-level real GDP growth to one-standard deviation monetary policy surprises. Panels (a) and (b) sort states based on quintiles of the spatial distributions of TrustInstitutions and TrustPersonal, respectively. Figures plot results for the highest (straight lines) and lowest (dashed lines) quintiles. Shaded areas represent 90% confidence intervals.

Figure 3: Trust and Monetary Non-Neutrality: Time Series

monetary shocks across *time*. The interpersonal trust channel is quantitatively weaker but qualitatively similar.

Our second and key set of results comes from the cross-sectional step of our empirical approach. We collect the distribution of state-level cumulative responses to the monetary shock and regress it on state-level trust indicators directly. Table 1 reports the main objects of interest: estimates of $\hat{\eta}$ from different specifications of Equation 2. The dependent variable in all specifications is the cross-section of regional GDP responses to monetary policy shocks $\hat{\beta}_s$, obtained from Equation 1. Main independent variables are our seven measures of trust. Standard errors are bootstrapped (with 1000 replications, in parentheses) or clustered by the U.S. Census Bureau divisional dimension (in brackets). Note that the number of observations is 49 because for the District of Columbia and West Virginia the data on state GDP and trust was not available, respectively.

The first immediate takeaway from the Table is that the cross section of regional output responses to positive (i.e. contractionary) monetary policy shocks is robustly negatively associated with measures of institutional trust. This means that monetary policy is more effective in regions of the country where social capital, as measured by trust, is high. This result is consistent with Bursian and Faia (2018) who find a similar relationship for the European Union countries. For our baseline measures of trust - TrustInstitutions and TrustPersonal - in columns (1) and (2), the effects are strongly statistically significant and equal 31 and 38 basis points, respectively. This implies that a one-standard deviation

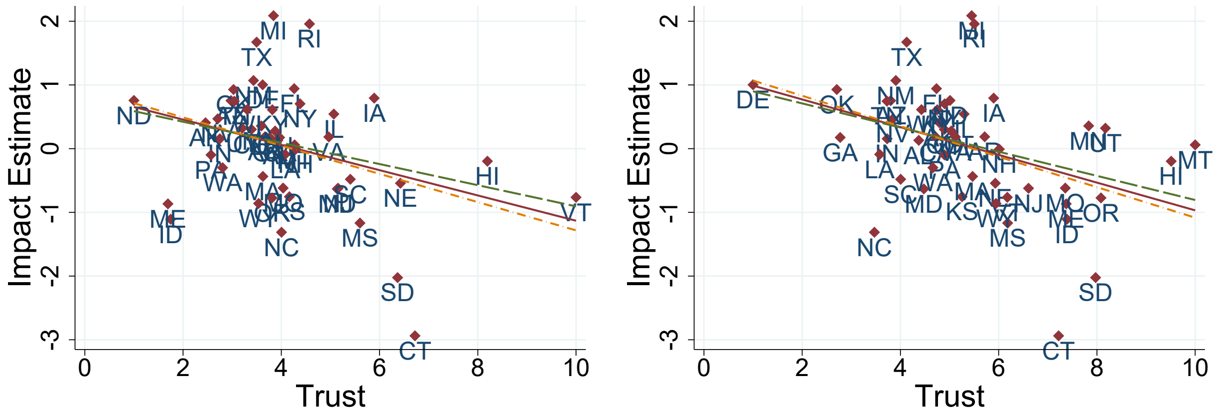
Independent Variable (std):	Dependent Variable: Regional GDP Response to MP Shock						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TrustInstitutions	-0.313 (0.152) [0.080]						
TrustPersonal		-0.382 (0.128) [0.125]					
TrustMarket			-0.334 (0.172) [0.132]				
TrustServices				0.123 (0.224) [0.143]			
TrustGovernment					-0.376 (0.165) [0.145]		
TrustLiberties						-0.271 (0.148) [0.065]	
TrustInternational							-0.228 (0.149) [0.087]
Observations	49	49	49	49	49	49	49
R^2	0.112	0.167	0.128	0.017	0.162	0.084	0.059

Notes: results from Step 2 of our empirical approach. The table depicts results from regressing impact estimates $\hat{\beta}_s$ on various trust indicators. Bootstrapped standard errors (with 1000 replications) are in parentheses; standard errors clustered by U.S. Census Bureau divisional dimension are in brackets.

Table 1: Trust and Monetary Non-Neutrality: Cross Section

increase in trust towards institutions or other persons enlarges the impact of transitory monetary policy shocks on regional output growth by 31-38 basis points - this is an economically significant amount. Similar results are observed across our five sub-indices of institutional trust, with the exception of TrustServices for which the coefficient is not statistically significant. The impact of TrustGovernment (Column (5)) is highly significant and quantitatively similar to TrustInstitutions, suggesting that the institutional trust channel is primarily driven by trust towards the government. The second takeaway from this Table is that the total explanatory power of the relationship is substantial as can be seen from high R^2 across the board. For example, TrustInstitutions and TrustPersonal (columns (1) and (2)) individually, i.e. without any controls, can explain roughly 11%-17% of the regional monetary transmission mechanism.

Figure 4 visualizes the results via scatter plots. Panels (a) and (b) report results for the TrustInstitutions and TrustPersonal indicators of trust, respectively. Note that x-axis values have been rescaled to lie in the [1,10] interval with 10 indicating the highest trust



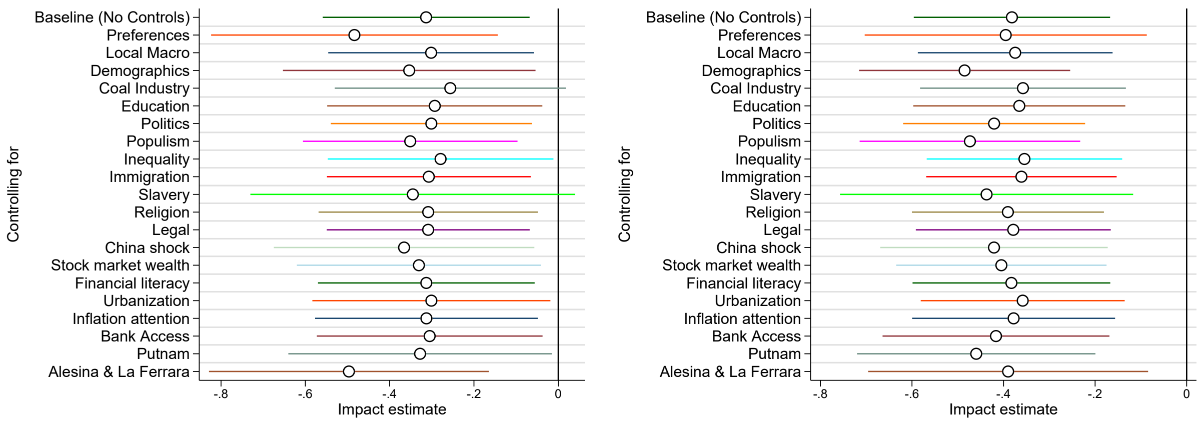
Notes: scatterplots from regressions of monetary policy impact elasticities $\hat{\beta}_s$ on TrustInstitutions and TrustPersonal trust indicators. Both panels present three lines of best linear fit: the straight red line is for the whole sample, the green long-dashed line is for the samples that exclude states with the lowest trust values, and the orange dash-dotted line is for the samples that exclude states with the highest trust values.

Figure 4: Trust and Monetary Non-Neutrality: Cross Section

level. On the y-axis we have impact responses of state GDP growth, $\hat{\beta}_s$. The negative association is stark and clearly visible in both panels. In order to mitigate the concern that outliers are driving our results, both panels present three lines of best linear fit: the straight red lines are for the whole samples, the green long-dashed line are for the samples that exclude states with the lowest trust value (per panel), and the orange dash-dotted line are for the samples excluding states with the highest trust value. Results do not change.

Our cross-sectional specifications have so far not included any state-level controls and could thus suffer from an omitted variable bias. We now proceed by controlling, one-by-one, for competing channels of causality. Our extensive set of controls is grouped into 20 themes, which are detailed in Section 2.1. Figure 5 presents point estimates $\hat{\eta}$ and 90% confidence intervals for our two baseline trust indicators. Each row of each panel presents a different specification with the corresponding theme of control variables added to Z_s. We see that our results remain both qualitatively unchanged and quantitatively stable as well as almost always statistically significant (at the 90% level). This result firms up the *trust* channel of monetary policy as a channel that is independent from many alternative drivers. It also reinforces that dis-trust has a robustly negative effect on monetary policy effectiveness.

Relative coefficient stability that is apparent from Figure 5 could be indicative of our results not suffering from the omitted variable bias and most of the relevant selection on "unobservables" being accounted for. However, coefficient stability is not generally a sufficient statistic for gauging the bias if controls are actually not informative for explaining variation in $\hat{\beta}_s$ (Oster, 2017). It is important to also monitor changes in the R-squared,



(a) TrustInstitutions

(b) TrustPersonal

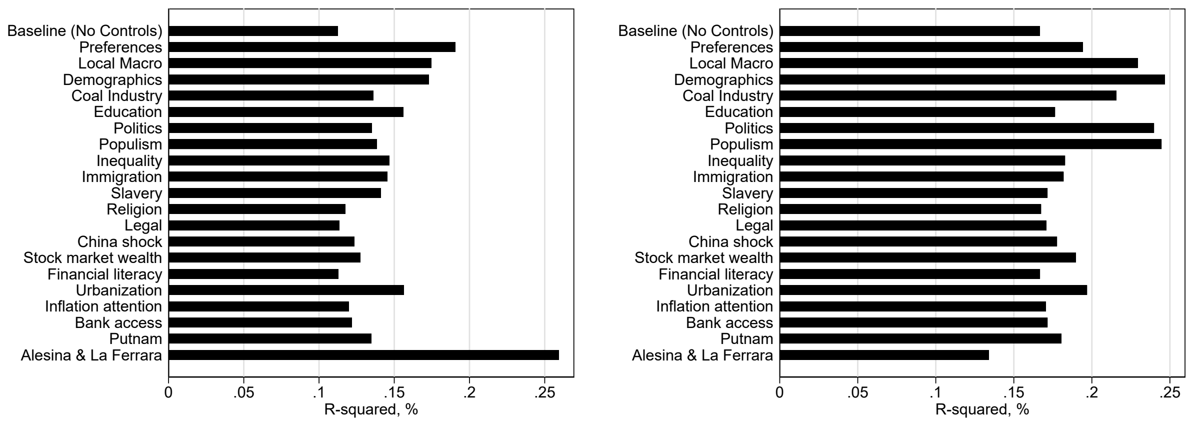
Notes: Point estimates of $\hat{\eta}$ and 90% confidence bands for cross-sectional regression results with each row stating which set of controls has been added to Z_s. Panels (a) and (b) use TrustInstitutions and TrustPersonal trust indicators as the $Trust_s$ measure, respectively.

Figure 5: Trust and Monetary Non-Neutrality: Adding Controls

which can help diagnose the quality of our observable alternative channels of causality. In Figure 6 we report the R-squared values from every cross-sectional specification with controls, analogously to Figure 5 which presented coefficient estimates. From Panel (a) we observe that certain sets of controls such as *Preferences* or the *Alesina-La Ferrara* index could be viewed as the so-called "high-variance" controls because they not only considerably increase the R-squared but also noticeably reduce the point estimate. Reasonable conclusions about controlled coefficients could probably not be drawn based on these two cases. For the remaining controls, however, we observe both coefficient stability *and* consistent albeit modest increases in the R-squared. In the case of TrustPersonal, controlled coefficients are quantitatively very stable, and about half of the controls add to the R-squared.[10] We conclude that while we have discovered that some controls are more informative than others, there is little evidence to suggest that our findings are biased.

To sum up, we have documented that U.S. states that exhibit high levels of trust towards institutions or other persons are more responsive to identified monetary policy shocks. This result is robust to the inclusion of numerous controls that range from behavioral to social to demographic.

[10]The case of *Alesina-La Ferrara* in Panel (b) is explained by the fact that the estimation sample is different from the no-controls case (there are 5 fewer observations than in the baseline); thus R-squared falls.



(a) TrustInstitutions

(b) TrustPersonal

Notes: R-squared values for every cross-sectional specification with each row stating which set of controls has been added to Z_s. Panels (a) and (b) use TrustInstitutions and TrustPersonal trust indicators as the $Trust_s$ measure, respectively.

Figure 6: R-squared Movement and Selection on Observables

2.4 Additional Results and Sensitivity Analysis

In the Online Appendix we present several additional results and sensitivity checks. First, we explore regional heterogeneity and test whether the social capital channel is concentrated in some regions of the country. Second, we improve the monetary policy shock measure by controlling for the information content in central bank communications in the spirit of Jarocinski and Karadi (2020). Third, we follow Miranda-Agrippino and Ricco (2021) and use an alternative way to measure monetary shocks that relies on Green Book forecast revisions. Fourth, we introduce regional inflation information, by leveraging the Hazell et al. (2021) state-level CPI data. Fifth, we conduct a lead-lag sensitivity check. Sixth and finally, for completeness we provide a full set of results for the five theme-based institutional trust sub-indices.

3 A New Keynesian Model with Trust

In this section we rationalize the empirical findings with a simple theoretical framework. We start with the canonical New Keynesian model (Clarida et al., 1999; Woodford, 2003; Gali, 2008) and introduce a behavioral friction in the spirit of Gabaix (2020). The reduced-form friction is micro-founded with a new approach. In the next section, we bring the model to the data and run a quantitative exercise.

3.1 Sceptical Households

Time is continuous, and t denotes the current period. The economy is populated by a continuum of households of measure one. Households maximize:

$$\int_0^\infty e^{-\rho t} U\Big(C(t), N(t)\Big) dt \tag{3}$$

subject to the budget constraint:

$$P(t)C(t) + \dot{B}(t) \leq \hat{i}(t)B(t) + W(t)N(t) - T(t) \tag{4}$$

Where $C(t)$ is consumption, $N(t)$ is labor supply, $P(t)$ the aggregate price level, $B(t)$: one-period bonds, $W(t)$: the aggregate wage rate, and $\hat{i}(t)$ the "perceived" bond rate. The "objective" rate is $i(t)$, and the two are related according to:

$$\hat{i}(t) = \xi \, i(t) + (1 - \xi) \, i_d \tag{5}$$

Where $\xi \in [0, 1]$ is the measure that governs the level of trust in the economy or the degree of payoff distortions. In its most general form, ξ is potentially household-specific and time-varying but throughout this paper we will assume that it's invariant across both agents and time. If $\xi = 1$, the household fully trusts the monetary/financial system and observes the true nominal rate. When $0 < \xi < 1$, the agent assigns a positive probability to the event that he will be "cheated". The household is sceptical of the proper functioning of financial markets, the judiciary, or the bond of the social contract more generally. Even though the objective reality is such that the return on bonds is guaranteed and riskless, the household doesn't believe this. Specifically, conditional on getting cheated, the household's "default" price heuristic is i_d (Gabaix, 2019). We discuss potential candidates for the default in the next section.[11]

The solution of the household problem is almost standard. For the utility function of $U\Big(C, N\Big) = \frac{C(t)^{1-\sigma}-1}{1-\sigma} - \frac{N(t)^{1+\varphi}}{1+\varphi}$ we get the following optimality conditions:

$$\varphi n(t) + \sigma c(t) = w(t) - p(t) \quad , \quad \frac{\dot{C}(t)}{C(t)} = \frac{1}{\sigma}\Big(\hat{i}(t) - \pi(t) - \rho\Big) \tag{6}$$

where $\pi(t) := \frac{\dot{P}(t)}{P(t)}$ is the rate of inflation and all lower-case variables are in logs. Note how the Euler equation contains the perceived interest rate instead of the objective one. This is an important nuance. Optimal demand of the household is obtained conditional

[11] In reduced form, our approach to modelling trust is very similar to Guiso et al. (2008) who present a simple portfolio choice problem where the risky asset has an objective return distribution but the investor assigns a positive subjective probability to the counterparty or an intermediary stealing all the proceeds.

on subjective prices. Consequently, if the agent under-perceives the price then he may over-spend and exceed the budget at time t. A simple t*â*tonnement process can achieve convergence of demand towards the level that is consistent with the budget constraint. If the agent, given subjective prices, is over budget then he will reduce demand by some $\lambda > 0$ so that the constraint binds exactly. Paraphrasing Gabaix (2019), the agent is distrustful but smart enough to always exhaust the budget.

