Heterogeneous Attention to Inflation and Monetary Policy[*]

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Abstract

We study how heterogeneous attention to inflation across households affects the transmission of monetary policy. Using household-level surveys for the US and Australia, we first show that households' attention to inflation varies across income levels. Specifically, we find that high-income households pay more attention to inflation than other income groups. To quantify the effects for the aggregate economy, we build a Heterogeneous Agent New Keynesian model with an endogenous attention choice where the level of attention to inflation varies along the income distribution. Compared to fully rational inflation expectations, we find that the economy faces a less severe recession after a monetary policy tightening when households' expectations are stable. This result is driven by the misperceived fall in future real labor income of low-income households that incentivizes an increase in their labor supply. At the same time, in response to the tightening, low-earners experience an even larger decrease in their welfare under inattention compared to the rational expectations case.

Keywords: Inattention, HANK, Monetary Policy, Inflation Expectations
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1. Introduction

Inflation expectations matter for the macro economy but the way they are generally introduced into state-of-the-art macroeconomic models is not in line with micro-level evidence. Micro-level data shows that inflation expectations systematically differ between household groups, indicating an important dimension of household heterogeneity in understanding the macroeconomic impact of monetary policy (see Weber et al. (2022)). In this paper, guided by the empirical estimates of the inflation expectations process from household-level data, we incorporate an endogenous inflation expectation formation process, driven by the level of attention households pay towards price changes, into a Heterogeneous Agent New Keynesian model and find that the distributional consequences of monetary policy are larger than under a rational expectations framework.

Firstly, we show empirically that households do not have fully rational inflation expectations, pay heterogeneous amounts of attention to inflation, which inter alia depends on their income level, and that inflation expectations affect households' labor supply decisions. Based on Pfäuti (2024) we estimate the level of attention to inflation, or the Kalman gain placed on forecast errors, across different household groups. We employ data from the Survey of Consumer Expectations from the New York Fed (SCE) for the US and the Consumer Attitudes, Sentiments and Expectations in Australia Survey (CASiE) for Australia and find robust cross-country evidence that high-income households pay significantly more attention to inflation than low-income households. Other socio-demographic characteristics like age, home-ownership or gender either drive less heterogeneity in attention levels or provide less robust results. In addition, we explore the positive relationship between labor supply across the income distribution and the stability of inflation expectations in response to monetary policy shocks, allowing us to unravel a new transmission channel of inflation expectations to labor supply decisions. Using the local projection framework of Jordà (2005) and the monetary policy shocks of Bauer and Swanson (2023), we find that hours worked (and the probability of unemployment) increase (decreases) after a monetary policy tightening among households with more anchored inflation expectations.

To quantify the effects of our empirical results for the macroeconomic impact of monetary policy we propose a Heterogeneous Agent New Keynesian (HANK) model with income and wealth heterogeneity and heterogeneous endogenous attention towards inflation. Households differ in their accumulated wealth, their labor productivity and their attention towards inflation. In each period they make consumption-saving and labor supply decisions. Accumulated savings depend on a history of labor productivity, where the latter is a product of idiosyncratic and a more permanent component, i.e. skills[1]. The first component is the income process driven by Bewley-type shocks. For the second component, endowed with skills for different occupations, households sort into high-wage and low-wage occupations. This determines the differences in the permanent income inequality across households and also their attention to inflation, which is calibrated to match our empirical evidence. Hours worked are heterogeneous and households save in one asset.

Through the lens of this model we find that in response to a contractionary monetary policy shock, households who are at the borrowing constraint or close to it, i.e. low-income households,

1 Which is also in line with the evidence in D'Acunto et al. (2023) who find heterogeneity in inflation forecasts across different IQ levels.

increase their hours worked in response to a monetary tightening. Observing nominal wages and due to the misperception of the inflation rates as a result of low attention, following a contractionary monetary policy shock, low-income households perceive a larger fall in their real labor income than they actually experience. Amid a lack of savings buffers, an increase in labor supply allows these households to smooth their consumption along the business cycle. This channel is absent in models with a representative agent, since a representative household is sufficiently rich to behave in line with her Euler equation and for whom the substitution effect dominates the income effect of labor supply. The above-mentioned results from local projections support our theoretical channel as they also indicate a larger increase in hours worked in response to monetary policy shocks for households with more anchored inflation expectations. In our model the dominant income effect is key for the monetary policy trade-off. Due to the increased labor supply of low-income and inattentive households, the recession induced by a contractionary monetary policy is milder than in a standard full information rational expectations (FIRE) economy and the policy maker faces a better inflation-output trade-off, measured as the ratio of standard deviations of inflation to output. However, given the household's disutility from working, low-income households encounter large welfare losses. Thus, the distributional consequences of monetary policy are larger in an economy with inattentive agents than in an economy under FIRE[2].

Armed with an understanding of the mechanism through which heterogeneous inflation expectations affect the monetary policy transmission we study policy design. Lowering the Taylor rule coefficient in the central bank's monetary policy rule leads to a rapid increase in attention levels and a less preferable inflation-output trade-off for the central bank once the change in attention level is accounted for by the households. So, if a central bank responds systematically less strongly to the deviations of inflation from target, households increase their levels of attention to inflation due to the increase in the volatility of inflation. This in turn makes the increase in labor supply after the monetary policy tightening less strong and the output falls by more in response to the tightening worsening the inflation-output trade-off. On the other hand, an increase in idiosyncratic risk accompanied by a lack of safety nets in the economy increases the share of low-income households who, as a response, supply more labor. This amplifies the difference in welfare costs among households.

The three dimensions of heterogeneity in our HANK model are introduced in the following ways. First, as is standard in the HANK literature, all households in the economy are subject to a Bewley-type uninsurable, transitory, idiosyncratic income risk which they can self-insure against through their savings. Second, households differ in their permanent income level. We model the permanent income component following Faia et al. (2022) which introduces Roy-type occupational choice into a HANK model. In this framework, households have occupation-specific labor skills that through an endogenous occupational choice of households result in occupation-specific permanent streams of labor income. Third, to account for the empirically found heterogeneous attention to inflation, we draw on Gabaix (2014) and assume that households are inattentive to parts of the economy and face a constraint on how much information they can process. Specifically, households have a "sparse" representation of the world in the sense that they only

2 Distributional effects under FIRE are assessed in, for example, Auclert (2019) or Gornemann et al. (2021); for an empirical analysis see Coibion et al. (2017).

observe variables which are of first order importance to their decision-making. We assume that they are inattentive to the aggregate price level and inflation, while being fully attentive to the rest of the state of the economy[3]. Households then have to decide once and for all how much attention they want to allocate towards aggregate prices and inflation, which ultimately affects their subjective inflation expectations. This misperception of prices due to only observing them partially, leads to a suboptimal consumption-saving choice and a loss in utility which in equilibrium is equal to the costs of paying attention. The model is calibrated to match our empirical evidence of income-specific attention levels. We close the model with monopolistically competitive firms and a Taylor-type monetary policy rule.

The model is solved using the sequence-space Jacobian method by Auclert et al. (2021). To simulate our model with non-rational inflation expectations, we solve for the fixed point between different attention levels and volatilities of inflation to conduct policy counterfactuals: in particular, we vary the Taylor rule coefficient in front of the inflation. The fixed point arises as a result of an inverse relationship between attention levels and inflation volatility following our analytical results employing Gabaix (2014). With counterfactually fixed levels of attention from the baseline specification we find that a decrease in the Taylor rule coefficient from its baseline value improves the inflation-output trade-off. Once the fixed point between attention levels and inflation volatility is solved, a rapid increase in attention levels eliminates the benefits of a less stronger response to inflation deviations from its target and implies a worse trade-off.

Related Literature. We add to four strands of literature. First, we provide new empirical evidence of household-level inattention to inflation for both US and Australia. Early contributions that study cross-sectional variations in inflation expectations include Malmendier and Nagel (2016) and Ehrmann and Tzamourani (2012) who show that cohorts build their inflation expectations depending on their lifetime inflation experiences, a fact complemented by recent contributions from Coibion et al. (2020), Weber et al. (2023) and Pfäuti (2024) who observe that households' inattention varies with economic conditions. Link et al. (2023) find that attention to macroeconomic variables is strongly persistent at the individual level, specifically, more attentive households are more likely to adjust inflation expectations during a shock to inflation as the cost of acquiring new information is lower for an attentive household than for an inattentive household which translates to an adjustment of expectations - a finding consistent with theories of inattention (Sims, 2003; Gabaix, 2014). We add to this literature by first, estimating heterogeneous attention levels following the framework of Pfäuti (2024) and second, by studying the relation between inflation expectations and household labor supply. Our results complement the work by Coibion et al. (2023) and Jiang et al. (2024) who find that individuals form pessimistic views about real income and total spending if they expect future inflation to increase.

Second, we contribute to the heterogeneous agent literature studying monetary policy transmission (see also Kaplan et al., 2018; Auclert, 2019; Acharya et al., 2023; Bayer et al., 2024). The closest paper to ours on this front is Auclert et al. (2020). In their paper, the authors study monetary policy transmission in a HANK model in which households have sticky expectations.

3 This framework can of course be extended by assuming inattention with respect to other variables. Since we specifically wanted to study the implications of non-rational expectations about prices, we assume inattention only towards inflation and the aggregate price level. In our simulation of the full model we find that assuming inattention to wages and interest rates leads to the same conclusions for the comparison of inattention to inflation and rational inflation expectations.

Contrary to them, our model features heterogeneous inflation expectations, whereas in their framework, all households update their expectations and beliefs about their value of illiquid assets and the state of the economy infrequently, but with the same probability. Furthermore, the information choice in our framework is endogenized and source-dependent while theirs is not. In a partial equilibrium heterogeneous agent model, Laibson et al. (2024) show that present bias increases households' marginal propensity to consume and also amplifies the effect of monetary policy, leading to an increase in households' consumption, which however also decelerates monetary transmission. Additionally, Angeletos and La'O (2020) and Eusepi and Preston (2018) study optimal monetary policy and inflation expectations when agents are imperfectly informed. A recent paper by Pfäuti and Seyrich (2022) introduces cognitive discounting in the sense of Gabaix (2020) into a model with wealth heterogeneity. They show that this generates amplification of monetary policy through indirect effects which has strong implications for the business cycle due to unequal exposure of households to shocks. We add to this literature by quantifying the effects of heterogeneity and information frictions for inflation expectations in a sticky-price model and documenting the transmission channel of monetary policy through labor supply.

Third, our paper adds to the growing literature that incorporates information frictions in macroeconomic models. Lately, these frictions have also been incorporated into models with heterogeneous agents and incomplete markets to not only match macroeconomic moments but to also reconcile them with microeconomic evidence on marginal propensities to consume. One application is Angeletos and Huo (2021) who analyze the consequences of noisy information for agents with different wealth levels. They show that "the habit-like sluggishness generated by informational frictions is amplified when the agents with the highest marginal propensity to consume are also the ones with the most cyclical income". In a closely related paper to ours, Broer et al. (2021a) study heterogeneous expectations in a model with information frictions and find that the accuracy of households' economic forecasts is mostly positively related to wealth and employment status. If households differ across these dimensions they also acquire different information sets about the economy which ultimately results in heterogeneous forecasts. Similar to our paper, they find that the choice to be better informed increases with households' wealth levels. In a methodologically related paper to ours, Guerreiro (2022) builds a HANK model with households who have endogenous but heterogeneous beliefs about their cyclical income. He shows that if households are heterogeneously exposed to business cycle shocks which affect their beliefs about future income, then business cycle fluctuations are amplified. We add to this literature by applying the sparsity-based model by Gabaix (2014) or rather the dynamic programming extension in Gabaix (2016) to a HANK model, allowing agents with heterogeneous permanent income levels to endogenize their attention choice towards prices and inflation, ultimately resulting in heterogeneous inflation expectations.

Lastly, our results on the labor supply channel relate our paper to studies of labor supply in heterogeneous agent environments and in response to monetary policy shocks, see Faia et al. (2022), Faia and Shabalina (2023), Eeckhout and Sepahsalari (2020), Gornemann et al. (2021), Graves et al. (2023), Cantore et al. (2022), Berger et al. (2025) and Broer et al. (2020). More precisely, we study the interaction between inflation expectations (that react to monetary policy) and labor supply, uncovering a new transmission channel of monetary policy under heterogeneity through a supply-driven labor market. Our work is complementary to Pilossoph and Ryngaert

(2024) who show that employed workers with high inflation expectations are more likely to search for and transfer to a new job compared to households with low inflation expectations. The households' job search thereby transmits inflation expectations to nominal wage demands. We add to this by additionally uncovering effects for unemployed households and by studying the implications for monetary policy in a HANK environment.

The paper is structured as follows. Section 2 presents the empirical estimation strategy, the results of the estimated attention levels to inflation and our empirical evidence of monetary policy driven responses of labor supply. Section 3 introduces the attention choice problem in an analytical toy HANK model abstracting from occupation choice and transitory income shocks. Then, Section 4 presents our full quantitative HANK model. We use the model to quantify the structural implications of endogenous inattention to inflation on the aggregate economy. Section 5 shows our model results and discusses the implications for the design of monetary policy. Section 6 concludes.

2. Empirical Analysis

This section presents our empirical strategy to estimate heterogeneous attention to inflation from micro-level data. We use two sources of data, the NY Fed SCE for the US and CASiE for Australia. High-income households are the top 25% earners in a country, in Australia they have a total pre-tax income of ≥\$90k while low-income households have an income of \$40k - \$89k, and in the USA high-income households have a total pre-tax income of ≥\$100k while low-income households have an income of \$40k - \$99k. Self-employed households work for themselves and not self-employed agents work for an employer[4]. To estimate attention levels from the data, we follow Pfäuti (2024) and extend the method by incorporating household heterogeneity. We also explore the relation between labor supply and inflation expectations uncovering a new transmission channel of heterogeneity in the economy.

2.1. Cross-Sectional Variation

To better understand the heterogeneity in the data, we first analyze the cross-sectional variation in households' inflation expectations for both countries. The results are displayed in Table 1. We regress the absolute (columns 2 and 4) or squared (columns 3 and 5) forecast errors of one-year-ahead CPI inflation on the household characteristics specified in column 1. Columns 2 and 3 show the results for Australia, while columns 4 and 5 show the results using US data. In general each household makes an average forecast error, independent of its specific group, denoted by the constant. If a household belongs to either of the income, sex, or occupational groups, the error is changed by the magnitude of the coefficient shown in the respective columns. To fix ideas let us focus on column 2: on average households in Australia make a significant absolute inflation forecast error of 4.42%. If the household however is a high-income household, this error significantly decreases by 1.26%, such that the error decreases to 3.46%. If the household however is self-employed the unconditional error diminishes as well by the magnitude of 0.96%, but the forecast error remains higher than that of a high-income household (3.46%>3.16%). Similar

4 See Appendix A.1 and A.2 for descriptive statistics of the data.

Table 1: Cross-Sectional Distribution of Inflation Expectations

	AUS		USA	
	Abs. Errors	Squared Errors	Abs. Errors	Squared Errors
Income				
Mid-Income	-0.68*** (0.22)	-8.04*** (2.99)	-1.45*** (0.14)	-39.35*** (5.42)
High-Income	-1.26*** (0.20)	-13.97*** (2.82)	-1.78*** (0.13)	-39.83*** (4.21)
Sex				
Male	-0.39*** (0.08)	-3.48*** (0.80)	-2.15*** (0.13)	-49.81*** (4.29)
Occupation				
Self-Employed	-0.96*** (0.16)	-12.09*** (1.81)	-0.73** (0.24)	-27.78** (8.73)
Demographics	X	X	X	X
Constant	4.42*** (0.33)	32.20*** (4.09)	16.14*** (2.78)	450.14** (141.66)
N	7,151	7,151	14,816	14,816
R-squared	0.07	0.05	0.12	0.07

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows results for the regression of inflation expectation errors on different demographics. Errors are clustered at the time-period level. Results are shown for both Australia and the US using quarterly data. Low-income households have an annual pre-tax income of < \$100k and high-income households have an annual pre-tax income of $\geq$ \$100k. Demographics includes the following indicator variables as regressors: home ownership (own or rent), the age level (< 40 or > 60 years or $40 - 60$ years), region (Mid, West, South, North), the education level (High School, Some College, College) and dummy variables for working full-time or being self-employed.

reasoning is applicable to the other categories. Those characteristics, however, are not mutually exclusive. For robustness we also check across other demographics (home ownership (own or rent), the age level (< 40 or > 60 years or $40 - 60$ years), region (Mid, West, South, North), the education level (High School, Some College, College) and dummy variables for working full-time or being self-employed, however they produce less significant results across our samples. In general, we see that being a high-income household significantly reduces the magnitude of the average individual forecast error robustly across our samples. The results are robust to stricter winsorizing, the inclusion of time fixed effects and macro controls.