3.2 The Circle of Trust

We now describe how the degree of trust ξ is determined. The mathematical treatment of this question is very standard and is known as computation of stopping times for n-dimensional Brownian motions. We begin by considering a ball $B(0, R)$, where $R > 0$. Let $\alpha \in \mathbb{R}^n$ but $\alpha \notin B(0, R)$. Now, consider a stochastic process:

$$B(t) = \alpha + W(t) \quad , \quad R < |\alpha| \tag{7}$$

Where $W(t) = \Big(W_1(t), \ldots, W_n(t)\Big)$ is an $n \geq 3$-dimensional Brownian motion. Now, consider the annulus:

$$A_k = \{x \in \mathbb{R}^n; R < |x| < kR\} \tag{8}$$

for some $k > 0$ and such that $\alpha \in A_k$. Next, let

$$\tau_k = inf\{t > 0; B(t) \notin A_k\} \tag{9}$$

be the exit time of $B(t)$ from A_k. In words, τ represents the first time at which the Brownian motion exits the annulus A_k. The main object of interest to us is the *probability* ξ, with which $B(t)$ will hit $B(0, R)$ in the limit of $k \to \infty$. Our main result can be summarized in the proposition below:

Proposition 1. *The probability ξ that the stochastic process $B(t)$, originating from outside the ball $B(0, R)$, hits the ball is:*

$$\xi = \lim_{k \to \infty} \xi_k = \Big(\frac{R}{\alpha}\Big)^{n-2} \tag{10}$$

Moreover, in $\mathbb{R}^n$ with $n \geq 3$, $\xi < 1$ and the Brownian motion $B(t)$ is transient.

Proof: Appendix B.3

The hitting probability is proportional to the size of the inner annulus and inversely related to the distance of the origin of the motion from the center of the ball. For the rest of the paper, including all our quantitative applications, we will consider the case of $n = 3$ without loss of generality.

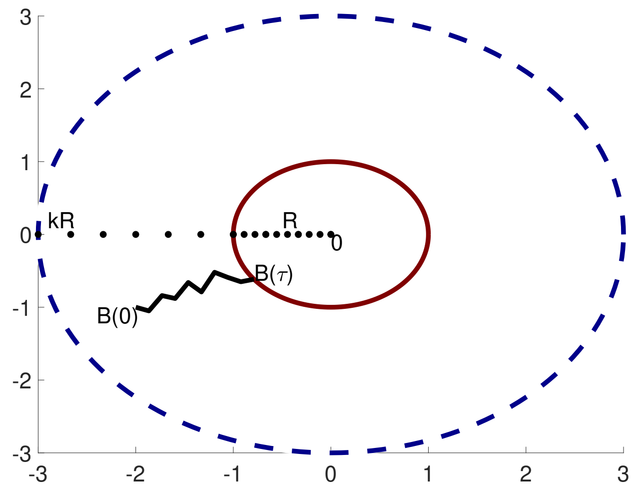


Figure 7: This figure demonstrates how the Brownian motion B(t), originating from outside the ball $B(0, R)$, hits it at time τ.

Illustration and Intuition Figure 7 illustrates the idea visually. The household is located in and operates from the center of $B(0, R)$ which symbolizes the "circle of trust" of the agent. With some abuse of notation, $B(t)$ can be thought of as holdings of one-period bonds from Section 3.1. We do not distinguish trust towards different counterparties or asset classes. Thus, $B(t)$ in this context can be viewed as *any* investment decision or action that the agent contemplates. Through the prism of his scepticism, the agent decides whether to act or not. The probability of the action is ξ. In reduced form, it represents the subjective probability of receiving the objective return on the act. In terms of our micro-foundations, it answers the following question: what is the probability that the action will eventually penetrate the agent's circle of trust and convince him to act?

That probability, as Proposition 1 indicates, depends on two essential parameters. First, the radius of the ball R. This can be thought of as the "individual fixed effect" or a measure of inter-personal trust; the empirical counterpart of this measure would be our TrustPersonal index. Intuitively, a greater R broadens the circle of trust and increases the likelihood of all engagements with the outside world. Second, the origin of the action α or, more concretely, the distance from the origin B_0 to $B(0, R)$. α best corresponds to the "institutional fixed effect", i.e. how trustworthy institutions appear to the agent, keeping inter-personal trust constant. The empirical counterpart of this measure would be our TrustInstitutions index. A greater α reduces familiarity of the agent with the source of the action, reduces trust, and decreases the probability of the action. The logic of our model is straightforward: changes in either interpersonal (R) or institutional (α) trust immediately impact generalized trust (ξ). That, in turn, feeds into the New Keynesian apparatus and affects the monetary transmission mechanism.

Separation of R from α is useful for several reasons. First, our empirical analysis shows that institutional and inter-personal trust are not perfectly correlated in the U.S. geographical cross section; it is important to model both. Second, for both types of trust there are readily available comparable empirical measures. Our model can thus be taken to the data in a rather straightforward fashion. Finally, our circle of trust block is an intuitive and "de-tachable" device that could be easily embedded into other, more sophisticated quantitative frameworks where $\alpha(t)$ or $R(t)$ are stochastic, for example.

3.3 Firms

We assume that the production side of the economy operates in the mode of full trust. That is, final and intermediate goods producers optimize subject to objective prices. This makes the supply side of the model fairly standard. We delegate the detailed exposition of the firms' problem to Appendix B.2. Below we summarize only the key equation according to which the inflation rate π is determined in the symmetric equilibrium:

$$\Big(i(t) - \pi(t) - \frac{\dot{Y}(t)}{Y(t)}\Big) = \frac{\epsilon - 1}{\theta}\Big(\frac{\epsilon}{\epsilon - 1}\frac{W(t)}{P(t)}\frac{1}{A} - 1\Big) + \dot{\pi}(t) \tag{11}$$

Where A is the level of productivity of intermediate goods firms, ϵ is the elasticity of substitution across intermediate goods, and θ is the degree of price stickiness or the Rotemberg cost of price adjustment (Rotemberg, 1982). Note how Equation 11 contains the objective rate $i(t)$ since firms, unlike households, fully trust the monetary authority.

3.4 Equilibrium

Define the output gap as $\frac{Y(t)}{Y^n(t)}$ where $Y^n(t)$ is natural output $Y^n(t) = A\Big(\frac{\epsilon}{\epsilon-1}\Big)^{\frac{-1}{1+\varphi}}$. The household Euler equation in terms of the output gap gives the IS curve:

$$\frac{\dot{X}(t)}{X(t)} = \frac{1}{\sigma}\Big(\hat{i}(t) - \pi(t) - r\Big) \tag{12}$$

where r is the natural rate of interest. Similarly, we obtain the New Keynesian Phillips curve. Derivations are in Appendix B.2:

$$\rho\pi(t) = \frac{\epsilon - 1}{\theta}\Big(X(t)^{1+\varphi} - 1\Big) + \dot{\pi}(t) \tag{13}$$

The objective nominal interest rate is determined by the Taylor rule:

$$i(t) = i^* + \phi_\pi \pi(t) + \phi_x logX(t) \tag{14}$$

Log-linearizing the IS and the Phillips curves, and defining the reduced-form slope of the Phillips curve as $\kappa := (\epsilon - 1)\frac{1+\varphi}{\theta}$ and the lower-case $x(t) := logX(t)$, yields a five-equation New Keynesian model with trust:

$$\dot{x}(t) = \frac{1}{\sigma}\Big(\hat{i}(t) - \pi(t) - r\Big) \qquad \textit{IS Curve} \tag{15}$$

$$\rho\pi(t) = \kappa x(t) + \dot{\pi}(t) \qquad \textit{Phillips Curve} \tag{16}$$

$$i(t) = i^* + \phi_\pi \pi(t) + \phi_x x(t) \qquad \textit{Taylor Rule} \tag{17}$$

$$\hat{i}(t) = i_d + \xi\Big(i(t) - i_d\Big) \qquad \textit{Trust Filter} \tag{18}$$

$$\xi = \frac{R}{\alpha} \qquad \textit{Circle of Trust} \tag{19}$$

The last equation constitutes the "circle of trust" block - the key theoretical novelty introduced by this paper. The "trust filter" distorts objective reality via the prism of the household's scepticism towards the outside world. The circle of trust micro-foundation links the trust parameter ξ to the inter-personal (R) and institutional trust (α) components. Those two factors, in turn, determine the perceived interest rate on bonds. The model nests the standard NK framework in a straightforward way if the Brownian motion $B(t)$ is recurrent, $\xi = 1$, and the household always engages with the act.

3.5 Determinacy and Uniqueness

The traditional model features multiple equilibria when monetary policy is passive. With (dis)trust, as we will see below, bounded equilibria are still generally impossible as the trust block cannot replace the Taylor principle and help achieve determinacy by itself. However, varying the trust parameter ξ affects the permissible set of ϕ_π and the possibility of determinate equilibria.

We continue to consider the Taylor rule-based determination of $i(t)$ as in Equation (17). Substituting out the trust block and the Taylor rule into the IS and Phillips curves yields the following system of ordinary differential equations:

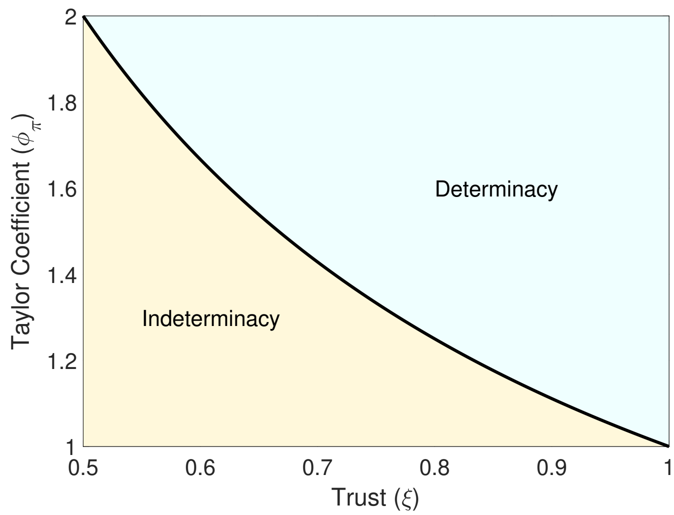


Figure 8: Equilibrium determinacy in the New Keynesian model with trust.

$$\begin{bmatrix} \dot{x}(t) \\ \dot{\pi}(t) \end{bmatrix} = \underbrace{\begin{bmatrix} \frac{\xi\phi_x}{\sigma} & \frac{\xi\phi_\pi - 1}{\sigma} \\ -\kappa & \rho \end{bmatrix}}_{\mathbf{A}} \begin{bmatrix} x(t) \\ \pi(t) \end{bmatrix} \tag{20}$$

The next proposition summarizes the augmented Taylor determinacy principle:

Proposition 2. *A unique equilibrium exists if and only if the following condition is satisfied:*

$$\phi_\pi \xi > 1 \tag{21}$$

Proof: Appendix B.4

Relative to the perfect-trust (standard model) counterfactual, the Taylor principle is more difficult to satisfy in the imperfect-trust version because $\xi < 1$. On the other hand, unanticipated positive shocks to ξ allow, ceteris paribus, the monetary authority to adopt a relatively more passive stance. Similarly, exogenous negative shocks to institutional trustworthiness α suddenly tie the hands of monetary policy-makers because the set of values of ϕ_π for which eigenvalues of $\mathbf{A}$ are greater than 0 becomes smaller. Figure 8 illustrates this point. Areas above (under) the curve represent determinacy (indeterminacy). Deterioration in the level of ξ requires a more inflation-sensitive stance from the central bank, ceteris paribus. Greater dis-trust makes the job of the central banker more difficult.

4 Model Meets Data

In this section we calibrate our model to the survey data on trust and quantitatively analyze transitory monetary policy shocks in high and low trust environments, loosely corresponding to 1990 and 2020, respectively. We conclude with a discussion of potential extensions and auxiliary results.

4.1 Parametrization

Trust Parameters In order to pin down generalized trust (ξ), we must first calibrate institutional (α) and interpersonal (R) trust components. The attractive feature of our framework is that both parameters have measurable counterparts that could be readily computed from surveys. Specifically, the two relevant empirical measures were plotted already in Figure 1. First, the share of the population with "hardly any" trust towards congress corresponds to α. Second, the share of the population with the "can't be too careful" reply to the question "Would you say that most *people* can be trusted?" corresponds to the inverse of R. In combination, the two values determine generalized trust ξ through Equation 19.

In order to bring the model closer to the data and run applied exercises, we compare the impact of transitory monetary shocks in high and low trust environments. The two steady states roughly correspond to 1990 and 2020, as seen on Figure 1. To this end, we first set α_{1990} to 0.2 and α_{2020} to 0.5. We then set R_{1990} to (1-0.55) and R_{2020} to (1-0.65). ξ_{1990} and ξ_{2020} are therefore 2.25 and 0.7, respectively. We normalize ξ_{1990} to unity to represent the "full-trust" benchmark; ξ_{2020} becomes 0.31. The joint decline in institutional and interpersonal trust over the past three decades has reduced aggregate generalized trust in the country by about 70%. Our goal is to quantify the impact of this decline on monetary policy effectiveness.

Standard Parameters The remaining parameters are fixed by surveying the literature. They are summarized in Table 2. We set the elasticity of intertemporal substitution and the Frisch elasticity of labor supply to 1, as in Kaplan et al. (2018). The product market demand elasticity is set to 10, which implies a realistic constant mark-up of 11 percent, again as in Kaplan et al. (2018). The time preference parameter is set in order to target the annual discount rate of roughly 4%, as in Gabaix (2020). We set the Taylor rule coefficients for inflation and output gap to 1.25 and 0.8, respectively, which are roughly in the middle of commonly used values for New Keynesian models. Persistence of the monetary policy shock is set to 0.5.