2.2. Attention to Inflation

Assume that households perceive the following law of motion for inflation

$$\pi_t = \rho \pi_{t-1} + \xi_t \tag{1}$$

where π_t is the inflation rate in year t, $\rho \in (-1, 1]$ is the autocorrelation coefficient and $\xi_t \sim i.i.d.N(0, \sigma_\xi^2)$ is the inflation innovation in year t. Each household belongs to a group $g = 1, 2, \ldots, n$, based on some specific characteristic (in our model this will be income). In every period, each household receives a noisy signal of inflation which according to them is generated as

$$s_{j,t} = \pi_t + \varepsilon_{j,t} \tag{2}$$

where $\varepsilon_{j,t} \sim i.i.d.N(0, \sigma^2_{\varepsilon^g})$ is the noise in the signal. The noise term is perceived to have different variances σ^2_g across household groups due to limited attention[5]: different types of households pay different amount of attention to inflation and the higher their attention, the lower the variation in the noise, $\varepsilon_{j,t}$. Applying the standard Kalman filter allows us to generate a conditional forecast of future inflation as

$$\begin{aligned} E[\pi_{t+1}|\mathcal{I}_{j,t}] = \rho E[\pi_t|\mathcal{I}_{j,t}] &= \rho E[\pi_t|\mathcal{I}_{j,t-1}] + \rho\gamma^g \left(s_{j,t} - E[\pi_t|\mathcal{I}_{j,t-1}]\right) \\ &= \rho E[\pi_t|\mathcal{I}_{j,t-1}] + \rho\gamma^g \left(\pi_t - E[\pi_t|\mathcal{I}_{j,t-1}]\right) + \nu_{j,t} \end{aligned} \tag{3}$$

where $E[\pi_t|\mathcal{I}_{j,t}]$ is the nowcast for inflation of household j once it receives new information, $E[\pi_t|\mathcal{I}_{j,t-1}]$ is the household's prior mean, $\nu_{j,t}$ is the noise. The inflation forecast is a linear combination of the household's prior mean, the product of the Kalman gain, which is the measure of attention towards inflation, γ^g, and the difference between the realized inflation and the previous period inflation forecast. When the household forecasts inflation it corrects its forecast by the error multiplied by the amount of attention it pays towards inflation: the lower the level of attention, the less strong the update and the more anchored the prior beliefs. Averaging across j for each group and introducing different means across the groups allows us to estimate group-specific attention from the data via the following specification

$$E_{g,t}\pi_{t+1} = \beta_g + \beta_1 E_{g,t-1}\pi_t + \beta_2^g I_g \left(\pi_t - E_{g,t-1}\pi_t\right) + \nu_{g,t} \tag{4}$$

where β_g are the potentially different mean expectations of the households, I_g are type-g dummies, $\beta_1 = \rho$, and $\gamma^g = \frac{\beta_2^g I_g}{\beta_1}$ is the group-specific level of attention. The mean one-year-ahead inflation expectation of households in group g is a linear combination of its own lag and the latest observed forecasting error after the agent observed its signal about inflation. Alternatively, one can further derive the forecast errors of inflation as functions of structural shocks by starting from equation (3) and rewriting it for notational convenience as

$$E_{j,t}\pi_{t+1} = \gamma^g E_t\pi_{t+1} + (1-\gamma^g)\, E_{j,t-1}\pi_{t+1} \tag{5}$$

Next, rewriting inflation as a function of structural shocks (in case of linearity)

$$\pi_{t+1} = \sum_{s=-\infty}^{\infty} J_{t+1-s} u_{t+1-s} \tag{6}$$

where u_t is a vector of structural shocks that are uncorrelated across time and with each other, and J_t represents impulse response functions (IRFs) of inflation to them, gives the forecast error

$$\pi_{t+1} - E_{j,t}\pi_{t+1} = \sum_{s=-\infty}^{\infty} J_{t+1-s} u_{t+1-s} - \gamma^g E_t\pi_{t+1} - (1-\gamma^g) E_{j,t-1}\pi_{t+1}$$

5 This is different to Pfäuti (2024) who doesn't distinguish between household characteristics and the observed volatility of the shock is the same across households; see also Vellekoop and Wiederholt (2019).

$$= \sum_{s=-\infty}^{0} J_{t+1-j} u_{t+1-j} + \sum_{s=1}^{\infty} J_{t+1-s} u_{t+1-s} \left[1 - \gamma^g \sum_{k=0}^{s-1} (1-\gamma^g)^k \rho^k \right] \tag{7}$$

The first term denotes unpredictable at time t future shocks that affect inflation (i.e. shocks that occur in periods $t+1$ or later) and the second term shows how forecast errors depend on past shocks - for example the coefficient in front of the shock in period t, u_t, is simply $J_t(1-\gamma^g)$. Shock-specific attention can then be estimated by regressing the forecast error on past shocks

$$e_{j,t+1} = \beta_j + \beta_1^g I_g u_t^m + \nu_{j,t} \tag{8}$$

where $e_{j,t+1} = \pi_{t+1} - E_{j,t}\pi_{t+1}$ is the forecast error of inflation, m stands for the shock of interest (for example, monetary policy shock) and $\gamma^g = 1 - \frac{\hat{\beta}_1^g I_g}{J_t^m}$ is the group-g specific attention level. J_t^m can be estimated or taken from other studies. Note, that this equation allows us to estimate attention using different shock series[6].

Table 2: Attention to Inflation of High- and Low-Income Households

	AUS		USA	
	Arellano Bond	Pooled OLS	Arellano Bond	Pooled OLS
Low-Income γ^1	0.11**	0.10**	0.06***	0.06
High-Income γ^2	0.24***	0.24***	0.09***	0.09
N	214	216	68	70
Robust to AR(2) specification	Yes	Yes	No	No

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows level of attention across household income-groups by estimating $E_{g,t}\pi_{t+1} = \beta_g + \beta_1 E_{g,t-1}\pi_t + \beta_2^g I_g (\pi_t - E_{g,t-1}\pi_t) + \nu_{g,t}$ on quarterly data. Attention of low-income households is given by γ^1, and attention of high-income households is given by γ^2. Stars indicate significance relative to the other income-group.

The estimated attention levels using specification (4) for the two income-groups groups for both countries are shown in Table 2. γ^1 shows the attention to inflation of low-income households and γ^2 shows the attention for high-income households. We find that there is a significant difference between the attention levels of the household groups. In particular, high-income households pay more attention than low-income households. These results are mostly robust for both estimators, the Arellano-Bond[7] and the pooled OLS estimator. Table 2 confirms our hypothesis that high-income households are more attentive to inflation than low-income households. Further, the results are robust to stricter winsorizing and using an AR(2)-process as a perceived inflation process as well as to the inclusion of macro controls. We have also estimated the same attention specification for other demographic groups based on: occupation, self-employment status, sex,

6 The regression can either be estimated with each shock individually or with all shocks together. These shocks are structural shocks with the assumption that they are uncorrelated with each other and the regression results will be equivalent.

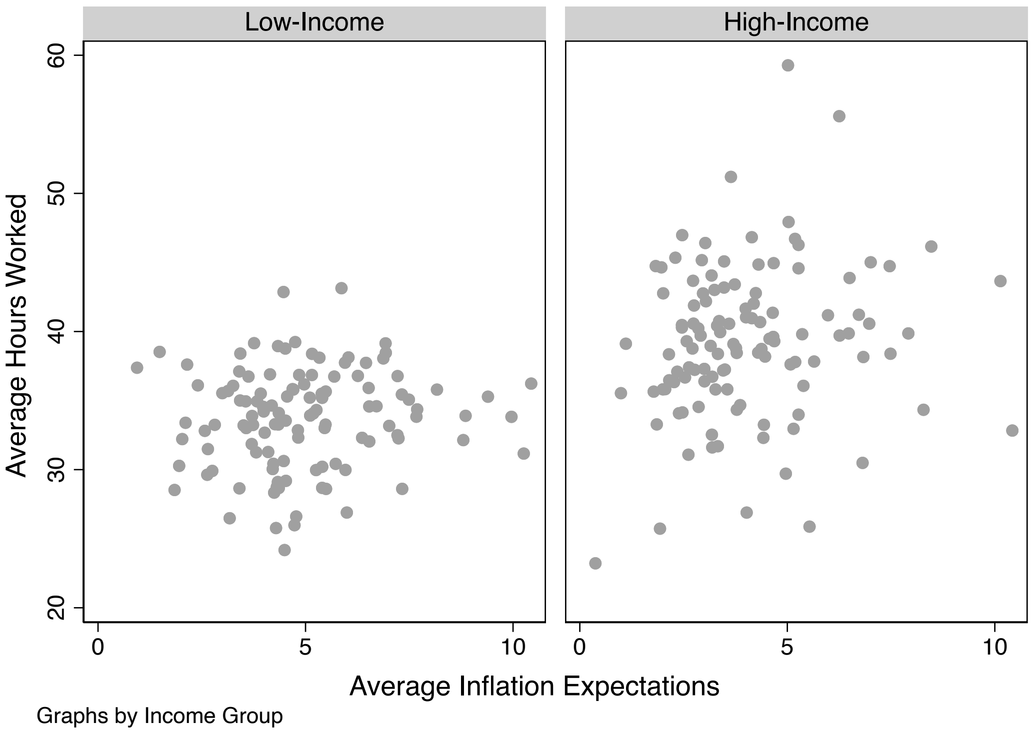
7 The Arellano-Bond estimator is applied since the dependent variable in specification (4) includes a lag on the right-hand side. See also Pfäuti (2024).

education level, home-ownership status, age, different states within the country, urban/rural and job-switcher dummies. None of these characteristics produce robust results with larger heterogeneity in attention levels than heterogeneity across income levels. When estimating the attention jointly across a variety of characteristics, income is the characteristic that stands out and produces significant and robust results. For the attention results in response to oil price and monetary policy shocks, see Appendix B.2, where results have larger confidence bounds due to more limited variation in the data.

2.3. Labor Supply and Inflation Expectations

Given that we study income-specific inflation expectations and we know that households' income is determined by their labor supply, we study a possible transmission channel of how income-specific inflation expectations interact with labor supply, representing the main transmission channel of heterogeneity in our model. Figure 1 shows the scatterplot between the average number of hours

Figure 1: Labor Supply and Inflation Expectations by Income Group, USA



Notes: The figure shows the number of hours worked by households' one-year-ahead CPI inflation expectations for high- and low-income self-employed households using NY Fed SCE monthly data for 2013-2023. Low-income households have an annual pre-tax income of $<$ \$100k and high-income households have an annual pre-tax income of $\geq$ \$100k.

worked per average inflation expectations for both low- and high-income individuals, that we observe in the SCE monthly data from June 2013 to January 2023 for self-employed households[8].

8 The SCE only collects number of hours worked for self-employed households and therefore we reduce our analysis to this set of observations. Cantore et al. (2022) present new empirical evidence about the effects

While actual inflation for this period was at 2.17%, high-income households on average expect inflation to be at 3.97% while low-income households have more biased expectations and expected inflation to be at 4.93%. Further we observe a positive relation between number of hours worked and inflation expectations that we uncover in the following.

First, we study the intensive margin of labor supply by looking at the interaction between inflation expectations and the amount of working hours households supply:

$$\Delta n_{j,t+s} = \beta_j + \beta_1^g \cdot I_g \cdot u_t^m + \beta_2^g \cdot I_g \cdot u_t^m \cdot \Delta E_{j,t}\pi_{t+1} + \varepsilon_{j,t} \tag{9}$$

where $s = \{0, 1\}$, u_t^m is the monetary policy shock (we use externally constructed shocks), I_g is an indicator for the income-group where $g = 1$ is the low-income household group and $g = 2$ is the high-income group and $n_{j,t}$ is the number of hours household j worked in time t. We exclude observations for $n_t > 168$. Expression (9) allows us to study how households change their labor supply at the intensive margin in response to a change in their inflation expectations and in response to a monetary policy shock.

Next, we look at the extensive margin of labor supply. In particular, we analyze if households change their labor status if they experience an increase in inflation expectations:

$$\Pr(unemployment_j = 1) = \Phi(\beta_j + \beta_1^g \cdot I_g \cdot u_t^m + \beta_2^g \cdot I_g \cdot u_t^m \cdot E_{j,t}\pi_{t+1}) \tag{10}$$

where $unemplyoment_j$ is an indicator for the unemployment status of household j and takes the value of 1 if the household is unemployed in t or 0 if the household is part of another employment situation[9].

Table 3 shows the estimation results of regression (9) and (10) for the US using Bauer and Swanson (2023) monetary policy shocks. For the results for Nakamura and Steinsson (2018) and Acosta (2022) shocks, see Appendix B.4. We find that low-income households decrease their labor supply insignificantly in response to a monetary policy shock but increase their current and future labor hours worked if their inflation expectations do not decrease or even increase after a monetary policy tightening, see coefficient in the third column row β_2^1. These results agree well with the theory put forward by Cantore et al. (2022) or Graves et al. (2023) that labor supply works as a mechanism to smooth consumption. This is especially true for income-poor households who cannot self-insure against income risk or only hold a limited amount of liquid assets and therefore have a larger incentive to increase their labor supply if they expect inflation to be higher in the future. This channel is usually missed in standard representative agent New Keynesian (RANK) models in which substitution effect dominates the income effect of labor supply.

We also find that households who increase (or do not decrease) their inflation expectations in response to a monetary policy shock are less likely to stay unemployed, especially the low-income households, see column four row β_2^1. This might be associated with a more intensive search for

of monetary policy directly on labor supply using the CPS and the CE collected by the US Bureau of Labor Statistics. Our analysis instead uncovers the transmission via inflation expectations, however complementing their results.

9 Other employment situations in the SCE include: working full-time, working part-time, temporarily laid off, on sick or other leave, permanently disabled or unable to work, retiree or early retiree, student or at school or in training, homemaker, other (specified by the user)

Table 3: Change in Labor Supply after a Change in Inflation Expectations, USA

	Bauer & Swanson		Bauer & Swanson
	(1)	(2)	(3)
	Δn_t	Δn_{t+1}	$Pr\{unemployment = 1\}$
Low-Income β_1^1	-7.668	0.198	11.251**
High-Income β_1^2	-6.142	13.139	-1.963***
Low-Income β_2^1	0.143	5.504**	-0.885***
High-Income β_2^2	-3.260	4.983	0.002
Constant	-0.122	-0.268	-3.433***
N	5,540	3,860	8,320

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows the parameters of regression $\Delta n_{j,t+s} = \beta_j + \beta_1^g \cdot I_g \cdot u_t^m + \beta_2^g \cdot I_g \cdot u_t^m \cdot \Delta E_{j,t}\pi_{t+1} + \varepsilon_{j,t}$ for both high- and low-income self-employed households. We estimate the regression on an individual level using monthly data. In the last column the table shows the parameters of the probit regression $\Pr(unemployment_j = 1) = \Phi(\beta_j + \beta_1^g \cdot I_g \cdot u_t^m + \beta_2^g \cdot I_g \cdot u_t^m \cdot E_{j,t}\pi_{t+1})$ for both high- and low-income households households. We estimate the regression on an individual level using monthly data. Errors are clustered at the individual level.

jobs that is in line with new evidence by Pilossoph and Ryngaert (2024). This result on the extensive margin of labor supply pushes our main transmission channel of labor supply further: households who expect inflation to increase in the future, increase their labor supply not only on the intensive but also on the extensive margin.

Insignificant results in the row β_2^2 show that the above described effects are not present among high-income earners. Estimates of β_1^1 and β_1^2 show that a contractionary monetary policy on average increases the unemployment probability among low-income households and decreases it among high-income earners which is consistent with previous literature, see, for example, Graves et al. (2023), Broer et al. (2021b), Faia et al. (2022).

3. The Household's Attention Choice Problem

To quantify the results from the empirical analysis we propose a Heterogeneous Agent New Keynesian (HANK) model with inattentive households and the permanent income heterogeneity. In this section we provide intuition and introduce a reduced form of the full HANK model generalized in Section 4 by abstracting from idiosyncratic risk[10] and focusing on permanent income and attention heterogeneity. We present the general attention choice problem the household faces, following the framework by Gabaix (2014) or more specifically, Gabaix (2016) for dynamic programming problems.

Consider an economy that is populated by a continuum of households $j \in [0, 1]$. Each household belongs to a group $g \in \{1, 2\}$ and gets group-specific labor income $Y_{g,t} \equiv \eta_g^o W_t^o n_t$ which depends

10 The role of which is assessed in Section 5.3.1

on its occupational skill-level η_g^o and where W_t^o is the occupation-o-specific nominal wage, where $o \in \{1,2\}$ denotes the household's occupational choice. n_t are fixed labor hours the household has to work and which are equal for both household groups. If the household has low occupational skills, it belongs to $g = 1$, works in $o = 1$ and gets income Y_1, otherwise the household belongs to the group of households with high occupational skills $g = 2$, works in $o = 2$ and gets income Y_2. We assume that the high-skill occupation pays a higher nominal wage than the low-skill occupation, $Y_2 > Y_1$. Households further hold a risk-free nominal asset a_t^n with nominal interest rate i_t^a between periods $t-1$ and t. Borrowing constraints prevent these households from taking negative bond positions. The household gets utility from consumption c_t and has a discount factor β.