Parameter	Value	Description
ξ_{1990}	1	Generalized trust in 1990 (normalized)
ξ_{2020}	0.31	Generalized trust in 2020
σ	1	Risk preference
ϵ	10	Elasticity of demand
$1/\varphi$	1	Frisch elasticity of labor supply
θ	100	Price adjustment cost
ρ	4%	Discount rate (p.a.)
ϕ_π	1.25	Taylor rule loading on inflation
ϕ_x	0.8	Taylor rule loading on output gap
η	0.5	Monetary policy shock persistence

Table 2: Model Parameters

4.2 Transitory Monetary Policy Shocks

We now analyze the main quantitative application of the model. Consider zero-probability innovations ϵ to the Taylor rule:

$$i(t) = i^* + \phi_\pi \pi(t) + \phi_x x(t) + \epsilon(t)$$

with $\dot{\epsilon}(t) = -\eta\epsilon(t)$, $\eta > 0$ and $\epsilon(t)$ reverts back to the steady state over time. The proposition below summarizes the pass-through from ϵ to the output gap and inflation:

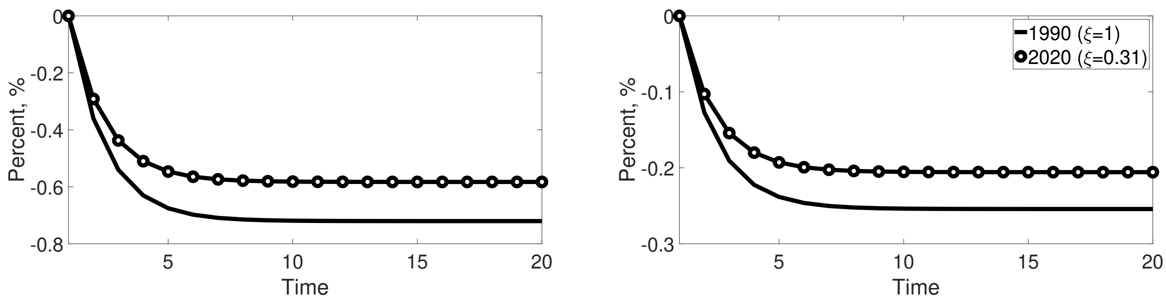
Proposition 3. *Equilibrium output gap $x(t)$ and inflation $\pi(t)$ are more responsive to monetary policy shocks $\epsilon(t)$ when trust ξ is high if and only if the Phillips curve is sufficiently flat.*

Proof: Appendix B.5

The proposition establishes that distrust, in line with the data, can dampen the impact of transitory monetary policy shocks on the macroeconomy. Let us revisit our calibration strategy and ensure that the required parameter restriction is indeed satisfied. As per Proposition 3, the following must hold:

$$\sigma\eta(\rho + \eta) > \kappa$$

That is, the Phillips curve cannot be too steep. Under our baseline parameterisation, the right-hand-side of the condition is $\kappa = (\epsilon - 1)\frac{1+\varphi}{\theta} = 0.18$. The left-hand-side is 0.255. The condition is satisfied if monetary policy is persistent, agents are more risk-averse, or if the discount rate is high. Note that our value of κ is on the high end of the spectrum. Gabaix (2020) works with a $\kappa = 0.11$. Stock and Watson (2019) find that the "Phillips correlation"



(a) *Cumulative Output Gap Response* **(b)** *Cumulative Inflation Response*

Notes: This figure shows cumulative output and inflation responses to a one-percent (annualized) unexpected and transitory shock to the nominal interest rate.

Figure 9: Monetary Policy in High and Low Trust Regimes

κ was just 0.03 over the 2000-2019 period. Nakamura and Steinsson (2014), Hazell et al. (2021) find similarly low or even lower estimates. All of this evidence points to the notion that the restriction will generally be easily satisfied and the model is consistent with the findings in our empirical section. In Section 4.3 we discuss how the above restriction could be easily relaxed with additional frictions.

The proof of Proposition 3 shows that the choice of the default rate i_d is important for the closure of the model. We consider two simple and analytically convenient cases. First, $i_d = 0$. This case implies that the household believes that with probability $1 - \xi$ bond holdings are completely worthless and generate no return. This is in line with the logic in Guiso et al. (2008). Conditional on this choice of the default, we assume that the monetary policy authority's target rate is $i^* = \frac{r}{\xi}$, i.e. the natural rate of interest normalized by the degree of generalized trust. Second, the default rate may be simply equal to the natural rate. This choice is logical since absent any transitory (MIT) shocks, the nominal rate will indeed be equal to the natural rate. In that particular case, we assume that the policy target is also equal to the natural rate. We summarize the choice of the default, and its consequences, below:

$$i^* = \begin{cases} \frac{r}{\xi} & \text{if } i_d = 0 \\ r & \text{if } i_d = r \end{cases}$$

We are now ready to present our main quantitative result. Figure 9 presents model-implied cumulative responses to a sudden one-percent increase in the nominal interest rate. Panels (a) and (b) show results for the output gap and inflation, respectively. In each panel, we plot two responses: the straight line corresponds to the "high-trust" regime of 1990 for which we normalized ξ_{1990} to 1. Incidentally, this is also the case of the textbook NK model with complete trust. The line with markers corresponds to the "low-trust" regime of 2020 for which our calibration using survey data yielded $\xi_{2020} = 0.31$.

The main takeaway from the Figure is that the decline in generalized trust in the U.S. over the past decades has considerably weakened monetary policy transmission. Given our calibration approach, the long-run (i.e. by period 20) macroeconomic response to the same monetary surprise is 20% milder in 2020 than what it was in 1990, everything else equal. In other words, we conclude that central bank effectiveness in impacting output and inflation in the short run has declined by one fifth. This negative relationship between trust and monetary effectiveness is in line with our empirical findings, as already discussed in previous sections.[12] Of course, our model is very stylized and introduces just one departure from the standard model while the U.S. economy has gone through many, multi-dimensional changes over the same 1990-2020 period. In a richer model, the 20% number could be lower.

4.3 Discussion

Populism and Central Banking In this section we sidestep from the discussion of just monetary policy shocks and analyze populism in the context of our framework. Populism is ravaging across the Western hemisphere and the rise of populism goes hand in hand with a crisis of trust (Guriev and Papaioannou, 2021). This paper can speak on this issue by conjecturing that populism can affect central banking independence, potency, and behavior through an interaction with the institutional trust capital stock. The idea is to provide a simple, equilibrium analysis of the linkage between populism, trust towards institutions, and monetary policy effectiveness. In Appendix B.1 we proceed in two steps. First, we briefly review how populism and social capital are related in the data. Second, we demonstrate how a simple (exogenous and unanticipated) populism cycle in the model can drive a cycle of monetary policy potency.[13] The main takeaway is that in aggregate states of the world in which populism intensity is high, the effects of transitory monetary shocks are weaker.

Sticky Information As Proposition 3 reveals, it is essential that the Phillips curve is not too steep for our model to generate empirically consistent predictions. It turns out that the $\sigma\eta(\rho + \eta) > \kappa$ restriction amounts to the requirement of having a positive response of the

[12] Model-implied implication that behavioral agents under-react to prices or policy instruments (as opposed to what a frictionless rational benchmark would predict) is a fairly common result. For example, in a classical paper, Chetty et al. (2009) find that consumers tend to under-react to taxes that are not salient. See Mullainathan et al. (2012) for the broader review of behavioral public finance.

[13] This idea was partially inspired by the "extreme policy cycle" theory that was recently developed in Levy et al. (2021).

relevant nominal interest rate $\hat{i}(t)$ to the policy shock. In the standard model, the maximal response of inflation happens on shock impact, after which inflation reverts back to steady state without amplification. Lack of endogenous inertia in the response of inflation means that disentangling inflation persistence from autocorrelation of the shock is not possible. In fact, a more persistent disturbance (high η) is more likely to satisfy the above restriction. Otherwise, a contractionary shock could yield the "wrong" movement in the interest rate and macro aggregates.

An extension of the model with sticky information in the spirit of Mankiw and Reis (2002, 2007) could solve the underlying challenge: inflation would become endogenously persistent since the model-implied correlation between contemporaneous output gap levels and future changes in inflation would turn positive. As a result, impact response of inflation would generally be smaller and the parameter restriction above would relax. On a more general note, strategic interactions between sticky information and (dis)trust would be interesting to explore in future work.

The Circle of Trust - Alternative Representation Appendix B.6 demonstrates how our circle of trust microfoundation could be represented with an n-dimensional Bessel process:

$$\mathcal{R}(t) = \text{dist}\,(0, W(t)) = \sqrt{W_1(t)^2 + \cdots + W_n(t)^2}$$

Consider, in parallel to our baseline process $B(t)$, a process $Y(t) = a + \mathcal{R}(t)$, such that $0 \leq a < R$ and $a = |\alpha|$ with similar interpretations for a and R. We show in the Appendix how to compute the transcience probability of $Y(t)$, which reduces to a familiar $\left(\frac{R}{a}\right)^{n-2}$. Without loss of generality, for $n = 3$, we can obtain a condition that is essentially identical to Equation (19), which could in turn be used as before in our calibration procedure.

Relation to Other Models Section 3.2 provides a novel, intuitive, and portable microfoundation device for models of behavioral inattention. The way the "trust block" enters the rest of the model is via the loading on objective reality ξ in the trust filter Equation 5. Generally, however, the block is portable in the sense that we could have used a different reduced-form representation of a departure from full attention or rational expectations.

For example, a prominent literature introduces level-k thinking into macroeconomic models in order to study the effects of conventional and unconventional central banking policies (Garcia-Schmidt and Woodford, 2019; Farhi and Werning, 2019; Iovino and Sergeyev, 2022). In the presence of level-k thinkers, and particularly so when markets are incomplete as shown by Farhi and Werning (2019), aggregate sensitivity to policy shocks gets dampened. The agents' desire to think through several layers could be correlated with their trust in the economic and political system. If the belief is that the "system is rigged" then one may have no incentive to be a higher-order thinker. Thus, one could link the circle of trust block with a general equilibrium model with level-k thinking such that institutional and interpersonal dis-trust become the ultimate origins of low-k agents. Greater distrust and, by extension, a lower aggregate k in the economy would also generate dampening of economic reactions to interest rate shocks.

Another salient approach in the "zoo" of behavioral departures from full rationality is "sticky expectations" (Carroll et al., 2018). In a recent paper, Auclert et al. (2020) have introduced sticky expectations into the canonical Heterogeneous Agents New Keynesian (HANK) framework (Kaplan et al., 2018). In Auclert et al. (2020), becoming informed about future paths of economic variables takes time. As a result, inattention generates dampening of direct effects of monetary policy shocks on aggregates such as consumption. In relation to our paper, an interesting question to ponder is *why* some households exhibit sticky expectations. Similarly to the argument above, it could be because agents do not trust signals that come out from policy makers. It therefore takes them more time to "confirm" via other sources that what they observe is in fact objectively true. Formally, suppose agents update their information sets about aggregate shocks (including interest rates) with a probability $1 - \theta$. In the frictionless benchmark, $\theta = 0$ corresponds to rational expectations. Now suppose that probability of updating information depends on generalized trust ξ such that θ is low when ξ is high. With this simple mapping, one could then obtain impact dampening of monetary shocks in the low-trust (low-updating) economy relative to the perfect-trust (perfect-updating) rational expectations equilibrium.

As is common with behavioral models, discriminating across frameworks and determining the "right" modelling approach is very challenging if not impossible. The purpose of this section was not to argue in favor of some framework at the expense of others. We emphasize that the crucial advantage of this paper's approach is that our microfoundation for various reduced-form behavioral departures from rational expectations and full information is ultimately *measurable*. Trust is a concept that could be elicited directly from the population, albeit with some measurement error, through surveys.

5 Conclusion

Empirically and theoretically, this paper has analyzed the social capital channel of monetary policy transmission. In the data, we find that U.S. states with higher levels of trust are more responsive to monetary policy shocks that are identified with high-frequency identification. Social capital is a "state variable" for the conduct of monetary policy. This channel is rationalized in an enriched workhorse New Keynesian model. Micro-founded generalized distrust, in line with the data, dampens the macroeconomic response to transitory monetary policy shocks. In addition, distrust also reduces the possibility of determinate equilibria.

While the present paper has filled some literature gaps, a lot more work needs to be done to refine the social capital channel of economic policy-making. Firm-level surveys, for example by following a quasi-experimental approach in the spirit of Coibion and Gorodnichenko (2012, 2015) or Faia et al. (2021), can potentially elicit firms' quantity and pricing plans conditional on exogenously provided (by the econometrician) policy forecasts - a kind of an institutional "trust stress test". At the same time, while we have focused on monetary policy in this paper, economic responses to *other* types of policy shocks may also depend on trust and social capital. For example, our two-step empirical approach is immediately applicable to a study of federal of regional fiscal policy. Finally, institutional trust could be essential for maintaining governmental credibility and preventing explosive equilibria in monetary-fiscal coordination games (Bianchi and Ilut, 2017; Bianchi and Melosi, 2019).

A Appendix

Variable	Definition	Source
TrustInstitutions	First principal component of 20 questions related to confidence in institutions. Questions are listed in the top Panel of Table A1. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
TrustPersonal	First principal component of 7 questions related to confidence in other persons. Questions are listed in the bottom Panel of Table A1. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
TrustMarket	First principal component of questions related to confidence in major companies and banks. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
TrustServices	First principal component of questions related to confidence in churches, armed forces, police, justice system/courts, and charitable organizations. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
TrustGovernment	First principal component of questions related to confidence in parliament, civil services, government, political parties, and major regional organizations. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
TrustLiberties	First principal component of questions related to confidence in the press, labour unions, television, environmental protection movement, women's movement, and universities. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
TrustInternational	First principal component of questions related to confidence in United Nations and NAFTA. Rescaled to [1,10] interval with 10 the highest level of trust.	WVS. Self-constructed.
Patience	State-level weighted average of the variable "patience". The weight is the variable "wgt"	Falk et al. (2018)
Risk aversion	State-level weighted average of the variable "risktaking". The weight is the variable "wgt"	Falk et al. (2018)
Positive reciprocity	State-level weighted average of the variable "positive reciprocity". The weight is the variable "wgt"	Falk et al. (2018)
Negative reciprocity	State-level weighted average of the variable "negative reciprocity". The weight is the variable "wgt"	Falk et al. (2018)
Altruism	State-level weighted average of the variable "altruism". The weight is the variable "wgt"	Falk et al. (2018)
Schwartz beliefs	First principal component of nine Schwartz social beliefs	WVS. Self-constructed.
Real per capita personal income	The logarithm of "Real per capita personal income (constant 2012 dollars)" for the year 2016	BEA
Real per capita PCE	The logarithm of "Real per capita personal consumption expenditures (constant 2012 dollars)" for the year 2016	BEA
Population over 65, share	Percentage of the state's population over the age of 65, 2013-2017 5-year estimates from the American Community Survey	U.S. Census Bureau
White population, share	Percentage of the state's residents who are white, 2013-2017 5-year estimates from the American Community Survey	U.S. Census Bureau
Black population, share	Percentage of the state's residents who are black, 2013-2017 5-year estimates from the American Community Survey	U.S. Census Bureau
No high school degree, share	Percent of adults with less than a high school diploma, 2016-20 American Community Survey 5-year average	U.S. Census Bureau
Bachelor degree, share	Percent of adults with a bachelor's degree or higher, 2016-20 American Community Survey 5-year average	U.S. Census Bureau

Table 3: Variable Definitions

Variable	Definition	Source
Citizen ideology	Measure of citizen ideology, from liberal to conservative. Updated for the year 2013	Berry et al. (1998)
Policy liberalism	Measure of policy liberalism, based on a dynamic latent-variable model of 148 policies, for the year 2013	Caughey and Warshaw (2016)
Inflation attention	A measure constructed through the following steps. Search for the term "inflation" on Google Trends. Restrict the time period to 2005-2016. Export state-level subregional data.	Google Trends
Trump vote share, 2016	Constituency (state-level) returns for the 2016 U.S. presidency. The share of Trump votes.	MIT Election Lab
Trump vote share, 2020	Constituency (state-level) returns for the 2020 U.S. presidency. The share of Trump votes.	MIT Election Lab
GINI coefficient	GINI index of income inequality, American Community Survey, for the year 2013	U.S. Census Bureau
Poverty rate	Estimated percent of individuals living in poverty, University of Kentucky Center for Poverty Research, for the year 2013	UKCPR
Top 1% wealth share	Concentration of wealth at the top 1% by region, as of 2018	Piketty and Saez (2018)
Unauthorized immigrants, share	State-level fraction of the nationwide total unauthorized immigrant population, estimated for 2015-2019	Migration Policy Institute
Highly religious, share	Share of the adult population identifying as "highly religious", the Religious Landscape Study by the PEW Research Center	PEW Research Center
Slaves, share	State-level share of slaves to the total population. Data was obtained from Table in the "Classified Population of the States and Territories, by Counties" files of the 1860 U.S. Census	1860 U.S. Census
Free colored, share	State-level share of the free colored population to the total population. Data was obtained from Table in the "Classified Population of the States and Territories, by Counties" files of the 1860 U.S. Census	1860 U.S. Census
State govt. integrity	Letter grade for state government integrity which summarizes 10+ measures and indices governmental transparency and accountability, for the year 2015	Center for Public Integrity
Chinese imports, per worker	Growth of Chinese imports per worker over 1990-2007	Autor et al. (2013)
Stock market wealth	State-level measure of local stock market wealth are constructed by Chodorow-Reich et al. (2021) in two steps. First, dividend income is capitalized at the state-elevel, yielding taxable stock wealth. Second, taxable stock wealth gets adjusted for nontaxable stock wealth.	Chodorow-Reich et al. (2021)
Finance course, share	Share of high school students that are required to take at least one semester of a stand-alone personal finance course, as of 2017	Milken Institute
Urban population, share	Local share of the population living in urban areas, i.e. densely developed territories that encompass residential, commercial, and other non-residential urban land uses. For the year 2013	U.S. Census Bureau
Log (coal production)	Real mining (except oil and gas) production by state (millions of chained 2012 dollars). Industry detail is based on the 2012 NAICS classification. As of 2016	BEA
Without bank account, share	Fraction of the population that is "unbanked", i.e. without a bank account. For the year 2015. Collected via the "Custom Data Table Tool" of the FDIC	FDIC
Putnam Index	Robert Putnam's original social capital state-level index from "Bowling Alone"	Putnam (2000)
Alesina La-Ferrara Index	State-level index of social capital that is built on various indicators such as group participation and trust, divided into four unequally-sized categories, and sourced from the General Social Survey (GSS)	Alesina and La Ferrara (2002)

Table 3: Variable Definitions (Continued)

Variable	Obs	Mean	Std.	Min	Max
TrustInstitutions	49	2.61	1	0.63	6.33
TrustPersonal	49	3.07	1	0.57	5.70
TrustMarket	49	2.52	1	0.54	5.38
TrustServices	49	2.01	1	0.73	7.26
TrustGovt	49	4.90	1	0.86	8.56
TrustLiberties	49	3.16	1	0.70	6.98
TrustInternational	49	2.87	1	0.64	6.39
Patience	50	4.15	1	0.64	6.38
Risk aversion	50	2.76	1	0.51	5.06
Positive reciprocity	50	4.96	1	0.72	7.20
Negative reciprocity	50	4.04	1	0.63	6.26
Altruism	50	5.10	1	0.82	8.16
Schwartz beliefs	49	6.28	1	0.80	7.95
Personal income	50	104.18	1	102.16	106.99
Personal consumption	50	130.55	1	128.47	132.51
Population over 65, share	50	8.29	1	5.12	10.70
Whilte population, share	50	4.52	1	1.48	6.05
Black population, share	50	1.07	1	0.03	3.95
No high school degree, share	50	3.85	1	2.37	6.12
Bachelor degree, share	50	5.98	1	3.95	8.37
Citizen ideology	50	3.19	1	1.34	5.87
Policy liberalism	50	0.02	1	-1.76	1.80
Inflation attention	50	7.39	1	5.04	9.48
Trump vote share, 2016	50	4.72	1	2.83	6.59
Trump vote share, 2020	50	4.83	1	2.93	6.71
GINI coefficient	50	16.37	1	14.67	18.96
Poverty rate	50	4.04	1	2.42	6.56
Top 1% wealth share	50	3.93	1	2.26	6.94
Unauthorized immigrants, share	50	0.48	1	0.01	5.92
Highly religious, share	50	5.09	1	3.07	7.17
Slaves, share	40	0.65	1	0.00	3.07
Free colored, share	40	0.32	1	0.00	6.08
State govt. integrity	50	3.62	1	0.81	4.87
Chinese imports, per worker	48	2.09	1	0.31	4.60
Stock market wealth	48	1.85	1	0.69	5.24
Finance course, share	50	0.69	1	0.00	3.36
Urban population, share	50	5.05	1	2.66	6.52
Log (coal production)	50	4.76	1	1.23	6.29
Without bank account, share	50	2.07	1	0.49	4.56
Putnam Index	48	0.03	1	-1.83	2.19
Alesina La-Ferrara Index	44	1.81	1	0.83	3.32

Table 4: Summary Statistics for All Variables

References

Acemoglu, D. and J. Robinson, "Why nations fail: The origins of power, prosperity, and poverty," *Currency*, 2012.

_ , S. Johnson, and J. Robinson, "The colonial origins of comparative development: An empirical investigation," *American Economic Review*, 2001, *91(5).*

_ , _ , and _ , "Institutions as a fundamental cause of long-run growth," *Handbook of economic growth*, 2005, *1(1).*

Adam, K. and A. Marcet, "Internal Rationality, Imperfect Market Knowledge and Asset Prices," *Journal of Economic Theory*, 2011, *146.*

_ and M. Woodford, "Robustly Optimal Monetary Policy in a Microfounded New Keynesian Model," *Journal of Monetary Economics*, 2012, *59.*

_ and _ , "Robustly Optimal Monetary Policy in a New Keynesian Model with Housing," *Journal of Economic Theory*, 2021, *Forthcoming.*

_ , J. Beutel, and A. Marcet, "Stock Price Booms and Expected Capital Gains," *American Economic Review*, 2017, *107(8).*

Aghion, P., Y. Algan, P. Cahuc, and A. Shleifer, "Regulation and Distrust," *Quarterly Journal of Economics*, 2010, *125(3).*

Alesina, A. and E. La Ferrara, "Who trusts others?," *Journal of Public Economics*, 2002, *85(2).*

_ and L. Summers, "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence," *Journal of Money, Credit and Banking*, 1993, *25(2).*

Algan, Y., "Trust and social capital," *In Joseph E. Stiglitz, Jean-Paul Fitoussi Martine Durand (eds.), For Good Measure Advancing Research on Well-being Metrics Beyond GDP. Paris: OECD*, 2018, *283-320.*

_ and P. Cahuc, "Civic Virtue and Labor Market Institutions," *American Economic Journal: Macroeconomics*, 2009, *1.*

_ and _ , "Inherited Trust and Growth," *American Economic Review*, 2010, *100.*

_ and _ , "Trust, Growth, and Well-Being: New Evidence and Policy Implications," *Handbook of Economic Growth*, 2014, *2.*

_ , D. Cohen, E. Davoine, M. Foucault, and S. Stantcheva, "Trust in Scientists in Times of Pandemic: Panel Evidence from 12 Countries," *Proceedings of the National Academy of Sciences*, 2021, *18(40).*

_ , S. Guriev, E. Papaioannou, and E. Passari, "The European Trust Crisis and the Rise of Populism," *Brooking's Papers on Economic Activity*, 2018, *Fall Meetings.*

Allen, T. and D. Donaldson, "Persistence and Path Dependence: A Primer," *Regional Science and Urban Economics (special issue on "Urban Economics and History")*, 2022, *94.*

Ang, D., P. Bencsik, J. Bruhn, and E. Derenoncourt, "Police violence reduces civilian cooperation and engagement with law enforcement," *Working Paper*, 2021.

Angeletos, G-M. and C. Lian, "Forward Guidance Without Common Knowledge," *American Economic Review*, 2018, *108(9).*

Arrow, K. J., "Gifts and Exchanges," *Philosophy and Public Affairs*, 1972, *1(4).*

Aruoba, S. and T. Drechsel, "Identifying Monetary Policy Shocks: A Natural Language Approach," *CEPR*, 2022, *DP17133.*

Auclert, A., M. Rognlie, and L. Straub, "Micro Jumps, Macro Humps: Monetary Policy and Business Cycles in an Estimated HANK Model," *NBER Working Paper*, 2020, *26647.*

Autor, David H., David Dorn, and Gordon H. Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," *American Economic Review*, 2013, *103* (6).

Banfield, E., "The Moral Basis of a Backward Society," *Glencoe, IL: The Free Press*, 1958.

Barro, R. and R. McCleary, "The Wealth of Religions: The Political Economy of Believing and Belonging," *Princeton University Press*, 2019.

Bauer, M. and E. Swanson, "An Alternative Explanation for the "Fed Information Effect"," *American Economic Review (Forthcoming)*, 2022.

Beraja, M., A. Fuster, E. Hurst, and J. Vavra, "Regional Heterogeneity and the Refinancing Channel of Monetary Policy," *Quarterly Journal of Economics*, 2019, *134(1).*

Bernanke, B. and A. Blinder, "The Federal Funds Rate and the Channels of Monetary Transmission," *American Economic Review*, 1992, *82(4).*

_ **and K. Kuttner**, "What Explains the Stock Market's Reaction to Federal Reserve Policy?," *Journal of Finance*, 2005, *60(3).*

_ **and M. Gertler**, "Inside the black box: The credit channel of monetary policy transmission," *Journal of Economic Perspectives*, 1995, *9* (1).

Berry, William D., E. Ringquist, R. Fording, and R. Hanson, "Measuring Citizen and Government Ideology in the American States," *American Journal of Political Science*, 1998, *42(1).*

Bertrand, M. and E. Kamenica, "Coming apart? Cultural distances in the United States over time," *NBER Working Paper*, 2020, *24771.*

Bianchi, D. and C. Ilut, "Monetary/Fiscal Policy Mix and Agents' Beliefs," *Review of Economic Dynamics*, 2017, *26.*

— and L. Melosi, "The Dire Effects of the Lack of Monetary and Fiscal Coordination," *Journal of Monetary Economics*, 2019, *104.*

Bianchi, F., T. Kind, and H. Kung, "Threats to Central Bank Independence: High-Frequency Identification with Twitter," *NBER Working Paper 26308*, 2021.

Broer, T., A. Kohlhas, K. Mitman, and K. Schlafmann, "Information and Wealth Heterogeneity in the Macroeconomy," *CEPR DP15934*, 2021.

Bursian, D. and E. Faia, "Trust in the monetary authority," *Journal of Monetary Economics*, 2018, *98.*

Butler, J., P. Giuliano, and L. Guiso, "Trust and Cheating," *The Economic Journal*, 2015, *126(595).*

—, —, and —, "Trust, Values, and False Consensus," *International Economic Review*, 2015, *56(3).*

Camous, A. and D. Matveev, "Furor over the Fed: A President's Tweets and Central Bank Independence," *CESifo Economic Studies*, 2021.

Campante, F., R. Durante, and A. Tesei, "Media and Social Capital," *CEPR Discussion Paper 16500*, 2021.

Campbell, J., C. Evans, J. Fisher, and A. Justiniano, "Macroeconomic Effects of Federal Reserve Forward Guidance, Premia, and the Monetary Transmission," *Brookings Papers on Economic Activity*, 2012, *42(1).*

Carroll, C., E. Crawley, J. Slacalek, K. Tokuoka, and M. N. White, "Sticky Expectations and Consumption Dynamics," *Working Paper*, 2018.

Caughey, D. and C. Warshaw, "The Dynamics of State Policy Liberalism," *American Journal of Political Science*, 2016, *60(4).*

Chetty, R., A. Looney, and K. Kroft, "Salience and Taxation: Theory and Evidence," *American Economic Review*, 2009, *99(4).*

Chodorow-Reich, Gabriel, "Regional Data in Macroeconomics: Some Advice for Practitioners," *Journal of Economic Dynamics and Control*, 2020, *115.*

—, **Plamen T Nenov, and Alp Simsek**, "Stock market wealth and the real economy: A local labor market approach," *American Economic Review*, 2021, *111* (5), 1613–57.

Clarida, R., J. Gali, and M. Gertler, "The Science of Monetary Policy: A New Keynesian Perspective," *Journal of Economic Literature*, 1999, *37(4).*

Coibion, O. and Y. Gorodnichenko, "What Can Survey Forecasts Tell Us about Information Rigidities?," *Journal of Political Economy*, 2012, *120(1).*

— and —, "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts," *American Economic Review*, 2015, *105(8).*

Coleman, J.S., "Power and the Structure of Society," *Norton, New York*, 1974.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl, "The deposits channel of monetary policy," *Quarterly Journal of Economics*, 2017, *132* (4), 1819–1876.

Ehrmann, M., M. Soudan, and L. Stracca, "Explaining European union citizens' trust in the European central bank in normal and crisis times," *Scandinavian Journal of Economics*, 2013, *115(3).*

Eusepi, S. and B. Preston, "The Science of Monetary Policy: An Imperfect Knowledge Perspective," *Journal of Economic Literature*, 2018, *56(1).*

Faia, E., A. Fuster, V. Pezone, and B. Zafar, "Biases in Information Selection and Processing: Survey Evidence from the Pandemic," *NBER Working Paper 28484*, 2021.

Falk, A., A. Becker, T. Dohmen, B. Enke, D. Huffman, and U. Sunde, "Global Evidence on Economic Preferences," *Quarterly Journal of Economics*, 2018, *133.*

Farhi, E. and I. Werning, "Monetary Policy, Bounded Rationality, and Incomplete Markets," *American Economic Review*, 2019, *109(11).*

Favara, G., S. Gilchrist, K. Lewis, and E. Zakrajsek, "Updating the Recession Risk and the Excess Bond Premium," *FEDS Notes. http://dx.doi.org/10.17016/2380-7172.1739.*, 2016.

Ferrario, B. and S. Stantcheva, "Eliciting People's First-Order Concerns: Text Analysis of Open-Ended Survey Questions," *AEA Papers and Proceedings*, 2022, *112.*

Fukuyama, F., "Trust: The Social Virtues and the Creation of Prosperity," *The Free Press*, 1996.

Gabaix, X., "Behavioral Inattention," *Handbook of Behavioral Economics: Applications and Foundations 1*, 2019, *2.*

_ , "A Behavioral New Keynesian Model," *American Economic Review*, 2020, *110(8).*

Gali, J., "Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework and Its Applications," *Princeton University Press*, 2008.

Galiani, S., P. Gertler, and C. Ahumada, "Trust and Saving in Financial Institutions," *NBER Working Paper 26809*, 2020.

Gambetta, D., "Trust: Making and Breaking Cooperative Relations," *Blackwell*, 1988.