At every point in time, the household forms beliefs about the behavior of future variables relevant to its decision problem, in particular, the aggregate price level, nominal labor income and the nominal interest rate. To isolate the effects driven by non-rational expectations about inflation, we assume that households have rational expectations about their future nominal income $E_t(\{Y_{g,t+h}\}_{h=1}^{\infty})$, they fully observe the correct nominal interest rate and therefore have rational beliefs $E_t(\{i_{t+h}^a\}_{h=1}^{\infty})$. We further make the simplifying assumption that agents know the current aggregate price level P_t. Thus, the only variable to which the household may be inattentive to and forms subjective beliefs about is the future aggregate price level $P_{t+h}, h = 1, 2 \dots$. The household solves the following maximization problem:

$$\begin{aligned} V_j(m_t) &= \max_{c_t} \{u(c_t) + \beta \tilde{E}[V_j(m_{t+1})]\} \\ s.t. \quad P_t c_t + a_t^n &= Y_{g,t} + (1 + i_t^a) a_{t-1}^n, \quad a_t^n \geq 0 \end{aligned} \tag{11}$$

where m_t describes the state variables and $\tilde{E}$ is the expectation operator we define in Definition 1. We define the household's utility function as $v_{j,t}(c_t(a_{t-1}^n, \gamma^g), m_t)$ where $\gamma^g \in [0,1]$ and $c_t \equiv c_t(a_{t-1}^n, \gamma^g)$. Notice that the household's consumption decision is directly affected by its attention to inflation.

Definition 1. Subjective Beliefs. *Suppose the agent observes variable z_t and forms expectations about $\{z_{t+h}\}_{h=1}^{\infty}$. Then, the expectations about the future variable are:*

$$\tilde{E}(z_{t+h}) = \gamma^g E_t(z_{t+h}) \ if \ \gamma^g \in [0,1) \tag{12}$$

$$\tilde{E}(z_{t+h}) = E_t(z_{t+h}), \ if \ \gamma^g = 1 \tag{13}$$

where E_t is the rational expectation operator, γ^g is the attention to variable z_t and we define $E_{j,t} \equiv \gamma^g E_t(z_{t+h})$ as the subjective beliefs operator.

Subjective expectations $E_{j,t}$ are the expectations taken with respect to the household's subjective model (with partial inattention to macro variables) and capture the agent's discounting of future variables by γ^g. Thus, if the household is partially inattentive to variable z_{t+h}, it replaces the rational expectations $E_t(z_{t+h})$ by subjective expectations $E_{j,t}(z_{t+h}) = \gamma^g E_t(z_{t+h})$. With an increasing amount of attention the quality of subjective beliefs about inflation increases, possibly aligning with rational expectations. Notice that the agent is rational about its nonrationality, such that the policy of the behavioral agent is the policy of the rational agent under its inattention, $c_t^*(a_{t-1}^n, \gamma^g)$.

Combining the budget constraint and the utility function of the household in (11), reexpressing the problem in terms of inflation, gives the following. The *rational* household who observes the variables fully rational and pays full attention to the entire state of the economy has a utility

$$v_{j,t}(c_t(a_{t-1}^n, 1), m_t) \equiv u(c_t) + \beta[V_j(m_{t+1})] \tag{14}$$

with the states defined as $m_t = (a_{t-1}^n, \{\pi_{t+j}\}_{j=0}^{\infty}, \{i_{t+j}^a\}_{j=0}^{\infty}, \{Y_{g,t+j}\}_{j=0}^{\infty})$[11].

The *inattentive* household in the simplified model that we described above is inattentive to inflation and has a utility[12]

$$v_{j,t}(c_t(a_{t-1}^n, \gamma^g), m_t) \equiv u(c_t) + \beta[V_j(m_{t+1})]$$

Being inattentive leads to an imperfect policy $c^*(a_{t-1}, \gamma^g)$ and an expected loss in utility

$$L = E_t(v_{j,t}(c_t(a_{t-1}^n, \gamma^g), m_t) - v_{j,t}(c_t(a_{t-1}^n, 1), m_t) \tag{15}$$

measured as the difference between the utility with the optimal policy $c^*(a_{t-1}^n, 1)$ under full rationality and the optimal policy $c^*(a_{t-1}^n, \gamma^g)$ under inattention. The household wants to minimize its expected loss in utility, however, it can only process a limited amount of information and therefore faces a cognitive constraint, $\chi\gamma^g$, where $\chi > 0$ measures the amount of sparsity. When $\chi = 0$, the agent is the traditional rational agent and can acquire new information at 0 cost. Minimizing the expected loss in utility subject to the cognitive constraint[13]

$$\min_{\gamma^g} -\frac{1}{2}\frac{\partial^2 v(c(a^n, \gamma^g), m)}{\partial c^2} \sum_{h=1}^{\infty}\sum_{h'=1}^{\infty} \frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}}(\gamma^g - 1)^2 \sigma_{\pi_h \pi_{h'}} + \chi\gamma^g \tag{16}$$

where $\frac{\partial c}{\partial \pi_h}$ denotes the household's change in consumption due to a change in inflation at period h, $\sigma_{\pi_h \pi_{h'}} = E(\pi_h \pi_{h'})$ the perceived variance of the aggregate inflation level, and $\frac{\partial^2 v(c(a^n,\gamma^g),m)}{\partial c^2}$ is the disutility from misoptimized consumption such that $\frac{\partial c}{\partial \pi_h}(\gamma^g - 1)\pi_{t+h}$ denotes the error due to inattention, gives optimal attention of the household to inflation which is group-specific based on its labor income.

Proposition 1. Optimal Attention. *The optimal level of attention $\gamma^g \in [0, 1]$ towards inflation is given by*

$$\gamma^g = \max\left\{0, 1 - \frac{\chi}{\Lambda}\right\} \tag{17}$$

where we define the cost-of-inattention factor $\Lambda := -\frac{\partial^2 v(c(a^n,\gamma^g),m)}{\partial c^2} \sum_{h=1}^{\infty}\sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}}\sigma_{\pi_h \pi_{h'}}$.

11 Given that the household fully perceives labor income and the nominal interest we could also just take the state variables to be $m_t = (a_{t-1}, \{\pi_{t+j}\}_{j=0}^{\infty})$

12 More precisely, utility is given by $v_{j,t}(c_t(a_{t-1}^n, \gamma^g), m_t) = v_{j,t}(c_t, \gamma^g m_1, \gamma^g m_2, \gamma^g m_3, \dots)$. If we, for example, assume $m_t = \pi_t$, then utility is $v_{j,t}(c_t, \gamma^g \pi_1, \gamma^g \pi_2, \gamma^g \pi_3, \dots)$. In Section 4 this will be extended by a default inflation level to which households anchor their expectations: $v_{j,t}(c_t, \gamma^g \pi_1 + (1-\gamma^g)\pi_1^d, \gamma^g \pi_2 + (1-\gamma^g)\pi_2^d, \gamma^g \pi_3 + (1-\gamma^g)\pi_3^d, \dots)$

13 Following Gabaix (2014) we approximate the household's utility function with a second order Taylor approximation; see Appendix C.1 for a detailed derivation.

Proof. See Appendix C.1 □

The optimal level of attention (17) depends on the state of the economy and individual income and wealth levels. Depending on their individual income level agents either value or do not value additional information about inflation. If a household has low income and is close to the borrowing constraint, i.e. is hand to mouth, it is not able to smooth consumption and therefore does not acquire more information. If the household, however, has high income, it benefits from acquiring more information since the disutility from misoptimized consumption has direct effects on their savings, and large forecasting mistakes are costly for their wealth accumulation, making information acquisition more valuable for them. In addition, attention decreases with increasing wealth as a result of the decrease in the marginal utility of consumption.

When the cost of cognition χ increases it becomes too costly for households to gather new information about the state of the economy. As a result, their expectations stay close or at their default value of inflation (usually the last observed inflation or perceived expectation) receiving no update.

Additionally, attention increases with perceived inflation volatility. Highly varying inflation creates a bigger taste for attention as it leads to high variation in levels of real income, making correct inflation forecasts more valuable and increasing attention levels. This is independent of households' income level.

4. Quantitative Model

In this section we generalize the model from Section 3 to a canonical HANK model with incomplete markets and heterogeneous beliefs. In particular, we allow households to differ in three dimensions of heterogeneity. First, each household is characterized by the idiosyncratic, transitory income. Second, we assume that households additionally differ in their permanent income by making labor income skill- and occupation-specific. This allows us to match the income dimension of attention we found in the data. Next, we assume that households are inattentive to future inflation and that households endogenously decide how much attention they want to allocate towards inflation. The firm optimizes production as in McKay et al. (2016), while the central bank sets the nominal interest rate.

4.1. Household Problem

In the following we present the household problem of our model. The timing is as follows. First, the household makes the attention choice by evaluating its loss in utility from misoptimized consumption due to being inattentive. Second, the agent simultaneously decides on occupation and consumption-saving by evaluating different consumption levels for different occupations.

4.1.1. Baseline Problem: Transitory Income Inequality

In the following we lay out the general setup of a standard one-asset HANK model in which income is determined by an idiosyncratic income shock, against which we benchmark our results.

The economy is populated by a continuum of households $j \in [0, 1]$. Each household has preferences over consumption c_t, hours worked n_t, gets nominal income $e_t W_t n_t$ and faces a nominal budget as well as a borrowing constraints for nominal assets. Specifically, each household solves the following Bellman equation

$$\begin{aligned} V_j(m_t, e_t) &= \max_{c_t, n_t, a_t^n} u(c_t, n_t) + \beta \tilde{E} V_j(m_{t+1}, e_{t+1}) \\ \text{s.t.} \quad P_t c_t + a_t^n &= e_t W_t n_t + (1 + i_t^a) a_{t-1}^n \\ a_t^n \geq 0, \quad u(c_t, n_t) &= \frac{c_t^{1-\sigma} - 1}{1 - \sigma} - \varphi \frac{n_t^{1+\nu}}{1 + \nu} \end{aligned} \tag{18}$$

where W_t is the nominal wage, P_t is the price index, e_t are Bewley-type idiosyncratic income shocks creating transitory income inequality in the economy and m_t describes the macroeconomic state. Households hold only one risk-free asset which are the nominal savings a_t^n with nominal interest rate i_t^a between periods $t-1$ and t. We assume that they have rational expectations with respect to each variable relevant to their consumption-saving and labor decisions except for the price level or rather inflation.

4.1.2. Beliefs

At every point in time, the household forms beliefs about the future behavior of variables relevant to its decision-making. We maintain the assumption that households have rational expectations about their nominal income, they also fully observe the nominal interest rate and form rational expectations about it. Thus, the only variable relevant to their decision-making to which the agent is inattentive to, are the future aggregate price and inflation level. We assume that households observe all current and past prices and only form subjective beliefs about future price levels and inflation rates. In the model with borrowing constraints this assumption also guarantees that the constraints are not violated due to misperceptions of current prices. We follow the same formulation of expectations for inflation that we use in our empirical estimation, see equation (5), that we generalize for group-specific expectations. We specify subjective beliefs in the following.

Definition 2. Subjective Beliefs, HANK. *Suppose the agent observes variable z_t and forms expectations about $\{z_s\}_{s>t}$. Then, the expectations about the future variable are:*

$$\tilde{E}(z_s) = \gamma^g E_t z_s + (1 - \gamma^g) E_{j,t-1} z_s \, \forall s > t, \; if \; \gamma^g \in [0, 1) \tag{19}$$

$$\tilde{E}(z_s) = E_t(z_s), \; if \; \gamma^g = 1 \tag{20}$$

where E_t is the traditional rational expectation operator, γ^g is the attention level to the future variable and we define $E_{j,t} \equiv \gamma^g E_t z_s + (1 - \gamma^g) E_{j,t-1} z_s$ as the subjective beliefs operator.

Definition 2 formalizes a similar idea as in the Kalman gain, namely that households learn about the state of the economy if they receive a new signal about inflation updating their beliefs about future inflation. If agents decide to pay attention to inflation, they update their old inflation expectations and learn from new information. With an increasing amount of attention the quality of the subjective beliefs about inflation increases, eventually minimizing the importance of the previous inflation expectations, which is totally mitigated under $\gamma^g = 1$. If agents decide to not pay attention, their beliefs about future inflation are anchored at their old beliefs.

Numerical Solution. We solve the model using the Sequence Space Jacobian method by Auclert et al. (2020) which allows us to introduce behavioral frictions into the model. For that, we define the expectation matrix as

$$E = \begin{pmatrix} 1 & \gamma^g & \gamma^g & \gamma^g & \dots \\ 1 & 1 & \gamma^g + (1-\gamma^g)\gamma^g & \gamma^g + (1-\gamma^g)\gamma^g & \dots \\ 1 & 1 & 1 & \gamma^g + (1-\gamma^g)(\gamma^g + (1-\gamma^g)\gamma^g) & \dots \\ \vdots & \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

where the columns stand for the time period of the variable to which the household pays attention to and the rows stand for the periods in which the expectation is formed. The lower triangular matrix of ones captures the fact that households have full information about current and past prices. γ^g is the attention level of a household in group g towards the input variable (in our case we only focus on π_t and P_t) which affects the consumption-savings and labor choice. If the household holds FIRE, $E(r,l) = 1 \; \forall r, l$, i.e. has rational expectations E_t and pays full attention to the economy with $\gamma^g = 1$, whereby in case of inattention the household has beliefs deviating from FIRE and $\gamma^g \in [0, 1)$ given by Definition 2. Using the fact that a change in expectations at time τ for the household is equivalent to a news shock

$$J^{o,\pi}_{t,s} = \sum_{\tau=0}^{\min\{s,t\}} (E_{\tau,s} - E_{\tau-1,s}) J^{FI,o,\pi}_{t-\tau,s-\tau}, \tag{21}$$

the relationship between behavioral Jacobians and FIRE Jacobians can be obtained in the following.

Proposition 2. Behavioral Jacobian. *In the outlined setting, behavioral Jacobians with respect to inflation are related to FIRE Jacobians in the following form*

$$J^{o,\pi}_{t,s} = \begin{cases} \gamma^g J^{FI,o,\pi}_{t,s}, & t = 0, \; s > 0 \\ J^{FI,o,\pi}_{t,s}, & s = 0 \\ \gamma^g J^{FI,o,\pi}_{t,s} + (1-\gamma^g) J^{o,\pi}_{t-1,s-1}, & t > 0, s > 0 \end{cases} \tag{22}$$

where J^{FI} are FIRE Jacobians.

Proof. See Appendix D.1 □

The Jacobian $J^{o,\pi}_{t,s}$ describes the marginal change in period t of the output variable o to a period-s-change in the input variable π. For consumption, the Jacobian would be given by $J^{C,\pi}_{t,s} = \delta C_t / \delta \pi_s$ which is the partial response in consumption in t to a change in inflation in s. Inattention thereby enters the household's beliefs via the expectation matrix, affecting the household's Jacobian as seen in equation (21). Note that we assume $\gamma^g \neq 1$ only for π_t and $P_t \; \forall s > 0, t > 0$, but keep the assumption of FIRE for every other input variable. In line with the literature, we assume that the price in period t is fully observed. Next, we endogenize γ^g and assume that households solve an attention allocation problem.

4.1.3. The Attention Choice

We assume that households choose their attention levels optimally facing a cognitive capacity constraint. In the present HANK model households do not only choose consumption (as in the previous toy model) but they also contemporaneously optimize their labor and occupational choice. We call these variables the "action" variables. In the following, we assume that households pay inattention to inflation when they choose consumption, given the other action variables. The household's labor choice then adjusts accordingly[14]. This allows us to isolate the loss in utility from consumption directly. Being inattentive leads to a suboptimal consumption choice $c^*(a^n, e, \gamma^g)$ resulting in a loss in utility compared to the choice under FIRE. The household wants to minimize the loss by choosing its optimal level of attention γ^g.

The *rational* household who observes the variables fully rational and pays full attention to the entire state of the economy has utility

$$v_{j,t}(c_t(a_{t-1}^n, e_t, 1), m_t, e_t) \equiv u(c_t) + \beta[V_j(Y_{g,t} + (1+i_t^a)a_{t-1}^n - P_t c_t, m_{t+1}, e_{t+1})] \tag{23}$$

where e_t and m_t are the state variables characterizing the economy at point t.

The *inattentive* household is inattentive to inflation and has utility

$$v_{j,t}(c_t(a_{t-1}^n, e_t, \gamma^g), m_t, e_t) \equiv u(c_t) + \beta[V_j(Y_{g,t} + (1+i_t^a)a_{t-1}^n - P_t c_t, m_{t+1}, e_{t+1})]$$

Being inattentive leads to imperfect policy choices, $c(a^n, e, \gamma^g)$, and an expected loss in utility

$$L = E_t(v_{j,t}(c_t(a_{t-1}^n, e_t, \gamma^g), m_t, e_t) - v_{j,t}(c_t(a_{t-1}^n, e_t, 1), m_t, e_t)) \tag{24}$$

where $c_t(a_{t-1}^n, e_t, 1)$ is the optimal policy under full information and $c_t(a_{t-1}^n, e_t, \gamma^g)$ is the optimal policy under inattention. The household wants to minimize its expected loss in utility and faces a cognitive constraint on how much information to process, $\chi^g\gamma^g$ where $\chi^g > 0$. Replacing the household's utility function by a linear quadratic approximation allows us to state the household's attention optimization problem

$$\min_{\gamma^g} -\frac{1}{2}\sum_e \int \frac{\partial^2 v_j(c(a^n, e_t, \gamma^g), m, e)}{\partial c^2} \sum_h \sum_{h'} \frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}}(\gamma^g - 1)^2 \sigma_{\pi_h \pi_{h'}} dD^g(e, da) + \chi^g\gamma^g \tag{25}$$

where $\sigma_{\pi_h \pi_{h'}}$ the perceived variance of inflation, $\frac{\partial^2 v(c(a^n, e, \gamma^g), m, e)}{\partial c^2}$ the disutility from misoptimized consumption, $D^g(e, da)$ is the joint distribution between the transitory shock and wealth accumulation across groups. The first term in equation (25) is the leading term of the second order Taylor approximation of the expected utility loss of a household in equation (24). The second

14 This is possible since under endogenous attention as in Online Appendix XV.D. of Gabaix (2014) the actions are chosen given the other action. We elaborate on it in Appendix D.3 where we additionally derive the optimal labor choice when we assume that it is directly affected by the inattention to inflation. For now, we assume that the agents pay attention to inflation γ^g when choosing consumption. The labor supply choice then follows directly

term, $\chi^g \gamma^g$, is the linear psychological cost attention creates, whereby under $\chi^g = 0$ the household is the rational agent. Note, that we allow for varying costs of attention among income groups as those are necessary to match empirical evidence of lower attention among low-earners, see Section 5.3.2. Solving equation (25) gives the household's optimal level of attention to inflation.

Proposition 3. Optimal Attention, HANK. *The optimal level of attention to inflation is given by*

$$\gamma^g = \max\left\{0, 1 - \frac{\chi^g}{\sum_e \int \frac{\partial^2 v^g(c^g(a^n,e,\gamma^g),m,e)}{\partial (c^g)^2} \sum_h \sum_{h'} \frac{\partial c^g}{\partial \pi_h} \frac{\partial c^g}{\partial \pi_{h'}} \sigma_{\pi_h \pi_{h'}} dD^g(e, da)}\right\} \tag{26}$$

Proof. See Appendix D.2 □

When $\gamma^g = 0$, the household "does not think about π or P" and sets a default value for inflation and the price level and doesn't update its expectations, and when $\gamma^g = 1$ the household pays full attention, perceives the true value of inflation and prices and updates its inflation expectations if necessary. Given our definition of expectations, attention accumulates over time and includes new information about the state of inflation and price level in period s. It thereby depends positively on the volatility of inflation, $\sigma_{\pi_h \pi_{h'}}$, the change of group-specific consumption given a change in inflation, $\frac{\partial c^g}{\partial \pi_h}$, and the disutility from misoptimized consumption, $\frac{\partial^2 v^g(c(a^n,e,\gamma^g),m,e)}{\partial (c^g)^2}$. Again, a similar argument as in the analytical HANK model can be applied here: attention, and therefore also the correct expectations of inflation, increases with inflation fluctuations in the economy, decreases with an increase in information acquisition costs and increases with the disutility from misoptimized consumption-saving decisions.

4.1.4. Endogenizing Income: the Permanent Component of Income Inequality

In the baseline model income inequality is exogenous and is fully driven by the persistence and the standard deviation of the Bewley-type idiosyncratic income shocks. We augment the model by introducing occupational choice following Faia et al. (2022). Households thereby differ in their skills and efficiency units of labor that they can provide in each occupation which delivers endogenous labor income inequality. Each household in group g has the same set of skills. It then optimizes its consumption c_t, labor n_t and occupational choice $o \in \{1, ..., O\}$, by solving the following Bellman equation[15]

$$\begin{aligned} V_j^g(a_{t-1}^n, e_t, \boldsymbol{\phi_t}) &= \max_{o_t, c_t, n_t, a_t^n} u(c_t, n_t) + \phi_t^o + \beta E_{j,t}^g V_j^g(a_t^n, e_{t+1}, \boldsymbol{\phi_{t+1}}) \\ \text{s.t.} \quad & P_t c_t + a_t^n = \eta_g^o e_t W_t^o n_t + (1 + i_t^a) a_{t-1}^n \\ & a_t^n \geq 0 \end{aligned} \tag{27}$$

Each household j in group g makes an occupational choice o based on its occupation-specific vector of skills $\boldsymbol{\eta}_g$. The vector of shocks $\boldsymbol{\phi_t}$ is the O-vector of occupational amenities across

15 For notational purposes we abstract in this subsection from the state variable m_t that describes the exogenous and endogenous state which is important for endogenizing attention. Given that the section provides background information about endogenizing labor, we focus on the exogenous states a_{t-t}^n and e_t. However the full macroeconomic state is nonetheless given by m_t.

all occupations in which shocks are i.i.d. and drawn from a Gumbel distribution. This allow us to obtain occupational probabilities in a closed form, i.e. the household in group g chooses occupations o with probability

$$\theta_j^g(o|a_{t-1}^n, e_t) = \frac{\exp(\tilde{V}_j^{o,g}(e_t, a_{t-1}^n))}{\sum_o \exp(\tilde{V}_j^{o,g}(e_t, a_{t-1}^n))} \tag{28}$$

where $\tilde{V}_j^{o,g}$ is the value function in occupation o of type g household, $V_j^{o,g}(e_t, a_{t-1}^n)$, evaluated at the optimal consumption-saving and labor supply policies $c_j^o(e_t, a_{t-1}^n)$, $a_j^o(e_t, a_{t-1}^n)$ and $n_j^o(e_t, a_{t-1}^n)$. Note that the occupation choice is not a one-time choice and introduces heterogeneity in permanent income of the households. Heterogeneity in labor income, $Y_{g,t} \equiv \eta_g^o e_t W_t^o n_t$, is now given by first, the occupation-specific wage, W_t^o, determined by the labor market, second, exogenous idiosyncratic productivity shock e_t, and third, by occupation-specific talents. The occupation-specific wage thereby captures the heterogeneity in workers' skills as they affect the wages (e.g. high-skill households earn higher wages). Given that labor supply is occupation-specific, labor demand is also occupation-specific, see the modification of the production function at the end of Section 4.2.1.

4.2. The Rest of the Model

4.2.1. Production

Monopolistically competitive firms produce output by combining total labor input and capital using Cobb–Douglas production function: $y_t = z_t k_{t-1}^{\nu} L_t^{1-\nu}$, where y_t is the variety produced, z_t is the total factor productivity, ν is the capital share, k_t is capital and L_t is labor input. Competitive final good producers aggregate varieties using the CES aggregator, such that optimal demand for each variety is given by $p_t = \left(\frac{Y_t}{y_t}\right)^{\frac{1}{\eta}} P_t$, where P_t is the aggregate price level and is normalized to 1 in the steady state. Monopolistically competitive firms choose prices, p_t, labor demand, capital demand, k_t, and investment, I_t, to maximize the sum of future discounted real profits, which recursively reads as follows

$$\begin{aligned} J_t\left(k_{t-1}\right) = \max_{p_t, k_t, I_t, L_t} & \left\{ \frac{p_t}{P_t} y_t - W_t L_t - I_t - \frac{\xi}{2}\left(\frac{I_t}{k_{t-1}} - \delta\right)^2 k_{t-1} - \frac{\eta}{2\kappa}(\ln(1+\pi_t))^2 Y_t + \frac{E_t J_{t+1}(k_t)}{1+r_{t+1}} \right\} \\ \text{s.t.} \quad & k_t = (1-\delta)k_{t-1} + I_t; \\ & p_t = \left(\frac{Y_t}{y_t}\right)^{\frac{1}{\eta}} P_t; \quad y_t = z_t k_{t-1}^{\nu} L_t^{1-\nu} \end{aligned} \tag{29}$$

where the first constraint is the capital accumulation equation, δ is the depreciation rate of capital, and $\frac{\eta}{2\kappa}(\ln(1+\pi_t))^2 Y_t$ is the quadratic price adjustment cost which is necessary to study monetary policy. Investment adjustment costs are not necessary for the main mechanism, but they dampen investment volatility that is large otherwise and as shown in Auclert et al. (2020) investment dynamics are an important driver of monetary policy transmission in HANK with deviations from rationality. The first order condition with respect to prices gives the Phillips curve

$$\ln(1+\pi_t) = \kappa\left(mc_t - \frac{1}{\mu_p}\right) + E_t \frac{Y_{t+1}}{Y_t} \ln(1+\pi_{t+1}) \Psi_{t,t+1} \tag{30}$$

where $\mu_p = \frac{\eta}{\eta-1}$ and $\Psi_{t,t+1}$ is the stochastic discount factor and equal to $\frac{1}{1+r_{t+1}}$ and $\pi_t \equiv P_t/P_{t-1} - 1$. κ is the coefficient for the slope of the Phillips curve.

Occupational Choice. In the case of occupational choice (see Section 4.1.4) the production function is modified to include a CES aggregator of occupation-specific labor: $L_t = \left(\sum_{o=1}^{O} \alpha_o l_{o,t}^{\sigma}\right)^{\frac{1}{\sigma}}$ and the costs of labor for firms are therefore $\sum_{o=1}^{O} W_t^o l_t^o$, such that the labor market clearing is occupation-specific and yields $l_{o,t} = \sum_g m_g \int \gamma_o^g e_t n^o \theta^o dD_g(e_t, a_{t-1}^n)$.

4.2.2. Asset Market and Equilibrium Conditions

Let v_t denote the price of equity and d_{t+1} the firm dividend. The real return on equity is $\frac{d_{t+1}+v_{t+1}}{v_t}$. The no-arbitrage condition is: $v_t = \frac{E_t(d_{t+1}+v_{t+1})}{1+r_{t+1}}$. The asset that households use for their savings is the equity index. Thus, the return on households' assets is: $(1+i_{t-1}^a) = \frac{d_t+v_t}{v_{t-1}}(1+\pi_t)$[16].

The supply of efficient labor is equal to the demanded labor $\int n_t e_t dD_t(e_t, a_t^n) = L_t$. Aggregate supply of goods is equal to aggregate demand of goods, hence: $Y_t = \mathcal{C}_t + I_t$, where consumption is aggregated through the joint distribution, D_t. Finally, asset markets clearing implies: $\mathcal{A}_t = v_t$, where again aggregation is obtained through the joint distribution D_t.

4.2.3. Policy

Monetary policy follows a Taylor-type rule, which endogenously responds to macroeconomic conditions as follows: $i_t^a = \rho_r i_{t-1} + (1-\rho_r)(r_t^* + \phi_\pi \pi_t + \phi_y(Y_t - Y_{ss})) + \varepsilon_t^r$, where i_t^a is the monetary policy interest rate, ε_t^r is the monetary policy shock, ρ_r is the smoothing parameter, ϕ_π is the weight on inflation π_t, ϕ_y is the weight on output gap, $(Y_t - Y_{ss})$, with Y_{ss} as the steady state value of output Y_t, r_t is the real interest rate, r_t^* is the natural interest rate, which is equal to the real interest rate in the steady state, and the Fisher equation reads as follows: $1 + r_t = \frac{1+i_{t-1}^a}{1+\pi_t}$.

Definition 3. Competitive Equilibrium. *A competitive equilibrium of the economy satisfies the following definition: the sequence $[c_t, a_t, n_t, o_t]_{t=0}^{\infty}$ solves households' consumption-saving and labor supply decisions in Equation (18), given the distribution of idiosyncratic shocks, $P(e_{t+1}|e_t)$ and the sequence of prices i_t^a, W_t^o, π_t and the attention choices. The policy functions resulting from the consumption-saving and attention problem solve a fixed point equilibrium. Aggregate asset holdings and consumption of the households are equal to the product of the individual optimal functions and the distribution of households across occupations, idiosyncratic shocks and assets. Firms choose prices, labor demand, and capital inputs to solve discounted profit optimization, given in equation (29). Market clearing and the aggregate resource constraints are satisfied. Monetary policy determines the short term interest rate according to the Taylor rule.*

4.2.4. Calibration

For the calibration we follow the literature and assume that the steady state is common knowledge. This means that the steady state is solved under fully rational expectations. In calibrating the model to the US economy we follow Auclert et al. (2021). Calibration to Australian economy is

16 This includes the return on capital and profits due to monopolistic power of the firms.

based on Gibbs et al. (2018). Wealth statistics for Australia are taken from Australian Bureau of Statistics. Results for Australia are shown in Appendix E.3. In the following we outline calibration of occupational parameters and attention choice for the US.

Table 4: Calibration

Parameter	Description	Value US	Value Australia
Production Function			
δ	Capital depreciation	0.02	0.0175
K	Capital to output ratio	10.0	12.23
κ	Slope of the price Phillips curve	0.1	0.06
ξ	Investment adj. cost parameter	4.0	4.0
Households			
σ	EIS	0.5	0.5
ρ	Inverse Frisch elasticity	1	1
ρ_z	Autocorrelation of earnings	0.966	0.973
σ_z	Cross-sectional std of log earnings	0.92	1.08
A	Total wealth	14.0	21.19
Asset Markets			
r	Real interest rate	0.0125	0.00875
Monetary and Fiscal Policy			
ϕ_π	Coefficient on inflation in Taylor rule	1.5	1.4
ϕ_y	Coefficient on output gap in Taylor rule	0.08	0.2
ρ_r	Smoothing parameter in Taylor rule	0.8	0.8

Occupational choice. Output, labor hours and price level are normalized to 1. In the case of occupations, the share of high-income households is $m_2 = 0.3$, there are two occupations and the wages in those occupations are: 0.43 and 1.21 (wage distribution pins down α_o), labor substitutability across occupations is measured through $\sigma = 0.2$, high-income households have a comparative advantage in high-wage occupation $\eta_2^2 = 1.0$ and $\eta_2^1 = 0.68$, low-income households have a comparative advantage in occupation 1 $\eta_1^1 = 1.0$ and $\eta_1^2 = 0.16$. The occupational wages and skill-distribution is based on O*NET and KLEMS data, see Faia et al. (2022) for details[17].

Attention. We derive optimal attention analytically and find that it is an inverse function of the volatility of inflation, see Eq. 26. We simulate the model under three shocks: monetary policy, markup and technology shocks. Table 5 shows the values for the shock process parameters we used in the calibration. The values for monetary policy and markup shocks are taken from Smets and Wouters (2007), parameters for the technology shocks are calibrated to match output and consumption volatility from the data (US, since 1966, HP filter). We find attention for different values of ϕ_π by solving a fixed point between the attention levels of two types of households (high-income and low-income) and the volatility of inflation. So, for the baseline value of the parameter, $\phi_\pi = 1.5$, attention is calibrated to match the empirical results shown in Table 2 (parameters γ^1 and γ^2) through the calibration of the cost of attention parameter χ^g. For the other values of the ϕ_π, we guess the volatility for inflation σ_π, solve for attention levels given the volatility of inflation and the calibrated value of costs of attention from the baseline, then

17 The analysis can of course be extended to more than 2 occupation-specific income levels, see also Faia et al. (2022) who analyze 8 occupational groups.

Table 5: Shock Process Parameters

Shocks	Monetary Policy	Markup	TFP
ρ	0.15	0.69	0.995
σ	0.24	0.04	0.04

Notes: The table shows the persistence and volatility of shocks used for the specification of the shock process. The values for the monetary policy and markup shocks are taken from Smets and Wouters (2007) and the values for TFP shocks are calibrated to match output and consumption volatility from the US data for the period of 1996-2023.

we simulate the model with the found levels of attention under the above specified calibration of shocks, verify that the guessed volatility of inflation is close to the equilibrium volatility of inflation given ϕ_π and if not, we update the guess of inflation volatility and repeat until convergence.

5. Model Results

The following section presents model results for our HANK model with inattention to inflation. We first present impulse responses to a monetary policy shock[18]. We compare results for HANK and RANK economies, both under FIRE and endogenous inattention. Then, we conduct two policy experiments varying the variance of idiosyncratic risk to capture the role of safety nets and varying the Taylor rule inflation coefficient to study the inflation-output trade-off under different policy rules in a model with households heterogeneous in attention levels, income, and wealth.