Garcia-Schmidt, M. and M. Woodford, "Are Low Interest Rates Deflationary? A Paradox of Perfect-Foresight Analysis," *American Economic Review*, 2019, *109(1).*

Gennaioli, Nicola, Rafael La Porta, Florencio Lopez de Silanes, and Andrei Shleifer, "Trust and Insurance Contracts," 2020, (27189).

Gertler, M. and P. Karadi, "Monetary Policy Surprises, Credit Costs, and Economic Activity," *American Economic Journal: Macroeconomics*, 2015, *7(1).*

Gilchrist, S. and E. Zakrajsek, "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, 2012, *102(4).*

Giuliano, P. and R. Wacziarg, "Who Voted for Trump? Populism and Social Capital," *NBER Working Paper 27651*, 2020.

Glaeser, E., D. Laibson, J. Scheinkman, and C. Soutter, "Measuring Trust," *Quarterly Journal of Economics*, 2000, *115(3).*

Gorodnichenko, Y. and M. Weber, "Are sticky prices costly? Evidence from the stock market," *American Economic Review*, 2016, *106.*

Guiso, L., P. Sapienza, and L. Zingales, "The Role of Social Capital in Financial Development," *American Economic Review*, 2004, *94.*

_ , _ , and _ , "Trusting the Stock Market. The Journal of Finance," *Journal of Finance*, 2008, *63.*

Guriev, S. and E. Papaioannou, "The Political Economy of Populism," *Journal of Economic Literature*, 2021, *Forthcoming.*

Gurkaynak, R., B. Sack, and E. Swanson, "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements," *International Journal of Central Banking*, 2005, *1(1).*

Hansen, S. and M. McMahon, "Shocking Language: Understanding the Macroeconomic Effects of Central Bank Communication," *Journal of International Economics*, 2016, *99.*

_ , _ , and A. Prat, "Transparency and Deliberation within the FOMC: a Computational Linguistics Approach," *Quarterly Journal of Economics*, 2018, *133(2).*

Hazell, J., J. Herreno, E. Nakamura, and J. Steinsson, "The Slope of the Phillips Curve: Evidence from U.S. States," *Quarterly Journal of Economics*, 2021, *Forthcoming.*

Helliwell, J., H. Huang, and S. Wang, "New Evidence on Trust and Well-being," *NBER Working Paper 22450*, 2016.

Iovino, L. and D. Sergeyev, "Central Bank Balance Sheet Policies Without Rational Expectations," *Review of Economic Studies*, 2022, *Forthcoming.*

Jarocinski, M. and P. Karadi, "Deconstructing Monetary Policy Surprises—The Role of Information Shocks," *American Economic Journal: Macroeconomics*, 2020, *12.*

Jorda, O., "Estimation and Inference of Impulse Responses by Local Projections," *American Economic Review*, 2005, *95(1).*

Kaplan, G., B. Moll, and G. Violante, "Monetary Policy According to HANK," *American Economic Review*, 2018, *108* (3).

Knack, S. and P. Keefer, "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation," *Quarterly Journal of Economics*, 1997, *4.*

Kuttner, K., "Monetary policy surprises and interest rates: Evidence from the Fed funds futures market," *Journal of Monetary Economics*, 2001, *47.*

Laibson, D., P. Maxted, and B. Moll, "Present Bias Amplifies the Household Balance-Sheet Channels of Macroeconomic Policy," *Working Paper*, 2021.

Lawrence, Christiano, M. Eichenbaum, and C. Evans, "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of Political Economy*, 2005, *113(1).*

Levy, G., R. Razin, and A. Young, "Misspecified Politics and the Recurrence of Populism," *American Economic Review*, 2021, *Forthcoming.*

Mankiw, G. and R. Reis, "Sticky information versus sticky prices: A proposal to replace the new Keynesian Phillips curve," *Quarterly Journal of Economics*, 2002, *117* (4).

_ **and** _ , "Sticky Information in General Equilibrium," *Journal of the European Economic Association*, 2007, *5.*

Mankiw, N. G., R. Reis, and J. Wolfers, "Disagreement about inflation expectations," *NBER Macroeconomics Annual*, 2003, *18.*

Michalopoulos, S. and E. Papaioannou, "Pre-Colonial Ethnic Institutions and Contemporary African Development," *Econometrica*, 2013, *81(1).*

Miranda-Agrippino, S., "Unsurprising Shocks: Information, Premia, and the Monetary Transmission," *Bank of England Working Paper*, 2016, *626.*

_ **and G. Ricco**, "The Transmission of Monetary Policy Shocks," *American Economic Journal: Macroeconomics*, 2021, *13 (3).*

Mullainathan, S., J. Schwartzstein, and W. Congdon, "A reduced-form approach to behavioral public finance," *Annual Review of Economics*, 2012, *4(1).*

Nakamura, E. and J. Steinsson, "Fiscal Stimulus in a Monetary Union: Evidence from US Regions," *American Economic Review*, 2014, *104.*

_ **and** _ , "Identification in Macroeconomics," *Journal of Economic Perspectives*, 2018, *32* (3).

North, D., "Institutions, Institutional Change and Economic Performance," *Cambridge University Press*, 1990.

Nunn, N. and Leonard Wantchekon, "The Slave Trade and the Origins of Mistrust in Africa," *American Economic Review*, 2011, *101* (7).

Oster, E., "Unobservable Selection and Coefficient Stability: Theory and Evidence," *Journal of Business & Economic Statistics*, 2017, *37.*

Ostrom, E., "Governing the Commons: The Evolution of Institutions for Collective Action," *Cambridge, UK: Cambridge University Press*, 1990.

Pastor, L. and P. Veronesi, "Inequality Aversion, Populism, and the Backlash Against Globalization," *NBER Working Paper 24900*, 2020.

Piketty, T. and E. Saez, "Distributional National Accounts: Methods and Estimates for the United States," *The Quarterly Journal of Economics*, 2018, *133(2).*

Plagborg-Moller, M. and C. Wolf, "Local Projections and VARs Estimate the Same Impulse Responses," *Econometrica*, 2021, *89(2).*

Putnam, R., "Making Democracy Work: Civic Traditions in Modern Italy," *Princeton University Press*, 1993.

_ , "Bowling Alone: The Collapse and Revival of American Community," *Simon Schuster*, 2000.

Romer, C. and D. Romer, "Federal Reserve Information and the Behavior of Interest Rates," *American Economic Review*, 2000, *90(3).*

Rotemberg, J., "Sticky Prices in the United States," *Journal of Political Economy*, 1982, *90(6).*

Sims, C., "Implications of rational inattention," *Journal of Monetary Economics*, 2003, *50(3).*

Stantcheva, S., "Understanding Tax Policy: How do People Reason?," *Quarterly Journal of Economics*, 2021, *136(4).*

_ , "How to Run Surveys: A Guide to Creating Your Own Identifying Variation and Revealing the Invisible," *NBER Working Paper*, 2022, *30527.*

Stevenson, B. and J. Wolfers, "Trust in Public Institutions over the Business Cycle," *American Economic Review: Papers & Proceedings*, 2011, *101.*

Stiglitz, J., "In No One We Trust," *The New York Times*, 2013.

_ **, A. Sen, and J-P Fitoussi**, "Report by the Commission on the Measurement of Economic and Social Progress," 2009.

Stock, J. and M. Watson, "Slack and Cyclically Sensitive Inflation," *NBER Working Paper 25987*, 2019.

Thakor, R. and R. Merton, "Trust in Lending," *NBER Working Paper 24778*, 2018.

Woodford, M., "Interest and Prices: Foundations of a Theory of Monetary Policy," *Princeton University Press*, 2003.

_ , "Robustly Optimal Monetary Policy with Near-Rational Expectations," *American Economic Review*, 2010, *100(1).*

_ , "Monetary policy analysis when planning horizons are finite," *NBER Macroeconomics Annual*, 2019, *33(1).*

Zak, P. and S. Knack, "Trust and Growth," *The Economic Journal*, 2001, *111(470).*

Online Appendix for
"Social Capital and Monetary Policy"

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Contents

A Empirical Appendix

In this appendix we first provide further details on WVS trust surveys and index construction. Second, we report additional results and sensitivity checks. Finally, we provide the full set of results for all institutional trust sub-categories.

A.1 WVS Survey Details

Table A1 provides a detailed list of 20 survey questions that are related to trust and confidence in *institutions*. These are used to construct low-dimensional aggregates (principal components). In WVS, these 20 questions are under the "Confidence" category that ask respondents to rank their confidence in institutions on the scale from 1 (full confidence) to 4 (no confidence). The full list of institutions includes (varbatim): churches, armed forces, the press, labour unions, police, parliament, civil services, television, government, political parties, major companies, environment protection movement, women's movement, justice system / courts, major regional organizations, United Nations, NAFTA, charitable organizations, banks, universities.

Table A1 also provides basic (aggregated) summary statistics for weighted-averaged responses across states. Table A2 provides state-level statistics for each index. Several points stand out from table A1. Recall that lower values indicate high trust/confidence. First, armed forces enjoy the greatest degree of trust by far.[1] Second, the parliament and political parties suffer from the lowest degree of trust. These two categories also display the least amount of disagreement as can be seen from very high minimum values: this suggests that even in a relatively trusting region the degree of trust towards the political system is still very low as compared to any other entity or institution. Third, interestingly the degree of trust towards the press and television is also very low.

The bottom panel of Table A1 provides all the WVS questions and summary statistics for questions related to *inter-personal* trust. These numbers are also on the scale from 1 (high trust) to 4 (trust). One can immediately notice how much lower inter-personal trust values are in comparison to the institutional trust counterparts. This means that inter-personal trust is much greater on average than trust towards institutions. Interestingly, the degree of trust towards the "people you meet for the *first time*" is still on average higher than confidence in the political system (as can be seen from the "Confidence: Political Parties" entry in Table A1).

[1] Armed forces are included in the list because perception of physical security may also be a component of social capital. Our results will not depend on this because they hold across sub-indices of institutional trust that do not include armed forces.

Variable	Observations	Mean	SD	Min	Max
Institutional Trust (WVS)					
Confidence: Churches	50	2.195	0.324	1	2.793
Confidence: Armed Forces	50	1.789	0.212	1	2.15
Confidence: The Press	50	2.894	0.257	1.875	3.364
Confidence: Labour Unions	50	2.911	0.252	2	3.388
Confidence: Police	50	2.125	0.242	1	2.541
Confidence: Parliament	50	3.007	0.297	2.159	4
Confidence: Civil Services	50	2.537	0.22	2	3.021
Confidence: Television	50	2.871	0.241	2	3.364
Confidence: Government	50	2.771	0.285	2	4
Confidence: Political Parties	50	3.059	0.226	2.159	4
Confidence: Major Companies	50	2.731	0.237	2	3.131
Confidence: Environment Protection Movement	50	2.533	0.285	2	3.638
Confidence: Women's Movement	50	2.474	0.246	1.907	3.181
Confidence: Justice System / Courts	50	2.418	0.217	1.875	3
Confidence: Major Regional Organization	50	2.833	0.272	2	3.638
Confidence: United Nations	50	2.763	0.275	1.697	3.177
Confidence: NAFTA	50	2.834	0.271	2	3.638
Confidence: Charitable organizations	50	2.273	0.291	1	2.784
Confidence: Banks	50	2.659	0.321	1.929	4
Confidence: Universities	50	2.293	0.211	1.817	2.871
Interpersonal Trust (WVS)					
Trust: most people can be trusted	50	1.577	0.22	1	1.92
Trust: how much do you trust your family?	50	1.361	0.22	1	2
Trust: how much do you trust your neighbourhood?	50	2.211	0.23	1.674	3
Trust: how much do you trust people know you personally?	50	1.769	0.21	1.129	2.21
Trust: how much do you trust people you meet for the first time?	50	2.78	0.24	2	3.36
Trust: how much do you trust people of another religion?	50	2.226	0.19	1.789	2.63
Trust: how much do you trust people of another nationality?	50	2.318	0.26	1.736	3.31

Notes: This table summarizes survey questions that are related to trust towards institutions and other persons. Data source: World Values Surveys. Observations are for 50 U.S. states minus West Virginia and plus District of Columbia.

Table A1: WVS Survey Questions on Trust

State	Respondents	TrustInstitutions	TrustMarket	TrustServices	TrustGovernment	TrustLiberties	TrustInternational	TrustPersonal
AK	3	2.458	3.086	2.045	5.597	3.058	3.190	4.794
AL	27	3.929	5.256	3.337	6.213	3.955	3.765	4.373
AR	16	3.669	2.867	2.479	5.142	4.265	5.174	5.716
AZ	55	2.976	3.693	1.000	5.159	3.447	4.226	3.801
CA	261	3.965	4.354	1.146	5.478	4.515	4.949	4.728
CO	38	3.392	5.698	1.540	5.247	4.157	3.489	4.894
CT	29	6.721	8.352	3.242	7.202	6.568	6.631	7.220
DC	5	8.507	4.425	2.670	7.197	9.759	8.373	4.845
DE	9	3.620	3.029	2.086	4.618	4.605	4.729	1.000
FL	139	4.263	5.077	2.403	6.102	4.489	4.668	4.734
GA	65	3.766	4.320	1.590	5.650	4.228	4.495	2.774
HI	2	8.196	3.437	3.356	10.000	7.065	8.916	9.512
IA	27	5.891	8.430	2.989	6.200	6.544	5.489	5.898
ID	11	1.748	1.000	1.486	4.451	2.447	3.246	7.390
IL	86	5.070	4.831	2.490	5.898	5.382	5.616	5.297
IN	43	2.750	5.180	1.792	5.035	3.380	2.943	3.730
KS	20	4.165	6.233	2.981	5.952	4.583	3.896	5.254
KY	32	3.818	5.282	2.988	5.757	4.063	3.935	4.749
LA	22	4.080	4.245	2.862	5.982	4.415	4.604	3.577
MA	58	3.626	2.896	1.482	5.472	4.478	4.443	5.469
MD	44	5.139	3.448	2.714	6.458	5.309	5.978	4.476
ME	10	1.692	3.952	3.336	4.401	2.987	2.871	7.375
MI	61	3.842	4.910	3.675	5.567	4.183	3.619	5.450
MN	52	3.594	5.249	2.844	5.720	4.000	3.530	7.832
MO	42	4.038	4.749	2.426	5.139	4.648	4.150	7.356
MS	19	5.601	7.881	5.109	7.070	5.424	4.588	6.182
MT	4	4.270	7.420	4.470	5.103	3.692	5.626	10.000
NC	59	4.005	4.040	2.643	5.785	4.408	4.795	3.470
ND	6	1.000	2.993	4.106	5.912	1.000	1.000	5.010
NE	17	6.425	7.615	3.444	8.125	6.541	5.267	5.931
NH	7	4.294	8.195	2.157	6.383	3.225	6.765	6.013
NJ	72	5.156	5.467	2.501	5.886	5.617	5.334	6.607
NM	14	3.435	2.541	2.712	5.225	4.196	3.644	3.906
NV	29	2.707	2.049	1.538	5.643	3.203	2.560	3.846
NY	128	4.382	4.633	1.709	5.958	5.115	4.365	4.901
OH	88	3.874	4.227	2.619	5.805	4.559	4.075	5.034
OK	24	3.027	4.373	1.105	5.289	3.789	3.971	2.704
OR	37	3.811	5.191	2.657	4.904	5.247	2.211	8.083
PA	109	2.569	3.139	1.952	5.236	3.165	3.342	4.896
RI	1	4.574	2.030	10.000	1.000	5.912	6.621	5.505
SC	29	5.405	5.955	3.342	5.758	6.282	5.425	4.005
SD	9	6.367	10.000	2.323	7.323	6.448	5.840	7.973
TN	49	3.044	3.191	3.030	5.391	3.612	3.796	3.727
TX	182	3.498	5.191	2.485	5.631	4.106	3.333	4.128
UT	13	3.203	3.640	4.375	5.188	3.529	2.786	8.173
VA	55	4.968	5.480	3.243	6.365	5.057	4.682	5.120
VT	1	10.000	3.367	3.105	6.833	10.000	10.000	6.176
WA	45	2.805	4.106	2.172	5.047	2.990	3.652	4.661
WI	59	3.306	3.539	1.712	5.439	3.949	3.627	4.428
WY	19	3.538	3.445	3.055	5.766	3.929	3.889	5.946

Notes: This table summarizes the first principal components of institutional and inter-personal trust indices. See Table A1 for further details on the composition of each index and main text for exact index construction.