5.1. Homogeneous Inattention

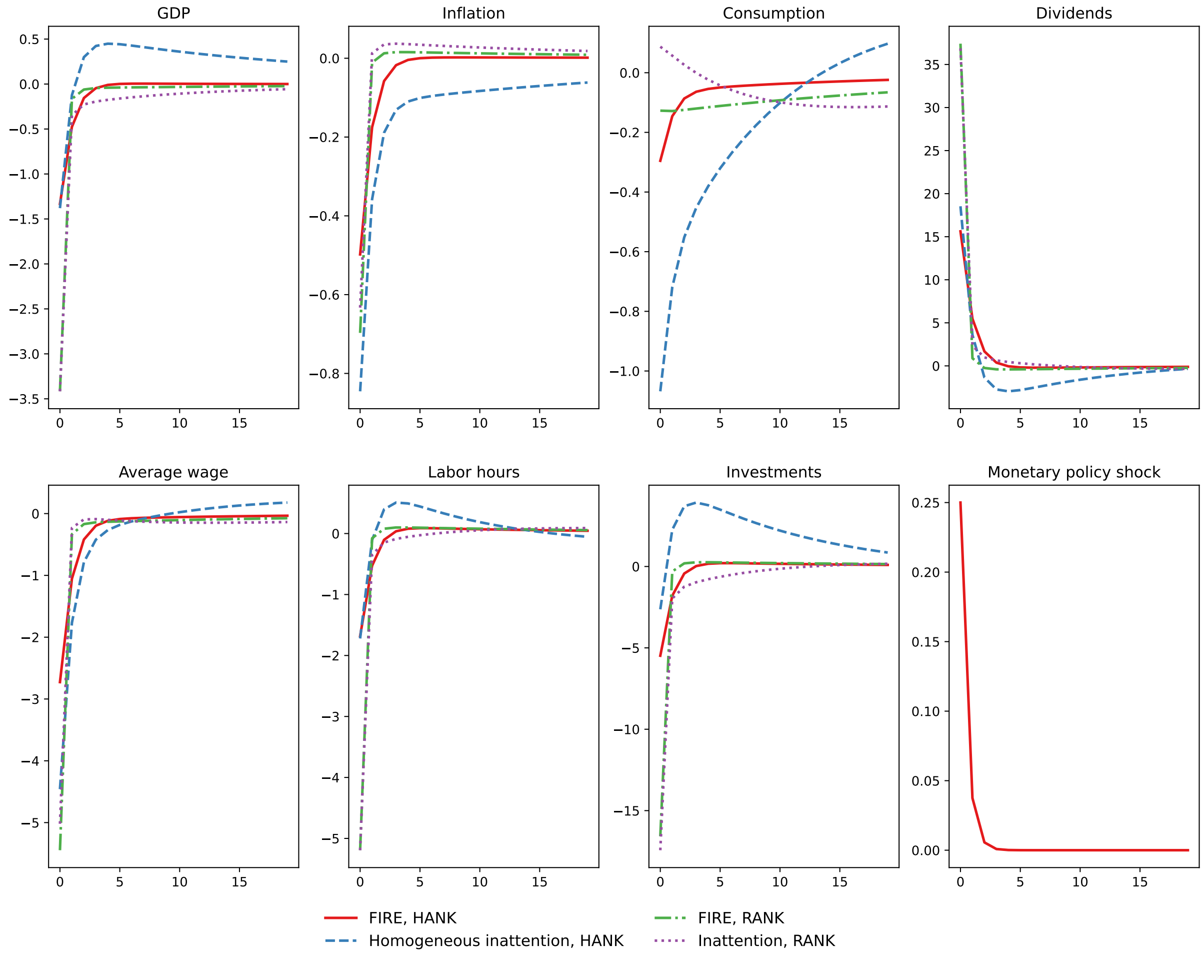
Figure 2 shows the impulse response functions for the model calibrated to the US to a 25 basis points contractionary monetary policy shock - for the results for Australia, see Figure 14 in Appendix E. We compare results of the traditional FIRE RANK model, the baseline FIRE HANK model with exogenous wage inequality and the responses in homogeneous inattention economies, both RANK and HANK models, in which households have the same level of ("homogeneous" or average) inattention. We show that a contractionary 25 basis points monetary policy shock induces a decrease in inflation, followed by a recession (see first row, the first two graphs). In all economies wages decrease because of the fall in labor demand which accompanies the fall in consumption of unconstrained households where the latter is driven by intertemporal substitution. As a result of a decrease in wages, labor supply in FIRE economies and consumption also fall (see second row, second graph).

However, with inattentive agents, who misperceive the fall in inflation to be smaller than it actually is, the perceived real wage decreases by more and the perceived real interest rate increases by less than they actually do. Reason being that due to inattention to prices, the household does not realize that a decrease in inflation or the price level actually implies a less

18 Impulse responses to TFP and markup shocks can be found in the Appendix E.

severe decrease in real wage as they instead fully observe their nominal wage but only partially their real income. Therefore, households perceive themselves to be poorer than they actually are, inclining them to work more to compensate for their perceived loss in income. In HANK, the larger perceived drop in labor income leads to a larger decrease in consumption, when compared to the FIRE economy, which dominates the more muted intertemporal substitution effect that stimulates consumption. This is another manifestation of larger indirect effects compared to a direct effect in models with heterogeneous households. As a result, in RANK, where indirect effects are small, the difference between FIRE and the model with inattention is smaller and the drop in consumption is less.

Figure 2: Impulse Response Functions to a Monetary Policy Shock, US



Notes: The figure shows in percentage points the impulse responses of output, inflation, dividends, consumption, average wage labor hours and investments to a contractionary 25 bps monetary policy shock with 0.15 persistence for the US. The red lines show the impulse response function under full information rational expectations for the HANK model, the dash-dotted green lines show the results under FIRE in RANK model, the dashed blue lines show the results under homogeneous inattention in a HANK model and the dotted purple lines show the results under homogeneous inattention in a RANK model.

In the HANK model, the increase in the household's marginal propensity to consume additionally incentives the agent to increase labor supply and due to labor capital complimentarity, it also incentives firms to increase investments (see second row, the third graph), stimulating the overall economy, making the recession less deep. Over time households update their expectations and observe their actual real income more correctly, adjust their labor supply and the economy recovers. The inflation-output trade-off is better in an inattentive economy because the increased labor supply creates a boom rather than a recession, reinforcing the importance of anchored expectations, i.e. expectations do not fluctuate systematically with inflation surprises stabilizing the aggregate economy.

Wage Rigidity Additional results with real wage rigidity are shown in Appendix E.6 in Figure 17 and show less of a difference between the responses of the economy under FIRE HANK and HANK with inattention. This provides additional evidence that the main channel of inattention in our economy is through the perceived drop in wages. When there are real wages rigidities in the economy and agents anticipate them, they perceive the drop in real incomes as less severe and don't adjust labor supply.

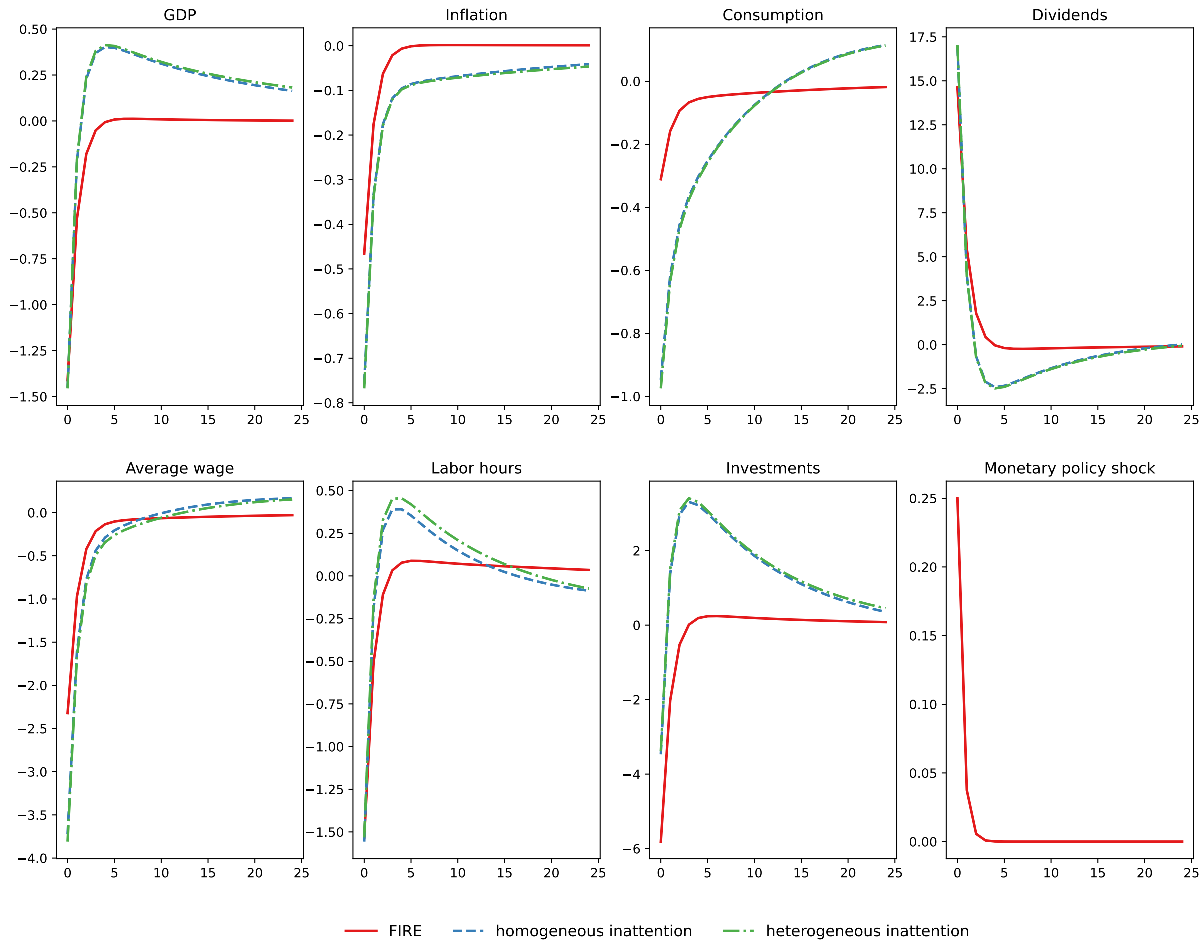
5.2. Heterogeneous Inattention along the Endogenous Income Dimension

To study the effects of heterogeneous inattention we now extend the model with the endogenous income inequality by allowing for occupational choice and heterogeneity in skills as we outlined in Section 4.1.4. We compare impulse responses in our model with heterogeneous inattention ($\gamma^1 \neq \gamma^2$) to two counterfactual economies: homogeneous inattention (every household group has the same level of inattention, $\gamma^1 = \gamma^2 \neq 1$) and the traditional full information rational expectations ($\gamma^g = 1 \; \forall g = [1, 2]$). Since the mechanism is the same for both countries we focus on the US in the following. Figure 3 shows impulse response functions to the same 25 basis points contractionary monetary policy shock for the aggregate variables as in the previous exercise. The monetary policy shock again creates a recession in the FIRE economy as well as in the economies with homogeneous and heterogeneous inattention, whereby again, the output-inflation trade-off is better in an economy with anchored expectations allowing households to be inattentive to inflation. However, with heterogeneous inattention, the consumption drop is mostly concentrated among more constrained households. Their lower attention and larger perceived drop in wages leads to an even larger increase in labor hours, which can be seen in the lower panel of Figure 3, elucidating the dominance of the income effect in an economy with inattentive households. The difference of homogeneous vs heterogeneous attention for the aggregate dynamics is, however, small due to the low average level of attention of households to inflation.

Welfare Analysis Figure 4 extends this analysis and decomposes the aggregate effect into its income-specific components. The figure shows the responses of consumption, labor hours and the welfare into the responses for high-income (richer type) households in the top panel and the low-income (poor type) households in the bottom panel. Welfare is evaluated across the different income types by calculating the implied consumption equivalent variation as the change in the permanent consumption of a household needed to make him just as well off as the change in both consumption and labor supply. Although it seems on aggregate, as shown in Figure 3, the responses between homogeneous and heterogeneous attention do not differ much, Figure 4 shows that there are significant differences in the type-specific responses.

In particular, the previous responses are amplified and we uncover a novel channel in models

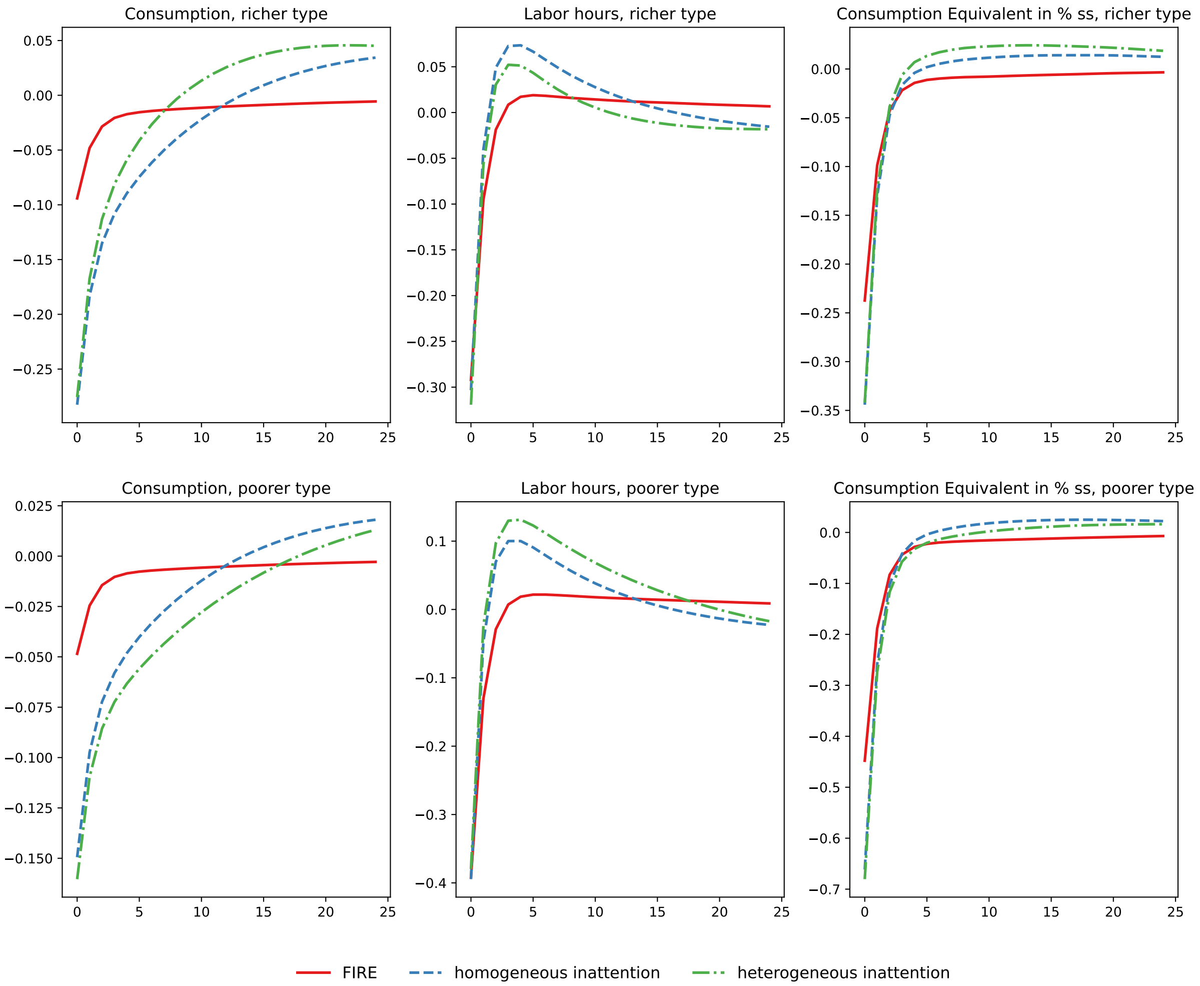
Figure 3: Impulse Response Functions to a Monetary Policy Shock with Endogenous Occupation, US



Notes: The figure shows in percentage points the impulse responses of output, inflation, consumption, dividends, average wage, labor hours and investments to a contractionary 25 bps monetary policy shock with 0.15 persistence for the US in the HANK model with endogenous occupation. The red line shows the impulse response function under full information rational expectations, the dashed blue line shows the results under homogeneous inattention in HANK model and the dash-dotted ed green line shows the results under heterogeneous inattention.

with inattention which is the following. Generally, when real wages decrease, households face income and substitution effects of labor supply. As we discussed previously, the income effect - realized by an increase in labor supply to compensate for the perceived loss in income - dominates in models with inattentive households, leading to an overshooting response of labor hours (see second row, middle graph). The labor supply however is even larger with heterogeneous inattention, as low-income households are less attentive to inflation and learn slower about inflation (see equation (20)) such that they perceive the fall in real wages to be larger compared to the homogeneous attention and rational expectations cases. As low-income households lack the smoothing mechanism that high-income households have, they smooth consumption along the business cycle by varying labor supply. The increase in labor supply, however, leads to even larger welfare loss among low-earners due to a high disutility of working. When we allow high-income

Figure 4: Heterogeneity across Income Types, US



Notes: The figure shows in percentage points the impulse responses of consumption, labor hours and the consumption equivalent welfare variation to a 25 bps monetary policy shock with 0.15 persistence for the US in the HANK model with endogenous occupation. The red line shows the impulse response function under full information rational expectations, the dashed blue line shows the results under homogeneous inattention in HANK model and the dash-dotted green line shows the results under heterogeneous inattention. The top panel shows the results for high-income households, the lower panel shows the results for low-income households

households to pay more attention to inflation (see green dash-dotted line in the upper row) they increase consumption after the initial drop quicker because they observe the economy more closely, allowing them to form closer to rational inflation expectations and correctly adjust their perception about their increase in real income, which is the opposite of low-income households who under lower level of attention (see green dash-dotted line in the lower panel) decrease their level of consumption for a longer period of time given their misperception over real labor income. These dynamics can be observed especially with labor supply: as long as households misperceive their income they increase their number of hours worked. Once they adapt their expectations closer to the actual level of inflation they decrease their labor supply as there is no need for them to work more given their increase in real income. Depending on the speed of learning these adjustments happen quicker or slower.