Table A2: Additional Summary Statistics

Census Region x Trust Measure	Dependent Variable: Regional GDP Response to MP Shock						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	TrustInstitutions	TrustPersonal	TrustMarket	TrustServices	TrustGovt	TrustLiberties	TrustInternational
North East x Trust	-0.345	-0.548	-0.518	0.107	-0.499	-0.299	-0.230
	(0.203)	(0.154)	(0.224)	(0.467)	(0.179)	(0.188)	(0.188)
Midwest x Trust	-0.177	-0.349	-0.202	0.304	-0.310	-0.165	-0.097
	(0.185)	(0.126)	(0.160)	(0.306)	(0.159)	(0.156)	(0.169)
South x Trust	-0.312	-0.577	-0.344	0.103	-0.375	-0.269	-0.200
	(0.184)	(0.153)	(0.174)	(0.280)	(0.167)	(0.160)	(0.152)
West x Trust	-0.286	-0.392	-0.359	0.130	-0.371	-0.275	-0.176
	(0.203)	(0.113)	(0.197)	(0.292)	(0.182)	(0.159)	(0.152)
Observations	49	49	49	49	49	49	49
R^2	0.144	0.268	0.223	0.052	0.266	0.114	0.079

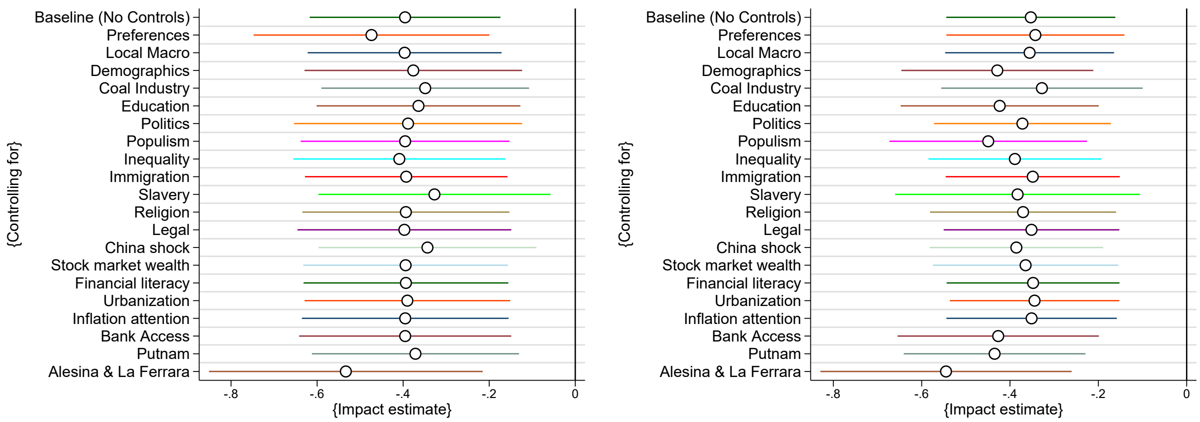
Note: This table shows how regional heterogeneity affects the impact of trust on monetary non-neutrality. We run cross-sectional regressions of state-level GDP responses $\hat{\beta}_s$ on standardized measures of social capital which are interacted with regional dummies. The four regions, following the U.S. Census classification, are "North East", "Midwest", "South", and "West". Each column represents a separate regression with a different measure of trust as an interacted independent variable. In parentheses are Long and Ervin (2000) robust standard errors.

Table A3: Regional Heterogeneity in Trust and Monetary Non-Neutrality

A.2 Regional Heterogeneity

In this section we inspect regional heterogeneity in our cross-sectional results. Specifically, we interact the main regressor of Equation 2 with dummies that represent four U.S. Census regions: "North East", "Midwest"', "South", and "West". Standard errors are now Long and Ervin (2000)-robust and nothing else in the specification changes. Table A3 reports the results.

In column (2) we see that the relationship between impact responses $\hat{\beta}_s$ and TrustPersonal is not necessarily driven by any particular region; point estimates are statistically significant for all regions. This implies that the interpersonal trust channel is quite homogenous across space. On the other hand, TrustInstitutions is concentrated slightly more in the North East and the South. A similar observation can be made for the five institutional sub-indices. Effects are generally concentrated in the North East and the South. The relative weight of the North Eastern region for the social capital channel is intriguing. Speculatively speaking, it may be related to the Great Migration of 1940-1970 and commute of millions of African Americans from the South to the Northern states (Boustan, 2016; Derenoncourt, 2021). Fully understanding this angle is outside the scope of the present paper but is an interesting avenue for future research.



(a) TrustInstitutions

(b) TrustPersonal

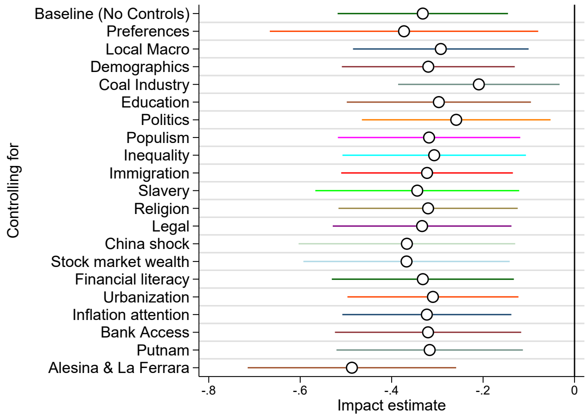
Notes: Point estimates of $\hat{\eta}$ and 90% confidence bands for cross-sectional regression results with each row stating which set of controls has been added to Z_s. The monetary shock measure used in the time-series step is from Jarocinski and Karadi (2020). Panels (a) and (b) use TrustInstitutions and TrustPersonal trust indicators as the $Trust_s$ measure, respectively.

Figure A1: Controlling for Information Content with Jarocinski and Karadi (2020)

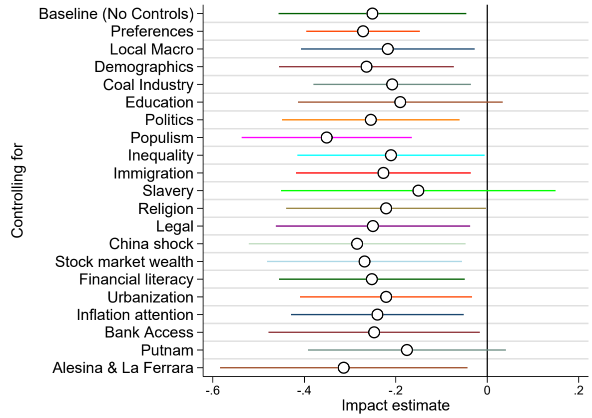
A.3 Monetary Policy Shock Robustness

Our baseline measure of monetary policy surprises can be refined in a way that accounts for the *information content* of central bank communication (Nakamura and Steinsson, 2018). We now use the Jarocinski and Karadi (2020) measure that disentagles the information channel from the pure monetary shock. We re-do the two-step procedure and present the results from cross-sectional specifications with the usual additional controls. Figure A1 reports the results in the usual format for our main measures - TrustInstitutions and TrustPersonal. We see that all coefficients are not only always statistically significant at least at the 90% level but also a lot more stable than in our baseline measure. If anything, our results have become starker.

Another robustness test that we perform with regards to measuring monetary surprises is the so-called "narrative" instrument proposed by Romer and Romer (2004), which is a well-known alternative to the market surprise approach. We use a related measure developed in Miranda-Agrippino and Ricco (2021), which adjusts the narrative instrument for the signalling (informational) effect of monetary policy. Once again, we repeat the two-step procedure and present the results in the usual format. Figure A2 reports the results. All coefficients in panel (a) are always statistically significant and as stable as in the baseline case. In the case of panel (b), point estimates are not always statistically significant, are relatively less stable, but remain in the same qualitative ballpark. Overall, we have documented that the social capital channel of monetary policy is generally very robust to how the monetary policy shock is measured.



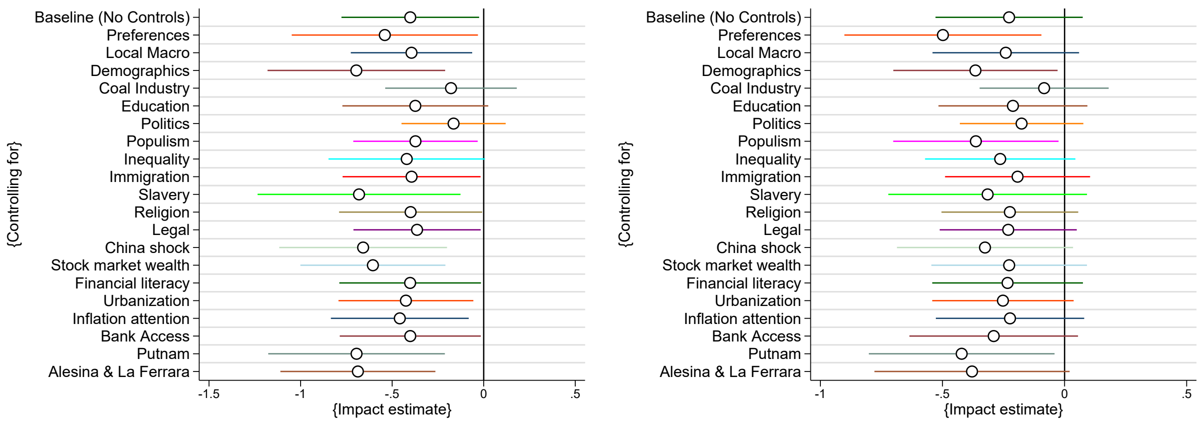
(a) TrustInstitutions



(b) TrustPersonal

Notes: Point estimates of $\hat{\eta}$ and 90% confidence bands for cross-sectional regression results with each row stating which set of controls has been added to Z_s. The monetary shock measure used in the time-series step is from Miranda-Agrippino and Ricco (2021). Panels (a) and (b) use TrustInstitutions and TrustPersonal trust indicators as the $Trust_s$ measure, respectively.

Figure A2: Controlling for the Central Bank's Information Set with Miranda-Agrippino and Ricco (2021)



(a) TrustInstitutions **(b)** TrustPersonal

Notes: Point estimates of $\hat{\eta}$ and 90% confidence bands for cross-sectional regression results with each row stating which set of controls has been added to Z_s. Relative to the baseline specification in main text, the control vector $\dot{x}t$ now also includes state CPI data from Hazell et al. (2021). Panels (a) and (b) use TrustInstitutions and TrustPersonal trust indicators as the $Trust_s$ measure, respectively.

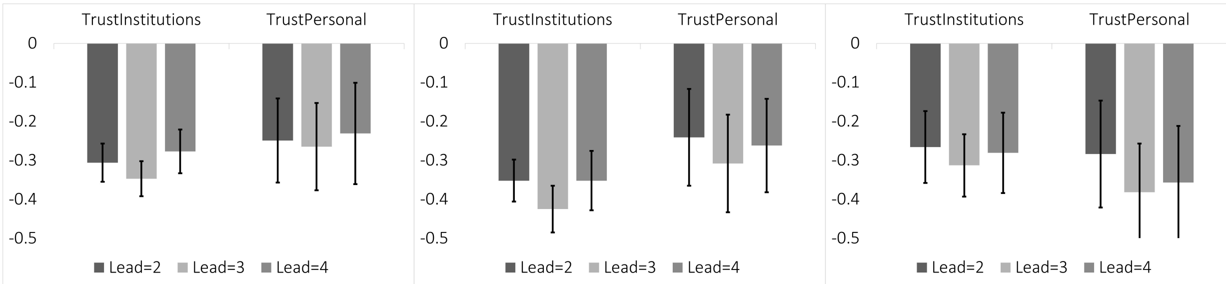
Figure A3: Controlling for State CPI with Hazell et al. (2021)

A.4 State Inflation Data

Our baseline analysis is missing regional inflation data - an essential determinant and target of monetary policy. To the best of our knowledge, Hazell et al. (2021) is the only comprehensive, publically available source for such data: authors make available the state consumer price index at the quarterly frequency for many states and going back to as early as 1978q1.

We obtain the latest available beta vintage of the dataset and use it in two separate exercises. First, in our time-series step we add state inflation to the control vector $\mathbf{x}_t$. Everything else in the specification, including lead-lag selection, remains unchanged. The outcome variable is still regional real GDP growth, as before. Figure A3 reports the results from the cross-sectional step. From panel (a) we see that almost all coefficients are statistically significant (with the exception of when we control for coal production and political beliefs). In panel (b), on the other hand, while coefficients remain qualitatively robust, most are not statistically significant at the 90% level; however they are all significant at the 68% level (two-tailed one standard deviation interval). Generally, all estimates have become on average a lot more negative, suggesting that our baseline exercise without the inflation control was potentially biased towards zero. In other words, not controlling for state inflation potentially made it harder for us to obtain any significant results. It is also important to note that the number of observations in the sample has reduced considerably to just 33 because state CPI data at the time of writing did not cover all states.

A second exercise that we have attempted is using state CPI as a dependent variable instead of real GDP growth in the time-series step. Our cross-sectional results consistently yield a noisy zero estimate, with or without controls (not shown). Cross-state heterogeneity in social capital and trust, either institutional or interpersonal, can not explain variation in the regional effects of monetary policy on inflation. Our results on the social capital channel should thus be thought of as only affecting production/quantities rather than prices. One caveat to this is that, again, the sample size of 33 may not be sufficiently large for a definitive conclusion.



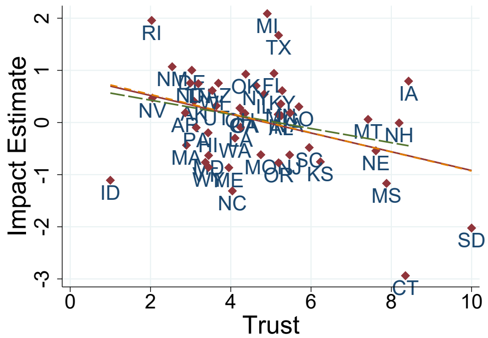
(a) *Lag=1* **(b)** *Lag=2* **(c)** *Lag=3*

Notes: This figure shows robustness to the selection of lags and leads in the first step of our empirical approach. Bars represent point estimates from the second step of the empirical approach, run under different lead-lag configurations. Error bars represent 90% confidence intervals.