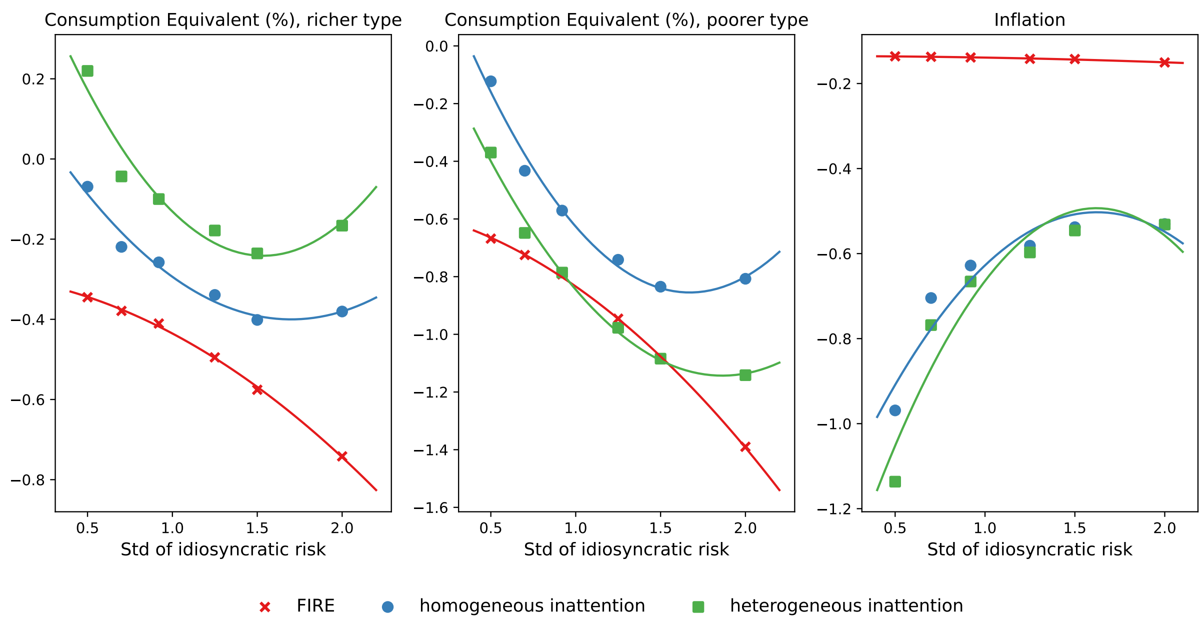
More importantly, the distributional consequences of monetary policy are underestimated under rational inflation expectations. Larger welfare losses of low-income households in response to contractionary monetary policy shocks are well-documented, see for example Coibion et al. (2017), and theoretically, see for instance Auclert (2019) and Gornemann et al. (2021). The welfare losses in consumption equivalent units following a contractionary monetary policy shock with inattention according to our results are larger among low-income households compared to the FIRE case.

5.3. Policy Counterfactuals

5.3.1. The Role of Transitory Income Inequality

Figure 5 presents cumulative welfare losses in consumption equivalent terms for a 25 basis point contractionary monetary policy shock as a function of the variance of idiosyncratic risk, which reflects the safety nets present in the economy. The first and second graphs show how idiosyncratic risk amplifies the difference in welfare costs between inattentive low- and high-income earners[19]. This is because with higher levels of idiosyncratic risk, more households are at the borrowing constraint or close to it. Those households precautionary supply labor to smooth their consumption and incur large losses in terms of welfare from labor disutility.

Figure 5: The role of Idiosyncratic Risk



Notes: The figure shows the change of consumption equivalent welfare variation and inflation as a function of the change of the standard deviation of idiosyncratic risk for high-income (left panel) and low-income (right panel) households under full information rational expectations, homogeneous and heterogeneous inattention. Each dot shows a cumulative loss in consumption equivalent terms.

The results reinforce our previous conclusions: along the increase in idiosyncratic risk, heterogeneous attention has opposite effects on high- and low-income households compared to homoge-

19 see Appendix E for an analysis without permanent, occupation-induced income inequality

neous attention - it increases welfare for high-income households and decreases it for low-income households due to the lack in the smoothing mechanism of poor households and the according adjustment in labor supply. The effects on inflation are mostly flat under FIRE. However, with inattention, as risk levels increase, households supply more labor hours, thus, receive more labor income, which allows them to decrease consumption by less in future periods, so aggregate demand falls by less and (cumulatively) the potency of monetary policy decreases.

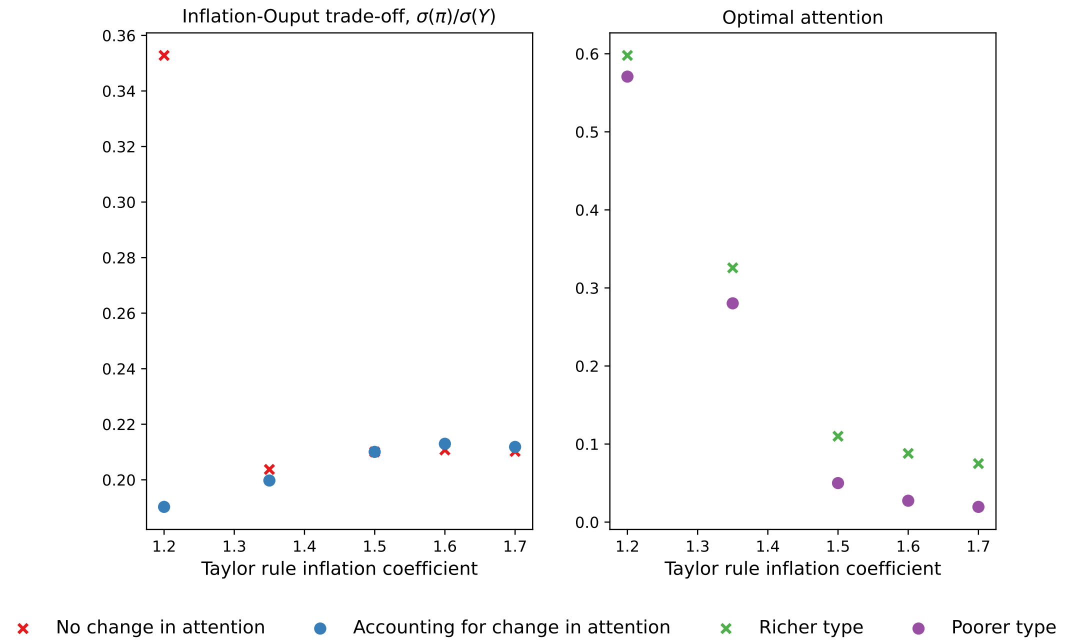
5.3.2. The Role of Monetary Policy

To analyze how attention to inflation affects the design of monetary policy we simulate the model for different Taylor-rule coefficients, ϕ_π. We use our baseline calibration of the model and change the Taylor rule coefficient in it. We then reassess volatility of inflation σ_ϕ under the shock processes specification reported in Table 5. In line with the expression for optimal attention (26), we recompute attention levels of both types of households in the economy given the new volatility of inflation. Given the new attention levels we recompute the inflation volatility and repeat the procedure until convergence. The results are shown in Figure 6. This figure shows both the inflation-output trade-off the central bank faces in terms of the ratio between inflation volatility and volatility of output (left graph) and the optimal attention level of the households for each value of the Taylor rule coefficient (right graph). We assess the trade-off when first, households have a constant level of attention and do not change their attention to inflation when the central bank changes its reaction to inflation (so without the fixed point), and second, when the households change their attention level in response to the central bank's policy. The optimal attention levels consistent with the ϕ_π values are evaluated for low-income (poorer type) and high-income (richer type) households shown in the right panel.

If attention to inflation is kept counterfactually fixed, central bank faces a better inflation-output trade-off with smaller Taylor rule coefficients. This is because the central bank does not induce a deep recession each time inflation deviates from target. However, larger inflation volatility leads to higher levels of attention as seen in the second graph. Both types of households increase attention levels rapidly with a decrease in ϕ_π. This leads to a worse inflation-output trade-off once change in attention is accounted for. As low-income households have larger costs of paying attention[20], their attention levels drop faster compared to high-income households in response to a higher ϕ_π.

20 As they loose from inattention more in terms of welfare, the model rationalizes their lower levels of attention found in the data through larger costs of paying attention.

Figure 6: The Role of Monetary Policy



Notes: The figure shows the ratio between inflation volatility and output volatility σ_π/σ_y for different values of ϕ_π (panel on the left side) with the optimal level of attention that is consistent with the volatility of inflation (blue dots) and with fixed attention as in the baseline (red crosses). Right panel shows optimal attention for high-income (richer type, green crosses) and low-income (poorer type, purple dots) households.

6. Conclusion

This paper studies how attention varies across distribution of households and what implications it has for monetary policy transmission. We have shown empirical cross-country evidence for varying attention across demographic groups, specifically income levels. We find significantly higher attention of high-income households. To quantify the implications of the empirical results for macro dynamics we introduce behavioral inattention into a one-asset HANK model in which households are inattentive to inflation. We calibrate our model to match empirical evidence on inattention that we find in the data. Counterfactual exercises show that compared to the fully rational expectations monetary policy has a better inflation-output trade-off with anchored expectations. However, the better trade-off is achieved through a larger decrease in welfare among low-earners following a contractionary monetary policy shock, thus distributional consequences of monetary policy are exacerbated by inattention. A more muted response to inflation, however, worsens the trade-off due to a rapid rise in attention levels to inflation.

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A. Data

In this section we describe the data used in Section 2. For the US we us the Survey of Consumer Expectations (SCE) provided by the New York Fed, the St. Louis Fed FRED data to recover macro variables and the administrative dataset PLIDA to match moments for the idiosyncratic income process. For Australia we use data from the Consumer Attitudes, Sentiments and Expectations in Australia Survey (CASiE).

A.1. Australia Descriptive Statistics

Table 6 shows the summary statistics for data in CASiE and the monetary shocks by Romer and Romer (2004); Hambur and Haque (2023); Beckers et al. (2020) and the oil supply news shocks by Känzig (2021). We use quarterly data for the period of 1974 - 2023.

To quantify heterogeneous inflation expectations from the data we use responses to the following question: "By what percentage do you think prices will have gone up by this time next year?" Respondents are asked to assign probabilities to values between 0 and 100.

Table 6: Summary Statistics, AUS

Variable	Median	25%	75%	1%	99%
Inflation expectations	5.0	2.0	6.0	-2.0	15.0
CPI inflation	2.5	1.7	3.1	-0.3	7.3
Romer-Romer shocks	0.008	-0.06	0.08	-0.40	0.35
Romer-Romer aug. shocks	0.008	-0.07	0.09	-0.50	0.38
Level shocks	0.0	-0.10	0.03	-2.16	2.24
Path shocks	0.0	-0.20	0.0	-1.46	2.36
Term-premia shocks	0.0	-0.04	0.13	-1.94	2.07
Oil news shocks	-0.05	-0.35	0.37	-1.58	1.30
Oil news shocks precovid	-0.005	-0.38	0.39	-1.44	1.35
Male	1.0	0.0	1.0	0.0	1.0
Income level	\$40-90k	$\leq$ \$40k	$\geq$ \$90k	$\leq$ \$40k	$\geq$ \$90k
Self-employed	0.0	0.0	0.0	0.0	1.0
Education	above school	school or below	above school	school or below	above school
Home-owners	1.0	1.0	1.0	0.0	1.0
Age	$\geq$ 45	34-45	$\geq$ 45	18-34	$\geq$ 45
Full-time workers	1.0	0.0	1.0	0.0	1.0

Note: The table shows summary statistics of the Australian data. We show the statistics for 1-year-ahead inflation expectations and the households characteristics we consider from CASiE, CPI inflation and the monetary and oil supply news shocks we consider for the analysis.

A.2. US Descriptive Statistics

Table 7 shows the summary statistics of the SCE data from the New York Fed for the period June 2013 - January 2023. For the US we consider two sets of monetary policy shocks, in particular we use shocks constructed by Nakamura and Steinsson (2018) and Bauer and Swanson (2023) and for the oil supply shocks we again consider the shocks constructed by Känzig (2021). We define a similar set of variables and cross-sectional characteristics for the US data as we did for the Australian survey. Income is categorized into three groups: the bottom 25.5% are those households that had a pre-tax income in the last 12 months of less than $\$40,000$, that of the 44.7% mid income households is $\$40,000 - \$99,999$ and high income households are the top 29.8% of our total population and have a total pre-tax income level of $\geq \$100,000$. CPI Inflation is the annualized, quarterly CPI inflation rate constructed using the US consumer price index from the St. Louis Fed FRED database (CPIAUCSL). For inflation expectations, we use responses to the following question: "What do you expect the rate of inflation/deflation to be over the next 12 months?" Respondents are asked to assign some probabilities. For the analysis we drop extreme values of $> |50|\%$.

Table 7: Summary Statistics, USA

Variable	Median	25%	75%	1%	99%
Inflation expectation	3.0	2.0	6.0	-25.0	49.0
CPI Inflation	2.17	1.41	3.35	-3.86	9.21
Nakamura and Steinsson	0.00	0.00	0.19	-1.37	1.99
Bauer and Swanson	0.0	0.0	0.01	-0.08	0.05
Oil news shocks, pre-Covid	-0.09	-0.46	0.39	-1.69	1.36
Oil news shocks	-0.05	-0.36	0.38	-1.66	1.49
Male dummy	1.0	0.0	1.0	0.0	1.0
Income level	\$40-99k	$<$ \$40k	$\geq$ \$100k	$<$ \$40k	$\geq$ \$100k
Self-employed	0.0	0.0	0.0	0.0	1.0
Education	College	Some College	College	High School	College
Home-owners	1.0	0.0	1.0	0.0	1.0
Age	40-60	$<$ 40	$>$ 60	$<$ 40	$>$ 60
Full-time workers	1.0	0.0	1.0	0.0	1.0

Note: The table shows summary statistics of the relevant variables for the New York Fed CSE. Nakamura and Steinsson are the monetary policy shocks constructed by Acosta (2022) following Nakamura and Steinsson (2018). Bauer and Swanson are the monetary policy shocks constructed by Bauer and Swanson (2023) using high-frequency data. Oil news shocks are taken from Känzig (2021). CPI Inflation is the quarterly change of the CPI.

B. Additional Results to Section 2

B.1. Aggregate Regressions

Based on group-specific inflation expectation equation (4) we can derive an equivalent equation for the average inflation expectation by averaging across g to get the expression for average inflation expectations as

$$\bar{\pi}_{t+1,t} = \bar{\beta} + \beta_1 \bar{\pi}_{t,t-1} + \beta_2(\pi_t - \bar{\pi}_{t,t-1}) + \bar{\epsilon}_t \tag{B.1}$$

where $\bar{\pi}_{t+1,t}$ denotes the average one period ahead inflation expectation in year t and $\bar{\beta}$ denotes the average of β_i. Following the same steps as in (7) we derive an equation of aggregate forecast errors of inflation, in the vein of Kučinskas and Peters (2022). In particular, we estimate the following regression

$$\bar{e}_{t+1} = \beta_0 + \beta_1 u_t^m + \bar{\nu}_t \tag{B.2}$$

where $\bar{e}_{t+1} = \pi_{t+1} + \bar{\pi}_{t+1,t}$ are the average forecast errors of inflation across groups, u_t^m is either the shock of interest (monetary policy or oil price news shock) directly or is used as an instrument for the central bank interest rate (if we consider monetary policy shocks) or the oil price change (if we consider oil price news shocks).

Table 8 shows the results for equation (B.2). The first row of Panel A and B shows the regression coefficients if we use the shocks, noted in the header, as an instrument for the central bank interest rate (columns 2-6) and the oil price change (columns 7-8), whereby the second row of Panel A and B shows the regression output when we regress forecast errors on the shocks specified in columns 2-8 directly.

Table 8: Forecast Errors on Shocks, Aggregate Level

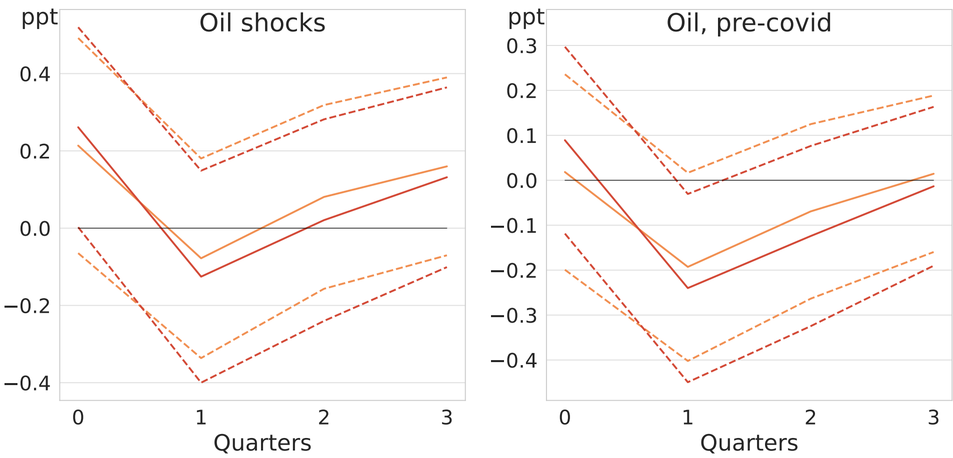
	Panel A: AUS						
	Romer-Romer	Romer-Romer aug.	Level	Path	Term-premia	Oil News	Oil News pre-covid
IV	0.10 (0.61)	-0.05 (1.17)	0.03 (0.58)	6.08 (25.94)	-0.42 (4.70)	1.75 (1.21)	0.59 (1.00)
Reduced Form	0.12 (0.78)	-0.03 (0.81)	-0.01 (0.10)	-0.06 (0.10)	-0.01 (0.10)	0.23 (0.16)	0.07 (0.13)
No. of observations	96	96	109	109	109	109	100
	Panel B: USA						
	NS	GSS target	GSS path	Acosta	MPS	Oil News	Oil News pre-covid
IV	-2.36 (8.45)	0.03 (0.31)	-0.56 (0.86)	-0.09 (0.37)	4.13 (19.67)	1.77 (3.63)	1.99 (2.55)
Reduced Form	0.33 (0.51)	0.06 (0.64)	0.29 (0.51)	-4.92 (19.08)	10.92 (9.25)	0.25 (0.50)	0.25 (0.32)
No. of observations	36	36	36	36	27	36	27

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table shows regression coefficients for aggregated across households inflation forecasting errors regressed on different shocks either directly (reduced form) or using IV (where shocks are used as an instrument for central bank interest rate or oil price changes) estimating (B.2). Panel A shows the result for Australia using a set of externally constructed monetary policy shocks and oil price new shocks.Romer-Romer shocks are monetary policy shocks constructed for Australia by Beckers et al. (2020) following Romer and Romer (2004). Level, path and term-premia shocks are high-frequency identified monetary policy shocks constructed by Hambur and Haque (2023) following Gürkaynak et al. (2005) with the Kaminska et al. (2021) extension that decomposes shocks into level, path and term-premia components. Oil news shocks are taken from Känzig (2021). Panel B shows the regression results of (B.2) for the US using a set of monetary policy and oil price news shocks. Acosta shocks contain the 30-minute change in expectations of the FFR immediately after each FOMC meeting, constructed by Acosta (2022). NS shocks are the monetary policy shocks constructed by Acosta (2022) following Nakamura and Steinsson (2018). Target and path shocks are high-frequency identified monetary policy shocks all constructed by Acosta (2022) following Gürkaynak et al. (2005). MPS shocks are the monetary policy shock instrument constructed by Bauer and Swanson (2023) using high-frequency data. Oil news shocks are taken from Känzig (2021).