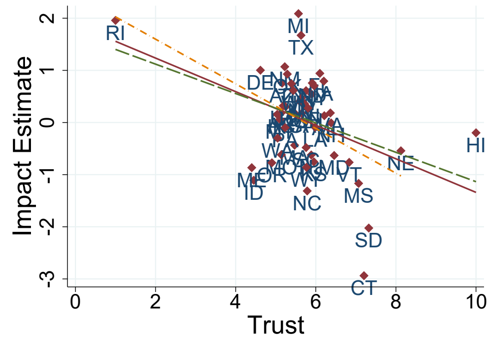
Figure A4: Lead-Lag Sensitivity of Main Results

A.5 Lead-Lag Sensitivity

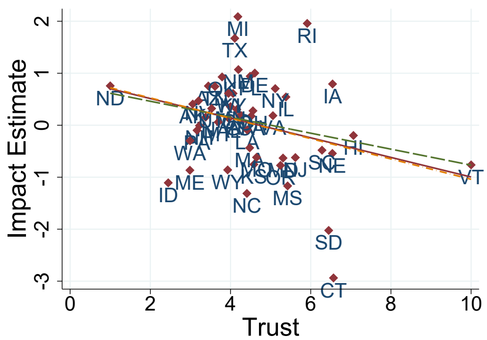
Selection of leads and lags during the first step of our empirical approach is an obvious degree of freedom for the researcher. It is important to ensure that our main results are not driven by the particular choice of $\hat{h} = 3$ and $L = 3$ in main text. We now conduct a sensitivity test where we re-do the analysis under various combinations of $\hat{h}$ and L. Our specifications remain otherwise unchanged relative to the baseline in main text. Figure A4 presents the results. In the three panels, we set the Lag (L) to 1, 2, 3, respectively. In each panel, the Lead ($\hat{h}$) is either 2, 3, or 4 quarters. In each set of results we show point estimates via columns and 90% confidence intervals via error bars. We find that all of our results remain quantitatively unchanged. Results also do not change when we control for the usual alternative channels of causality (not shown). We have thus established robustness of our findings with respect to the lead-lag selection.



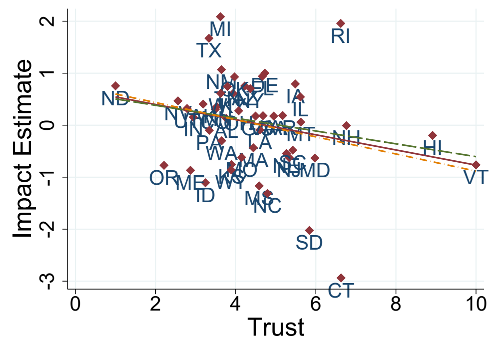
(a) TrustMarket



(b) TrustGovernment



(c) TrustLiberties



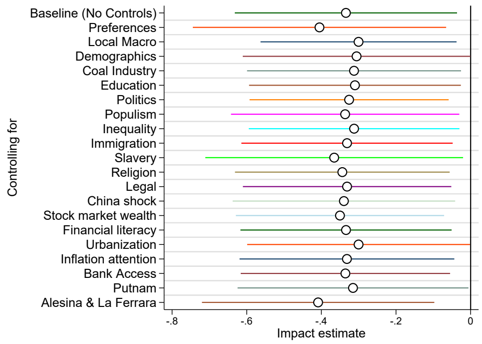
(d) TrustInternational

Notes: scatterplots from regressions of monetary policy impact elasticities $\hat{\beta}_s$ on TrustMarket, TrustGovernment, TrustLiberties, and TrustInternational indicators of regional trust. All panels present three lines of best linear fit: the straight red line is for the whole sample, the green long-dashed line is for the samples that exclude states with the lowest trust values, and the orange dash-dotted line is for the samples that exclude states with the highest trust values.

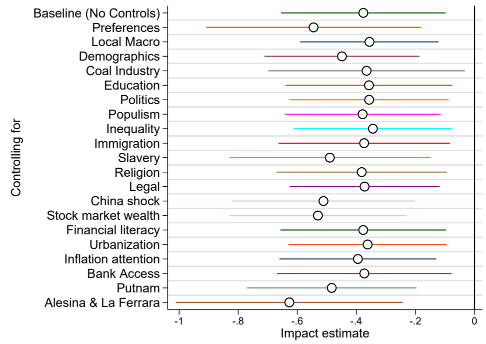
Figure A5: Results for Sub-Indices of TrustInstitutions

A.6 Results for all Sub-Indices of TrustInstitutions

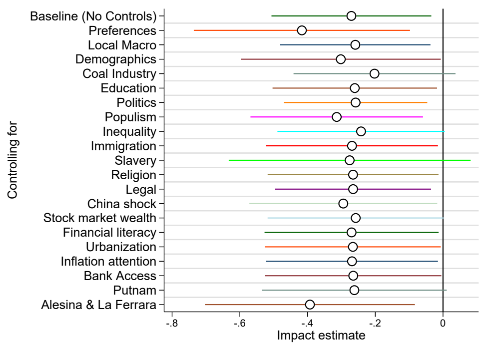
We now present results for sub-indices of institutional trust. First, in Figure A5 we depict scatter plots for TrustMarket, TrustGovernment, TrustLiberties, and TrustInternational. Second, in Figure A5 we show robustness to the presence of additional controls. We drop TrustServices because, as can be also seen from Table 1, this index does not produce significant effects. We find that TrustMarket and TrustGovernment produce estimates that are consistently significant and stable. As the comparison of lines of best linear fit in Figure A5 shows, results are also not driven by any singular outliers. We find that TrustLiberties produces results that are almost always significant, followed by TrustInternational for which estimates are generally noisier. Overall, we reaffirm the conclusion from main text that trust towards the market and the government are the two channels that are behind the importance of TrustInstitutions. This could have also been seen from



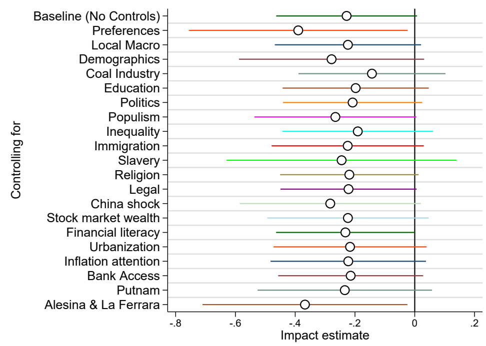
(a) TrustMarket



(b) TrustGovernment



(c) TrustLiberties

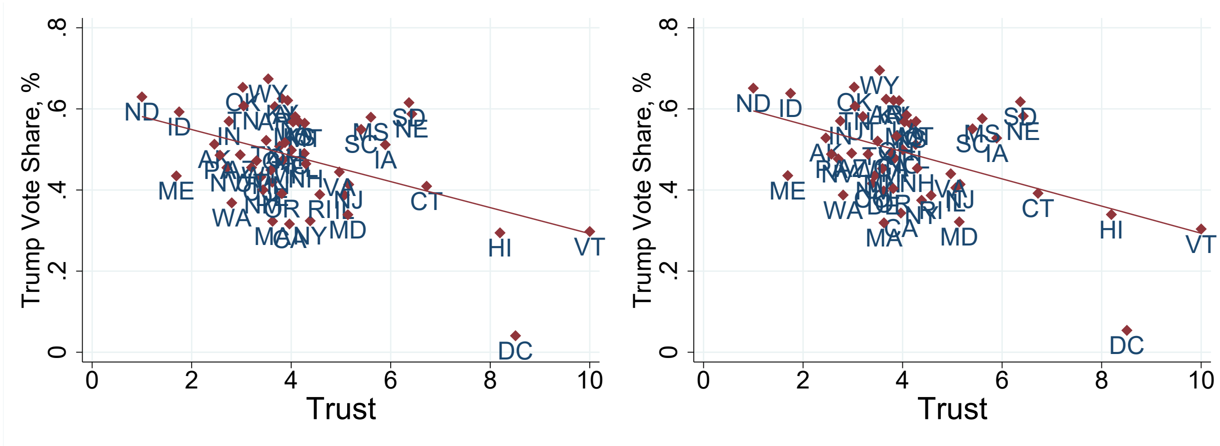


(d) TrustInternational

Notes: point estimates of $\hat{\eta}$ and 90% confidence bands for cross-sectional regression results with each row stating which set of controls has been added to Z_s. Panels (a), (b), (c), and (d) use TrustMarket, TrustGovernment, TrustLiberties, and TrustInternational trust indicators as the $Trust_s$ measure, respectively.

Figure A6: Results for Sub-Indices of TrustInstitutions with Additional Controls

Table 1 in main text: estimates for these two sub-indices are very close quantitatively to column (1), and the R-squared are large.



(a) 2016 Election **(b)** 2020 Election

Notes: Empirical relationship between the *TrustInstitutions* baseline measure of trust towards institutions (horizontal axis) and the Trump vote, in percentages of total vote (vertical axis), for the 2016 and 2020 U.S. Presidential elections. Pearson correlation coefficients in the two panels are -45.55 and -47.82, respectively.

Figure A7: Social Capital and the Trump Vote

B Model Appendix

B.1 Populism Cycles

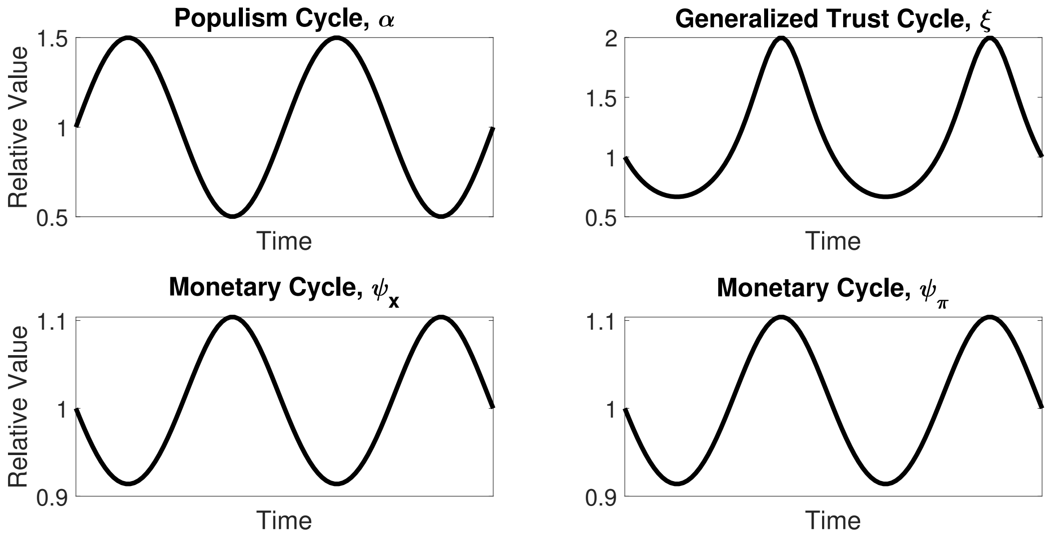
In this section we present a tangent discussion on how the social capital channel of monetary transmission may interact with the rise and cycle of populism (Rodrik, 2018).

Social Capital and Populism in the Data Giuliano and Wacziarg (2020) use a variety of data sources and show that social capital was a significant predictor of the Trump vote in the 2016 U.S. Presidential election. We replicate their approach. Figure A7 plots the relationship between our measure of trust towards institutions - TrustInstitutions - and the Trump vote shares in the 2016 and 2020 elections. The association is negative and statistically significant at least at the 5% level for both panels with Long and Ervin (2000)-robust standard errors. Notice also how low-trust outliers like North Dakota and Arkansas are states with weak regional monetary effectiveness (as per Figure 4) and are incidently also among the states with the highest support rate for Trump in both elections. Similarly for the high-trust outliers like Vermont and Hawaii - these two regions are among those with the highest monetary effectiveness and also the weakest support for Trump.

The intuitive idea is that the Trump era represents temporary success of the populist agenda. Populism thrives on the economically unfortunate and goes hand in hand with a crisis of trust and social capital. Regional heterogeneity in the local stocks of social capital is thus intuitively positively correlated with the desire to vote for the populist who promises to end globalization, punish the elites, or slow down automation and save jobs (Acemoglu and Restrepo, 2020). "Populism shocks" are associated with low levels of social capital, which in turn undermine the monetary transmission mechanism - this is the novel angle of this paper. It is obviously challenging to establish the direction of causality in the populism-trust relationship. Populists are attracted to areas that are already low in institutional trust; this is the whole point of the mantra and the strategy. On the other wand, populism waves are shown to be associated with *further* deterioration in trust (Algan et al., 2018).

Populism and Monetary Policy in the Model One appeal of our New Keynesian model with trust is that α, i.e. distance from the circle of trust to the origin of the Brownian motion, or what we call "institutional trust", can be used as a proxy for populism shocks in a workhorse equilibrium framework. In particular, a sudden and exogenous increase in α represents the notion that institutions and the government are suddenly perceived by the agent to be more "distant" and less trustworthy. For example, policy signals coming from the government are perceived to be more noisy and are thus discarded more frequently. Suppose that the populist blames the government or the central bank for high interest rates.[2] As a result, generalized trust ξ falls and social capital stocks dwindle. Since macroeconomic elasticities of monetary policy shocks fall when ξ falls, as we have established in main text, the power of transitory monetary interventions diminishes.

[2]President Trump regularly criticized the Federal Reserve on Twitter and elsewhere, calling for lower interest rates - a typical populist tactic.



Notes: populism (institutional trust α), generalized trust (ξ), and monetary policy effectiveness (ψ_x and ψ_π) in the model.

Figure A8: Populism Cycles, Trust, and Monetary Policy

Figure A8 illustrates the mechanism. All panels show relative values, i.e. with respect to the beginning of time which represents the full-trust steady state. The top-left panel plots the exogenous populism cycle: a sine wave fluctuation in α, with time on the horizontal axis. The top-right panel shows the implied time-series of generalized trust ξ. When populism is high, trust is low. The bottom two panels show the variation in the output gap and inflation elasticities of monetary policy shocks, i.e. structural objects ψ_x and ψ_π. Elasticities are low when populism is high. In other words, populism waves dampen the economic responsiveness to any shocks to the nominal interest rate. That is, if a central bank decides to cut rates in a surprise fashion and stimulate the economy when populism is high, the economic response will be significantly lower. Our framework therefore offers a cautionary prediction that populism waves may obstruct central banking. This idea is consistent with the general view that "populists dislike monetary dominance" (Edwards, 2019).

The level of populism can also be viewed as a *state variable* that matters for the transmission mechanism. Naturally, in this simple exercise we are simply entertaining comparative statics dynamics of exogenous changes in α. In future work, one can model a framework where $\alpha(t)$ follows a stochastic law of motion. In that scenario, aggregate fluctuations in populism and trust could drive economic and financial conditions without any underlying changes in technology or preferences.

B.2 Full Model Outline

Households Hamiltonian of the household problem is:

$$\mathcal{H}(C, N, B, \omega; t) = U(C, N) + \omega\Big(\hat{i}(t)B + W(t)N - T(t) - P(t)C(t)\Big) \tag{22}$$

Optimality conditions are:

$$\mathcal{H}_C : \; U_C(C, N) = \omega(t)P(t) \tag{23}$$

$$\mathcal{H}_N : \; -U_N(C, N) = \omega(t)W(t) \tag{24}$$

$$\mathcal{H}_B : \; \omega(t)\hat{i}(t) = \rho\omega(t) - \dot{\omega}(t) \tag{25}$$

Given the utility function $U\big(C, N\big) = \frac{C(t)^{1-\sigma}}{1-\sigma} - \frac{N(t)^{1+\varphi}}{1+\varphi}$ we obtain the simplified equations in main text.