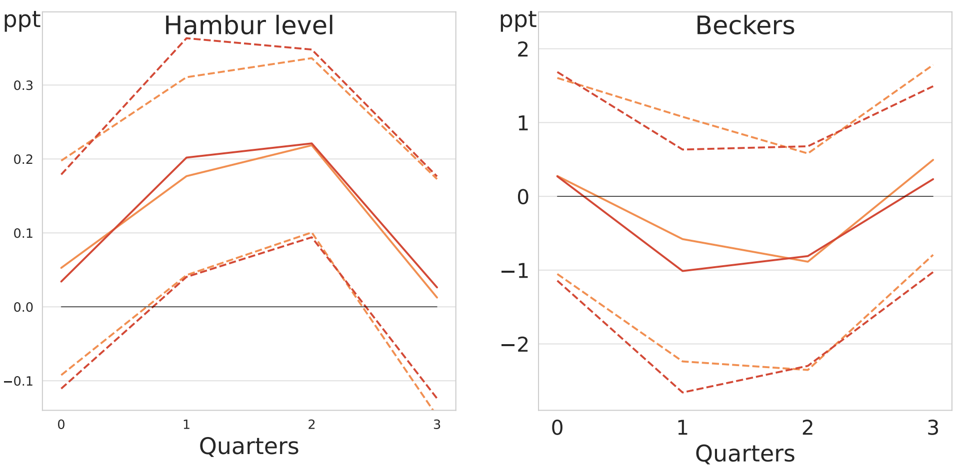
B.2. Shock-Specific Attention

Figure 7: Responses of Inflation Forecast Errors to Oil Supply News Shocks



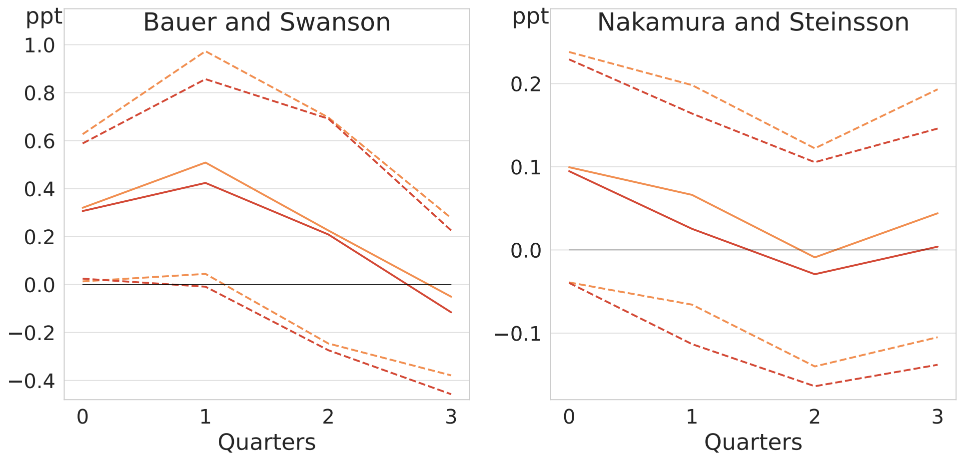
Notes: The figure shows in percentage points the impulse responses of inflation forecast errors to externally constructed oil supply news shocks. Responses of high-income households are shown in red, responses of lower-income households are shown in orange. Dotted lines show 90% confidence intervals.

Figure 8: Responses of Inflation Forecast Errors to Domestic Monetary Policy Shocks



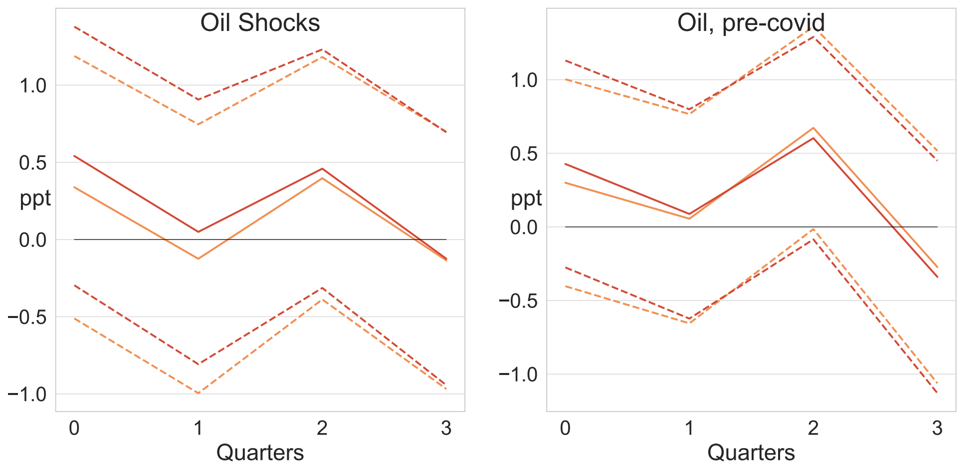
Notes: The figure shows in percentage points the impulse responses of inflation forecast errors to externally constructed monetary policy shocks. Responses of high-income households are shown in red, responses of lower-income households are shown in orange. Dotted lines show 90% confidence intervals.

Figure 9: Responses of Inflation Forecast Errors to US Monetary Policy Shocks



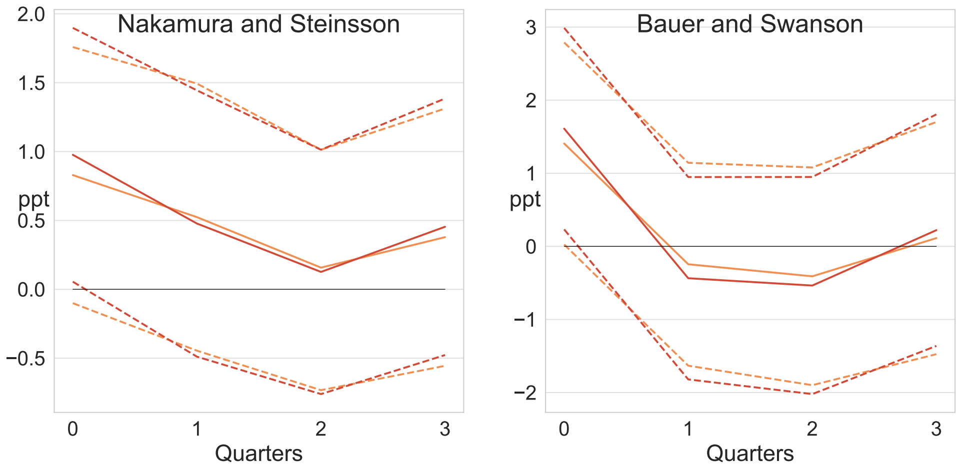
Notes: The figure shows in percentage points the impulse responses of inflation forecast errors to externally constructed US monetary policy shocks. Responses of high-income households are shown in red, responses of lower-income households are shown in orange. Dotted lines show 90% confidence intervals.

Figure 10: Responses of Inflation Forecast Errors to Oil Supply News Shocks



Notes: The figure shows in percentage points the impulse responses of inflation forecast errors to Känzig (2021) oil supply news shocks. Responses of high-income households are shown in red, responses of lower-income households are shown in orange. Dotted lines show 90% confidence intervals.

Figure 11: Responses of Inflation Forecast Errors to Monetary Policy Shocks



Notes: The figure shows in percentage points the impulse responses of inflation forecast errors to Bauer and Swanson (2023) and Nakamura and Steinsson (2018) monetary policy shocks. Responses of high-income households are shown in red, responses of lower-income households are shown in orange. Dotted lines show 90% confidence intervals.

B.3. Panel Regressions

Table 9: Forecast Errors on Shocks, Cross-Section

	Panel A: AUS						
	Romer-Romer	Romer-Romer aug.	Level	Path	Term-premia	Oil News	Oil News pre-covid
IV	-0.52*** (0.19)	-0.57* (0.31)	-0.23 (0.20)	-5.01** (2.50)	-11.00 (16.50)	1.13** (0.47)	-0.39 (0.38)
Reduced form	-0.93*** (0.33)	-0.67* (0.37)	0.04 (0.03)	-0.13*** (0.03)	0.11*** (0.03)	0.14** (0.06)	-0.05 (0.05)
No. of observations	832	832	1035	1035	1035	1035	896
	Panel B: USA						
	NS	GSS target	GSS path	Acosta	MPS	Oil News	Oil News pre-covid
IV	-2.20 (3.21)	-0.01 (0.13)	-0.51* (0.37)	-0.14 (0.14)	3.27 (4.58)	1.97 (1.49)	2.29* (1.13)
Reduced Form	0.26 (0.20)	-0.01 (0.26)	0.25 (0.20)	-7.24 (7.37)	10.17** (3.46)	0.28 (0.20)	0.29* (0.14)
No. of observations	284	284	284	284	212	284	212

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table shows regression coefficients for aggregated across households inflation forecasting errors regressed on different shocks either directly (reduced form) or using IV (where shocks are used as an instrument for central bank interest rate or oil price changes) estimating (B.2). Panel A shows the result for Australia using a set of externally constructed monetary policy shocks and oil price new shocks.Romer-Romer shocks are monetary policy shocks constructed for Australia by Beckers et al. (2020) following Romer and Romer (2004). Level, path and term-premia shocks are high-frequency identified monetary policy shocks constructed by Hambur and Haque (2023) following Gürkaynak et al. (2005) with the Kaminska et al. (2021) extension that decomposes shocks into level, path and term-premia components. Oil news shocks are taken from Känzig (2021). Panel B shows the regression results of (B.2) for the US using a set of monetary policy and oil price news shocks. Acosta shocks contain the 30-minute change in expectations of the FFR immediately after each FOMC meeting, constructed by Acosta (2022). NS shocks are the monetary policy shocks constructed by Acosta (2022) following Nakamura and Steinsson (2018). Target and path shocks are high-frequency identified monetary policy shocks all constructed by Acosta (2022) following Gürkaynak et al. (2005). MPS shocks are the monetary policy shock instrument constructed by Bauer and Swanson (2023) using high-frequency data. Oil news shocks are taken from Känzig (2021).

Table 10: Forecast Errors on Foreign Shocks for AUS, Cross-Section

	NS	GSS target	GSS path	Acosta	MPS
IV	4.11*** (1.23)	-3.63 (2.34)	9.36*** (1.98)	-1.26 (1.79)	3.22*** (0.74)
Reduced Form	0.10*** (0.03)	-0.09* (0.05)	0.20*** (0.03)	-0.89 (1.18)	0.38*** (0.08)
No. of observations	1003	1003	1003	1003	864

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table shows regression coefficients for households inflation forecasting errors regressed on different shocks either directly (reduced form) or using IV (where shocks are used as an instrument for FFR rate changes). Acosta shocks contain the 30-minute change in expectations of the FFR immediately after each FOMC meeting (first component of the policy news shock), constructed by Acosta (2022). NS shocks are the monetary policy shocks constructed by Acosta (2022) following Nakamura and Steinsson (2018). Target and path shocks are high-frequency identified monetary policy shocks all constructed by Acosta (2022) following Gürkaynak et al. (2005). MPS shocks are the monetary policy shock instrument constructed by Bauer and Swanson (2023) using high-frequency data.

Table 11: Group-Specific Forecast Errors on Shocks, AUS

	Romer-Romer	Romer-Romer aug.	Level	Path	Term-premia	Oil News	Oil News pre-covid
			Income level				
High-income	-0.88* (0.46)	-0.50 (0.49)	-0.01 (0.04)	-0.13*** (0.04)	0.12** (0.05)	0.10 (0.08)	-0.04 (0.06)
Mid and low-income	-0.98** (0.48)	-0.85 (0.55)	0.09* (0.05)	-0.13*** (0.04)	0.10** (0.05)	0.18** (0.09)	-0.05 (0.07)
			Entrepreneurs				
Self-employed	-1.36*** (0.52)	-1.09* (0.58)	0.04 (0.04)	-0.16*** (0.04)	0.13*** (0.05)	0.08 (0.09)	-0.10 (0.07)
Not self-employed	-0.50 (0.41)	-0.26 (0.45)	0.03 (0.04)	-0.10*** (0.04)	0.09** (0.04)	0.20*** (0.07)	0.01 (0.05)
			Occupation				
Professionals	-1.14** (0.46)	-0.91* (0.51)	0.05 (0.04)	-0.11*** (0.04)	0.12*** (0.05)	0.06 (0.08)	-0.07 (0.07)
Not professionals	-0.72 (0.47)	-0.43 (0.53)	0.03 (0.04)	-0.14*** (0.04)	0.10** (0.05)	0.22*** (0.08)	-0.03 (0.06)
			Sex dummy				
Female	-0.85* (0.47)	-0.76 (0.53)	0.02 (0.05)	-0.17*** (0.04)	0.14*** (0.05)	0.10 (0.08)	-0.06 (0.07)
Male	-1.01** (0.46)	-0.58 (0.52)	0.05 (0.04)	-0.08** (0.04)	0.08* (0.05)	0.19** (0.08)	-0.04 (0.06)
No. of observations	832	832	1034	1034	1034	1034	896

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table shows regression coefficients for households inflation forecasting errors regressed on different shocks (reduced form) interacted with different dummies (one at a time). Romer-Romer shocks are monetary policy shocks constructed for Australia by Beckers et al. (2020) following Romer and Romer (2004) methodology. Level, path and term-premia shocks are high-frequency identified monetary policy shocks constructed by Hambur and Haque (2023) following Gürkaynak et al. (2005) with the Kaminska et al. (2021) extension that decomposes shocks into level, path and term-premia components. Oil news shocks are taken from Känzig (2021)

Table 12: Panel Regressions of Inflation Expectations across Household Characteristics, USA

	NS	GSS target	GSS path	Acosta	MPS	Oil News	Oil News pre-covid
				Income level			
High-income	0.29 (0.30)	-0.03 (0.40)	0.27 (0.30)	-7.99 (11.05)	11.28* (4.65)	0.34 (0.29)	0.39 (0.19)
Mid and low-income	0.25 (0.27)	0.01 (0.32)	0.23 (0.27)	-6.38 (9.43)	8.97 (5.17)	0.21 (0.28)	0.18 (0.21)
				Entrepreneurs			
Self-employed	0.19 (0.31)	-0.09 (0.39)	0.19 (0.26)	-9.68 (10.61)	8.62 (5.21)	0.29 (0.31)	0.31 (0.24)
Not self-employed	0.36 (0.26)	0.07 (0.35)	0.31 (0.30)	-4.48 (10.12)	11.88** (4.47)	0.27 (0.26)	0.28 (0.16)
				Sex dummy			
Female	0.08 (0.33)	-0.08 (0.41)	0.10 (0.32)	-10.93 (11.10)	8.69 (5.29)	0.15 (0.32)	0.24 (0.23)
Male	0.46 (0.24)	0.06 (0.32)	0.40 (0.23)	-3.32 (9.56)	11.70* (4.55)	0.41 (0.24)	0.34* (0.17)
No. of observations	284	284	284	284	212	284	212

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table shows regression coefficients for households inflation forecasting errors regressed on different shocks (reduced form) interacted with different dummies (one at a time). Acosta shocks contain the 30-minute change in expectations of the FFR immediately after each FOMC meeting (first component of the policy news shock), constructed by Acosta (2022). NS shocks are the monetary policy shocks constructed by Acosta (2022) following Nakamura and Steinsson (2018). Target and path shocks are high-frequency identified monetary policy shocks all constructed by Acosta (2022) following Gürkaynak et al. (2005). MPS shocks are the monetary policy shock instrument constructed by Bauer and Swanson (2023) using high-frequency data. Oil news shocks are taken from Känzig (2021). Oil news shocks are taken from Känzig (2021).