Firms A representative, perfectly competitive final goods producer aggregates intermediate goods using a CES aggregator:

$$Y(t) = \Big(\int_0^1 y_j(t)^{\frac{\epsilon-1}{\epsilon}} dj\Big)^{\frac{\epsilon}{\epsilon-1}} \tag{26}$$

Cost minimization yields the demand function for intermediate good j:

$$y_j(t) = \Big(\frac{p_j(t)}{P(t)}\Big)^{-\epsilon} Y(t) \tag{27}$$

with the true price index:

$$P(t) = \Big(\int_0^1 p_j(t)^{1-\epsilon} dj\Big)^{\frac{1}{1-\epsilon}} \tag{28}$$

Intermediate good producers only input labor. Rotemberg rice adjustment carries a quadratic cost $\Theta\left(\frac{\dot{p}(t)}{p(t)}\right) = \frac{\theta}{2}\left(\frac{\dot{p}(t)}{p(t)}\right)^2 P(t)Y(t)$. We henceforth drop the j indexation for brevity and because it is irrelevant for the solution. Hamiltonian for the firms problem is:

$$\mathcal{H}(p, \dot{p}, \eta; t) = \Pi(p; t) - \Theta\left(\frac{\dot{p}(t)}{p(t)}; t\right) + \eta\dot{p}(t) \tag{29}$$

where η is a co-state variable and $\Pi(p; t)$ are flow profits under constant nominal marginal costs:

$$\Pi(p; t) = \left(p(t) - \frac{W(t)}{A}\right)\left(\frac{p(t)}{P(t)}\right)^{-\epsilon} Y(t) \tag{30}$$

Optimality conditions are:

$$\mathcal{H}_{\dot{p}}(p,\dot{p},\eta;t): \theta\left(\frac{\dot{p}(t)}{p(t)}\right)\frac{P(t)}{p(t)} = \eta(t) \tag{31}$$

$$\mathcal{H}_{p}(p,\dot{p},\eta;t): i(t)\eta(t) - \dot{\eta}(t) = \left[\left((1-\epsilon)+\epsilon\frac{W(t)}{p(t)A}\right)\left(\frac{p(t)}{P(t)}\right)^{-\epsilon} + \theta\left(\frac{\dot{p}(t)}{p(t)}\right)^2\frac{P(t)}{p(t)}\right]Y(t) \tag{32}$$

Now, impose the usual equilibrium symmetry assumption such that $p(t) = P(t)$. Simplifications yield:

$$\mathcal{H}_{\dot{p}}(p,\dot{p},\eta;t): -\theta\pi(t)Y(t) + \eta(t) \tag{33}$$

$$\mathcal{H}_{p}(p,\dot{p},\eta;t): i(t)\eta(t) - \dot{\eta}(t) = \left[\left((1-\epsilon)+\epsilon\frac{W(t)}{P(t)A}\right) + \theta\pi(t)^2\right]Y(t) \tag{34}$$

where $\pi(t) := \frac{\dot{P}(t)}{P(t)}$ is the inflation rate. Differentiating the first optimality condition with respect to time gives $\theta\dot{\pi}(t)Y(t) + \theta\pi(t)\dot{Y}(t) = \dot{\eta}(t)$. Use this object to eliminate $\dot{\eta}(t)$ from the second optimality condition and obtain:

$$\left(i(t) - \pi(t) - \frac{\dot{Y}(t)}{Y(t)}\right)\pi(t) = \dot{\pi}(t) + \frac{\epsilon-1}{\theta}\left(\frac{\epsilon}{\epsilon-1}\frac{W(t)}{P(t)}\frac{1}{A} - 1\right) \tag{35}$$

Equilibrium In general equilibrium we have $C(t) = Y(t)$. Substituting into the household's Euler equation yields the standard formula that links inflation and marginal costs:

$$\rho\pi(t) = \dot{\pi}(t) + \frac{\epsilon-1}{\theta}\left(\frac{\epsilon}{\epsilon-1}\frac{W(t)}{P(t)}\frac{1}{A} - 1\right) \tag{36}$$

Analogously, in integral form:

$$\pi(t) = \frac{\epsilon-1}{\theta}\int_t^\infty e^{-\rho(s-t)}\left(\frac{\epsilon}{\epsilon-1}\frac{W(s)}{P(s)}\frac{1}{A} - 1\right)ds \tag{37}$$

Substituting in the definitions of the output gap into the inflation and Euler equations yields the IS and Phillips formulae in levels:

$$\frac{\dot{X}(t)}{X(t)} = \frac{1}{\sigma}\left(\hat{i}(t) - \pi(t) - r\right) \tag{38}$$

$$\rho\pi(t) = \frac{\epsilon-1}{\theta}\left(X(t)^{1+\varphi} - 1\right) + \dot{\pi}(t) \tag{39}$$

Log-linearization yields the equations displayed in main text.

B.3 Proof of Proposition 1

Let $f : A_k \to \mathbb{R}$ be defined by:

$$f(x) = |x|^{2-n} \tag{40}$$

Given the stopping time τ, the diffusion $B(t)$ that originates from α, and assuming that $\mathbb{E}(\tau) < \infty$, for a given $k > 0$ the Dynkin's formula can be written as:

$$\mathbb{E}\Big[f\Big(B(\tau)\Big)\Big] = f(\alpha) + \mathbb{E}\left[\int_0^\tau \Big(Af\Big)\Big(B(s)\Big)ds\right] \tag{41}$$

Where A is the infinitesimal diffusion generator of $B(t)$ and ∇^2 the Laplace operator:

$$A = \frac{1}{2}\nabla^2 \tag{42}$$

Since $\nabla^2 f = 0$ we get:

$$\mathbb{E}\Big[f\Big(B(\tau)\Big)\Big] = f(\alpha) \tag{43}$$

In words, the expected value of f evaluated at the first exit time of $B(t)$, which is starting from α, is equal to the value of f at point α. Now, let $\xi_k = P(|B(\tau)| = R)$ and $q_k = P(|B(\tau)|) = kR$. Since $|X(\tau)|$ is a random variable with only two possible outcomes, we know that $\xi_k + q_k = 1$ and get:

$$\mathbb{E}\Big[f\Big(X(\tau)\Big)\Big] = \xi_k f(R) + q_k f(kR) \tag{44}$$

Substituting $f(R)$, $f(kR)$, and $f(\alpha)$ yields:

$$\frac{\xi_k}{R^{n-2}} + \frac{q_k}{k^{n-2}R^{n-2}} = \frac{1}{\alpha^{n-2}} \tag{45}$$

Finally, solving for ξ_k and taking the limit yields:

$$\begin{aligned}
\xi &= \lim_{k\to\infty} \xi_k \\
&= \lim_{k\to\infty} \left[\tfrac{R^{n-2}}{\alpha^{n-2}} - \tfrac{q_k}{k^{n-2}}\right] \\
&= \left(\tfrac{R}{\alpha}\right)^{n-2} < 1 \quad \text{For } n \geq 3
\end{aligned}$$

□

B.4 Proof of Proposition 2

Begin by solving the characteristic polynomial and finding eigenvalues of **A**:

$$\begin{aligned} 0 &= det(\mathbf{A} - \lambda I) \\ &= det \begin{bmatrix} \frac{\xi\phi_x}{\sigma} - \lambda & \frac{\xi\phi_\pi - 1}{\sigma} \\ -\kappa & \rho - \lambda \end{bmatrix} \\ &= \lambda^2 - \lambda\left(\frac{\xi\phi_x}{\sigma} + \rho\right) + \frac{(\xi\phi_\pi - 1)\kappa + \xi\phi_x\rho}{\sigma} \end{aligned}$$

The quadratic has two solutions:

$$\lambda = \frac{\frac{\xi\phi_x}{\sigma} + \rho \pm \sqrt{\left(\frac{\xi\phi_x}{\sigma} + \rho\right)^2 - 4\left[\frac{(\xi\phi_\pi - 1)\kappa + \xi\phi_x\rho}{\sigma}\right]}}{2}$$

The first root's real parts are always positive. Real part of the second is positive if and only if $\xi\phi_\pi > 1$.

□

B.5 Proof of Proposition 3

The proposition can be proved by the standard method of undetermined coefficients. Conjecture the following:

$$x(t) = \psi_x\epsilon(t), \quad \pi(t) = \psi_\pi\epsilon(t), \quad \dot{x}(t) = -\psi_x\epsilon(t)\eta, \quad \dot{\pi}(t) = -\psi_\pi\epsilon(t)\eta$$

First, start with the Euler equation:

$$\sigma\dot{x}(t) = i_d - r + \xi(i^* - i_d) + (\xi\phi_\pi - 1)\pi(t) + \xi\phi_x x(t) + \xi\epsilon(t)$$

Now plug in the guesses:

$$-\sigma\psi_x\eta\epsilon(t) = i_d - r + \xi(i^* - i_d) + (\xi\phi_\pi - 1)\psi_\pi\epsilon(t) + \xi\phi_x\psi_x\epsilon(t) + \xi\epsilon(t)$$

Following the discussion in main text, the interest rate target is fixed depending on the default rate heuristic:

$$i^* = \begin{cases} \frac{r}{\xi} & \text{if } i_d = 0 \\ r & \text{if } i_d = r \end{cases}$$

After simplifying we get:

$$-\sigma\psi_x\eta = (\xi\phi_\pi - 1)\psi_\pi + \xi\phi_x\psi_x + \xi$$

Now, plug in the guesses into the Phillips curve:

$$\begin{aligned} -\psi_\pi\eta\epsilon(t) &= \rho\psi_\pi\epsilon(t) - \kappa\psi_x\epsilon(t) \\ \psi_x &= \tfrac{\rho+\eta}{\kappa}\psi_\pi \end{aligned}$$

Plugging back into the first equation yields:

$$\begin{aligned} \psi_x &= -\tfrac{\xi(\rho+\eta)}{(\rho+\eta)(\sigma\eta+\xi\phi_x)+\kappa(\xi\phi_\pi-1)} \\ \psi_\pi &= -\tfrac{\xi\kappa}{(\rho+\eta)(\sigma\eta+\xi\phi_x)+\kappa(\xi\phi_\pi-1)} \end{aligned}$$

Finally, taking partial derivatives with respect to ξ gives:

$$\frac{\partial\psi_x}{\partial\xi} = \frac{(\rho+\eta)(\rho\eta\sigma+\eta^2\sigma-\kappa)}{B^2}$$

and

$$\frac{\partial\psi_\pi}{\partial\xi} = \frac{\kappa(\rho\eta\sigma+\eta^2\sigma-\kappa)}{B^2}$$

With $B := \kappa(\xi\phi_\pi - 1) + (\rho+\eta)(\sigma\eta + \xi\phi_x)$. Both derivatives are positive if and only if the following parameter restriction is satisfied:

$$\rho\eta\sigma + \eta^2\sigma - \kappa > 0$$

□

B.6 Bessel Process Representation

The layout and proof of Proposition 1 could be achieved using an n-dimensional Bessel process:

$$\mathcal{R}(t) = \text{dist}\,(0, W(t)) = \sqrt{W_1(t)^2 + \cdots + W_n(t)^2}$$

Consider, in parallel to our baseline process $B(t)$, a process $Y(t) = a + \mathcal{R}(t)$, such that $0 \leq a < R$. The generator of $Y(t)$ is the n-dimensional Bessel operator:

$$A = \frac{1}{2}\frac{d^2}{dx^2} + \frac{n-1}{2x}\frac{d}{dx}$$

Now, consider the exit time τ:

$$\tau = \{t > 0; Y(t) > R\}$$

Applying Dynkin's formula:

$$\mathbb{E}\left[f(Y(\tau))\right] = f\left[Y(0)\right] + \mathbb{E}\left[\int_0^\tau (Af)\,(Y(s))\,ds\right]$$

for $f(x) = x^2$ gives us $R^2 = a^2 + \mathbb{E}\left[\int_0^\tau nds\right]$. This recovers the same equations as in (20)-(22) conditional on $|\alpha|= a$. Now, consider again the annulus:

$$A_{R,kR} = \{x \in \mathbb{R}^n; R < |x|< kR\}$$

for $k > 0$. Consider the stopping time: $\tau = inf\{t > 0; Y(t) \notin A_{R,kR}\}$. Note that this stopping time is directly analogous to $\tau = inf\{t > 0; B(t) \notin A_{R,kR}\}$. Applying the Dynkin's formula for $f(x) = x^{2-n}$ yields:

$$\xi_k R^{2-n} + q_k (kR)^{2-n} = a^{2-n}$$

where $\xi_k = Pr\,(|Y(t)|) = R$, $q_k = Pr\,(|Y(t)|) = kR$, and $\xi_k + q_k = 1$. Solving for the object of interest yields:

$$\xi_k = \frac{\left(\frac{kR}{a}\right)^{n-2} - 1}{\left(\frac{kR}{R}\right)^{n-2} - 1}$$

Now, as before, compute the transcience probability that the motion hits the the ball:

$$\begin{aligned}\xi &= \lim_{k\to\infty} \xi_k \\ &= \lim_{k\to\infty} \frac{a^{2-n}(kR)^{n-2}-1}{R^{2-n}(kR)^{n-2}-1} = \left(\frac{R}{a}\right)^{n-2}\end{aligned}$$

Which is, again without loss of generality, < 1 as long as $n > 2$.

References

Acemoglu, D. and P. Restrepo, "Robots and Jobs: Evidence from US Labor Markets," *Journal of Political Economy*, 2020, *128(6).*

Algan, Y., S. Guriev, E. Papaioannou, and E. Passari, "The European Trust Crisis and the Rise of Populism," *Brooking's Papers on Economic Activity*, 2018, *Fall Meetings.*

Boustan, L., "Competition in the Promised Land: Black Migrants in Northern Cities and Labor Markets," *National Bureau of Economic Research Publications*, 2016.

Derenoncourt, E., "Can you move to opportunity? Evidence from the Great Migration," *American Economic Review*, 2021, *Forthcoming.*

Edwards, S., "The New Old Populism," *Project Syndicate*, 2019, *10 January.*

Giuliano, P. and R. Wacziarg, "Who Voted for Trump? Populism and Social Capital," *NBER Working Paper 27651*, 2020.

Hazell, J., J. Herreno, E. Nakamura, and J. Steinsson, "The Slope of the Phillips Curve: Evidence from U.S. States," *Quarterly Journal of Economics*, 2021, *Forthcoming.*

Jarocinski, M. and P. Karadi, "Deconstructing Monetary Policy Surprises—The Role of Information Shocks," *American Economic Journal: Macroeconomics*, 2020, *12.*

Long, J. and L. Ervin, "Using Heteroscedasticity Consistent Standard Errors in the Linear Regression Model," *The American Statistician*, 2000, *54(3).*

Miranda-Agrippino, S. and G. Ricco, "The Transmission of Monetary Policy Shocks," *American Economic Journal: Macroeconomics*, 2021, *13 (3).*

Nakamura, E. and J. Steinsson, "Identification in Macroeconomics," *Journal of Economic Perspectives*, 2018, *32* (3).

Rodrik, D., "Populism and the economics of globalization," *Journal of International Business Policy*, 2018.

Romer, C. and D. Romer, "A New Measure of Monetary Shocks: Derivation and Implications," *American Economic Review*, 2004, *94(4).*