B.4. Labor Supply with Different Monetary Policy Shocks

Table 13: Change of Unemployment Status after a Change in Inflation Expectations, USA

	Nakamura & Steinsson	Bauer & Swanson	Acosta
	(1)	(2)	(3)
Low-Income β_1^1	0.225*	11.251**	0.450
High-Income β_1^2	-0.035*	-1.963***	-0.090***
Low-Income β_2^1	-0.008	-0.885***	-0.031
High-Income β_2^2	-0.006*	0.002	-0.001
Constant	-2.976***	-3.433***	-2.983***
N	10,958	8,320	10,958

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows the parameters of the probit regression $\Pr(unemployment_j = 1) = \Phi(\beta_j + \beta_1^g \cdot I_g \cdot u_t^m + \beta_2^g \cdot I_g \cdot u_t^m \cdot E_{j,t}\pi_{t+1})$ for both high- and low-income households households. We estimate the regression on an individual level using monthly data. Errors are clustered at the individual level.

Table 14: Change of Labor Supply after a Change in Inflation Expectations, USA

	Nakamura & Steinsson		Bauer & Swanson		Acosta	
	(1)	(2)	(3)	(4)	(5)	(6)
	Δn_t	Δn_{t+1}	Δn_t	Δn_{t+1}	Δn_t	Δn_{t+1}
Low-Income β_1^1	-0.298	-0.0232	-7.668	0.198	-0.627	-0.0212
High-Income β_1^2	0.193	0.644	-6.142	13.139	-0.546	0.504
Low-Income β_2^1	-0.025	0.067	0.143	5.504**	0.150*	0.066
High-Income β_2^2	-0.128	0.052	-3.260	4.983	-0.749**	1.152***
Constant	-0.050	-0.246	-0.122	-0.268	-0.268	-0.242
N	7,324	5,157	5,540	3,860	7,324	5,157

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows the parameters of regression $\Delta n_{j,t+s} = \beta_j + \beta_1^g \cdot I_g \cdot u_t^m + \beta_2^g \cdot I_g \cdot u_t^m \cdot \Delta E_{j,t}\pi_{t+1} + \varepsilon_{j,t}$ for both high- and low-income self-employed households. We estimate the regression on an individual level using monthly data.

C. Appendix to Section 3

C.1. Attention Choice

In general, the household in our economy solves the following problem:

$$\begin{aligned} V_j(m_t) &= \max_{c_t} \{u(c_t) + \beta \tilde{E}[V_j(m_{t+1})]\} \\ s.t. \quad P_t c_t + a_t^n &= Y_{g,t} + (1 + i_t^a) a_{t-1}^n \end{aligned} \tag{C.1}$$

where $\tilde{E}$ is the expectation operator, we define in Definition 1 and the state is given by $m_t = (a_{t-1}^n, \{\pi_{t+j}\}_{j=0}^{\infty}, \{i_{t+j}^a\}_{j=0}^{\infty}, \{Y_{g,t+j}\}_{j=0}^{\infty})$.

In the traditional, fully attentive economy, the household pays full attention to all variables that are relevant to its decision making. It thereby has fully rational expectations about the entire state of the economy. If the household however is even only slightly inattentive to some state variable, it has a "sparse" representation of the world and anchors expectations about this state variable on a default value π^d which is equal to some level of deviation form the fully rational observed value. Depending on how much attention the household pays towards inflation, the consumption choice will look different. In the following, we look at the associated value functions for households under attention which gives a policy of $c_t(a_{t-1}^n, 1)$ and under inattention with policy $c_t(a_{t-1}^n, \gamma^g)$.

The *rational* household who observed the variables fully rational and pays full attention to the entire state of the economy solves

$$V_j(m_t) = \max_{c_t} \{u(c_t) + \beta[V_j(Y_{g,t} + (1 + i_t^a) a_{t-1}^n - P_t c_t, \{\pi_{t+j}\}_{j=1}^{\infty}, \{i_{t+j}^a\}_{j=1}^{\infty}, \{Y_{g,t+j}\}_{j=1}^{\infty})]\} \tag{C.2}$$

or more compact,

$$V_j(m_t) = \max_{c_t} \{u(c_t) + \beta[V_j(a_{t-1}^n, \{\pi_{t+j}\}_{j=1}^{\infty}, \{i_{t+j}^a\}_{j=1}^{\infty}, \{Y_{g,t+j}\}_{j=1}^{\infty})]\}$$

and we define utility as

$$v_{j,t}(c_t(a_{t-1}, 1), m_t) \equiv u(c_t) + \beta[V_j(a_{t-1}^n, \{\pi_{t+j}\}_{j=1}^{\infty}, \{i_{t+j}^a\}_{j=1}^{\infty}, \{Y_{g,t+j}\}_{j=1}^{\infty})] \tag{C.3}$$

The *inattentive* household has a subjective model about the economy and solves

$$V_j(m_t) = \max_{c_t} \{u(c_t) + \beta[V_j(Y_{g,t} + (1 + i_t^a) a_{t-1}^n - P_t c_t, \{\pi_{t+j}\}_{j=1}^{\infty}, \{i_{t+j}^a\}_{j=1}^{\infty}, \{Y_{g,t+j}\}_{j=1}^{\infty})]\}$$

with utility

$$v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t) \equiv u(c_t) + \beta[V_j(a_{t-1}^n, \{\pi_{t+j}\}_{j=1}^{\infty}, \{i_{t+j}^a\}_{j=1}^{\infty}, \{Y_{g,t+j}\}_{j=1}^{\infty})] \tag{C.4}$$

Taking the imperfect policy $c_t^*(a_{t-1}, \gamma^g)$ however leads to an expected loss in the agent's utility

$$\mathcal{L} = E_t(v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t) - v_{j,t}(c_t^*(a_{t-1}, 1), m_t)) \tag{C.5}$$

which is the difference between the optimal consumption $c_t^*(a_{t-1}^n, 1)$ the household chooses under full information and the imperfect consumption $c_t(a^n_{t-1}, \gamma^g)$ the household chooses under inattention.

To quantify (C.5), we follow Gabaix (2014) and replace $v_{j,t}$ by a second order Taylor approximation around the deterministic steady state and evaluate derivatives at $\gamma^g = 1$. We define the default model as the model at the steady state with steady state values for consumption, wealth and income, and only inflation π_t potentially variable. The household pays full attention to all the variables, except for inflation for which the default attention value is $\gamma^g_d = 0$. The agent now has to decide how much it wants to deviate from this default attention in order to make an optimal consumption choice given the subjective model. Assuming perfect foresight and resorting to the recursive nature of the optimization problem allows us to rewrite the agent's utility $\forall \gamma^g$ as

$$\begin{aligned} v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t) \;\; &\approx \;\; v_j + v_c \hat{c}_t + v_{a^n} \hat{a}^n_{t-1} + \sum_{h=1}^{\infty} v_Y \hat{Y}_{g,t} + \sum_{h=1}^{\infty} v_\pi \hat{\pi}_{t+h} + \sum_{h=1}^{\infty} v_{i^a} \hat{i}^a_{t+h} \\ &+ \;\; \frac{1}{2}\frac{\partial^2 v}{\partial c^2}\hat{c}^2_t + \frac{\partial^2 v}{\partial c \partial a^n}\hat{c}_t \hat{a}^n_{t-1} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial Y_g}\hat{c}_t \hat{Y}_{g+h} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial \pi_h}\hat{c}_t \hat{\pi}_{t+h} \\ &+ \;\; \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial Y_g}\hat{c}_t \hat{Y}_{g+h} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial i^a}\hat{c}_t \hat{i}^a_{t+h} + \ldots \textit{terms independent of } c \end{aligned}$$

where we use the notation $\hat{x}_t = x_t - \bar{x}$ as the deviation of a variable x_t from its long-run value x, $v_x \equiv \frac{\partial v_j(c(a^n, \gamma^g), m)}{\partial x}\big|_{x=\bar{x}, \gamma^g=1}$ and v_j is the steady state value of the utility function. Given the steady state, we have:

$$\begin{aligned} v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t) \;\; &\approx \;\; v_j + v_c c_t + v_{a^n} a^n_{t-1} + \sum_{h=1}^{\infty} v_Y Y_{g,t} + \sum_{h=1}^{\infty} v_\pi \pi_{t+h} + \sum_{h=1}^{\infty} v_{i^a} i^a_{t+h} \\ &+ \;\; \frac{1}{2}\frac{\partial^2 v}{\partial c^2} c^2_t + \frac{\partial^2 v}{\partial c \partial a^n} c_t a^n_{t-1} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial Y_g} c_t Y_{g,t+h} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial \pi_h} c_t \pi_{t+h} \\ &+ \;\; \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial Y_g} c_t Y_{g+h} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial i^a} c_t i^a_{t+h} \\ &+ \;\; \ldots \textit{terms independent of } c \end{aligned} \tag{C.6}$$

Since consumption is of first order importance for the maximization of household, we rewrite (C.6) as

$$\begin{aligned} v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t) \;\; &\approx \;\; v_j + v_c c_t + \frac{1}{2}\frac{\partial^2 v}{\partial c^2} c^2_t + \frac{\partial^2 v}{\partial c \partial a^n} c_t a^n_{t-1} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial \pi_h} c_t \pi_{t+h} \\ &+ \;\; \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial Y_g} c_t Y_{g,t+h} + \sum_{h=1}^{\infty} \frac{\partial^2 v}{\partial c \partial i^a} c_t i^a_{t+h} + \ldots \textit{terms independent of } c \\ &= \;\; v_j + v_c c_t + \frac{1}{2}\frac{\partial^2 v}{\partial c^2} c^2_t + \frac{\partial^2 v}{\partial c^2} c_t \left(\frac{\partial c}{\partial a^n} a^n_{t-1} + \sum_{h=1}^{\infty} \frac{\partial c}{\partial Y_g} Y_{g,t+h} \right. \\ &+ \;\; \left. \sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi_h} \pi_{t+h} + \sum_{h=1}^{\infty} \frac{\partial c}{\partial i^a} i^a_{t+h} \right) + \ldots \textit{terms independent of } c \end{aligned} \tag{C.7}$$

Notice first that when we maximize utility, $\max_c v_j(c(a^n, \gamma^g), m)$, we get the standard Euler equation $v_c = 0$. Second, the derivatives in parenthesis in expression (C.7) are evaluated at $\gamma^g = 1$, which means we can resort to the standard maximization of consumption to derive optimal rational policy $c_t^*(a_{t-1}, 1)$:

$$\max_{c_t} v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t)$$

which, together with the Euler equation $v_c = 0$ gives optimal consumption from the first order condition as

$$c_t(a_{t-1}, \gamma^g) = -\left(\frac{\partial c}{\partial a^n} a_{t-1}^n + \sum_{h=1}^{\infty} \frac{\partial c}{\partial Y_g} Y_{g,t+h} + \sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi_h} \pi_{t+h} + \sum_{h=1}^{\infty} \frac{\partial c}{\partial i^a} i_{t+h}^a\right)$$

where the right hand side is evaluated at $\gamma^g = 1$ such that

$$c_t(a_{t-1}, \gamma^g) \equiv c_t^*(a_{t-1}, 1)$$

This allows us to rewrite (C.7) $\forall \gamma^g$ as follows

$$\begin{aligned} v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t) &\approx v_j + \frac{1}{2}\frac{\partial^2 v}{\partial c^2} c_t(a_{t-1}, \gamma^g)^2 - \frac{\partial^2 v}{\partial c^2} c_t(a_{t-1}, \gamma^g) c_t^*(a_{t-1}, 1) \\ &+ \textit{terms independent of } c \end{aligned} \tag{C.8}$$

The expected loss function is then given by

$$\begin{aligned} L &= E_t((v_{j,t}(c_t(a_{t-1}^n, \gamma^g), m_t) - v_{j,t}(c_t^*(a_{t-1}^n, 1), m_t))) \\ &= [v_j + \frac{1}{2}\frac{\partial^2 v}{\partial c^2} E_t c_t(a_{t-1}, \gamma^g)^2 - \frac{\partial^2 v}{\partial c^2} E_t(c_t(a_{t-1}, \gamma^g) c_t^*(a_{t-1}, 1))] \\ &- [v_j + \frac{1}{2}\frac{\partial^2 v}{\partial c^2} E_t c_t^*(a_{t-1}, 1)^2 - \frac{\partial^2 v}{\partial c^2} E_t(c_t^*(a_{t-1}, 1) c_t^*(a_{t-1}, 1))] \\ &= -\frac{1}{2}\frac{\partial^2 v}{\partial c^2} E_t(c_t(a_{t-1}, \gamma^g)) - c_t^*(a_{t-1}, 1))^2 \\ &= -\frac{1}{2}\frac{\partial^2 v}{\partial c^2} \left(\frac{\partial c}{\partial a^n} a_{t-1}^n + \sum_{h=1}^{\infty} \frac{\partial c}{\partial Y_g} E_t Y_{g,t+h} + \sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi_h} \gamma^g E_t \pi_{t+h} + \sum_{h=1}^{\infty} \frac{\partial c}{\partial i^a} E_t i_{t+h}^a \right. \\ &- \left. \frac{\partial c}{\partial a^n} a_{t-1}^n - \sum_{h=1}^{\infty} \frac{\partial c}{\partial Y_g} E_t Y_{g,t+h} - \sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi_h} E_t \pi_{t+h} - \sum_{h=1}^{\infty} \frac{\partial c}{\partial i^a} E_t i_{t+h}^a \right)^2 \\ &= -\frac{1}{2}\frac{\partial^2 v}{\partial c^2} \left(\sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi} \gamma^g E_t \pi_{t+h} - \sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi} E_t \pi_{t+h}\right)^2 = -\frac{1}{2}\frac{\partial^2 v}{\partial c^2} \left(\sum_{h=1}^{\infty} \frac{\partial c}{\partial \pi_h} (\gamma^g - 1) E_t \pi_{t+h}\right)^2 \\ &= -\frac{1}{2}\frac{\partial^2 v}{\partial c^2} \sum_{h=1}^{\infty} \sum_{h'=1}^{\infty} \frac{\partial c}{\partial \pi_h} \frac{\partial c}{\partial \pi_{h'}} (\gamma^g - 1)^2 E_t \pi_{t+h} \pi_{t+h'} \end{aligned}$$

where $v \equiv v(c(a^n, \gamma^g), m)$ is the household's utility at the steady state and $c \equiv c(a^n, \gamma^g)$ is the steady state consumption.

The household wants to minimize its expected loss in consumption by choosing the optimal inflation-attention level γ^g facing a cognitive constraint $\chi\gamma^g$

$$\min_{\gamma^g} -\frac{1}{2}\frac{\partial^2 v}{\partial c^2}\sum_{h=1}^{\infty}\sum_{h'=1}^{\infty}\frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}}(\gamma^g-1)^2\sigma_{\pi_h\pi_{h'}}+\chi\gamma^g \tag{C.9}$$

where $\Lambda := -\frac{1}{2}\frac{\partial^2 v}{\partial c^2}\sum_{h=1}^{\infty}\sum_{h'=1}^{\infty}\frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}}\sigma_{\pi_h\pi_{h'}}$ is, following Gabaix (2014), the cost-of-inattention factor. The solution of the optimization problem (C.9) gives the result in Proposition 1.

D. Appendix to Section 4

D.1. Behavioral Jacobians

Here we derive the Jacobians of our model with inattentive households. To solve for the behavioral Jacobians we closely follow Auclert et al. (2020) section **D.3**.

Our model considers two groups of households: first, those households who have paid attention to the macroeconomy at $t \geq \tau$ and have all information about the shock arising in $t = 0$ and second, those households who didn't pay attention and still have to learn about the shock to inflation. Learning has probability $\gamma^g(1-\gamma^g)^\tau$, where γ^g is the attention parameter we use in (5). Aggregating across the households gives the following Jacobian which specifies the response of output o to inflation π:

$$J^{o,\pi} = \gamma^g \sum_{\tau=0}^{\infty}(1-\gamma^g)^\tau J^{o,\pi,\tau} \tag{D.1}$$

where $J^{o,\pi,\tau}$ is the Jacobian for the group of households learning about the shock to inflation π at date τ. It is the policy at t that responds to the shock to π at date s. The Jacobian for a given s is given by:

$$\begin{aligned} J^{o,\pi,\tau}_{t,s} &= \gamma^g \sum_{\tau=0}^{s}(1-\gamma^g)^\tau J^{o,\pi,\tau}_{t,s} \\ &= \gamma^g(J^{o,\pi,0}_{t,s} + (1-\gamma^g)J^{o,\pi,1}_{t,s} + \ldots + (1-\gamma^g)^s J^{o,\pi,s}_{t,s}) \\ &= (1-\gamma^g)^s J^{o,\pi,s}_{t,s} + \gamma^g \sum_{\tau=0}^{s-1}(1-\gamma^g)^\tau J^{o,\pi,\tau}_{t,s} \end{aligned} \tag{D.2}$$

To derive the Jacobians for each period t we further observe:

1. for $s \geq \tau$, we assume that households respond to a news shock about the date-s-change in π similarly to a news shock about the date-$(s-\tau)$-change in π, i.e. $J^{o,\pi,\tau}_{t,s} = \ldots = J^{o,\pi,0}_{t-\tau,s-\tau}$.
2. for $\tau > s$ the household has already updated her information in s about the news shock to π in s and therefore is irrelevant, such that $J^{o,\pi,\tau}_{t,s} = J^{o,\pi,s}_{t,s}, \forall t$

For any $t, s > 0$ this allows us to rewrite (D.2) as:

$$
\begin{aligned}
J_{t,s}^{o,\pi,\tau} &= (1-\gamma^g)^s J_{t,s}^{o,\pi,s} + \gamma^g J_{t,s}^{o,\pi,0} + \gamma^g \sum_{\tau=1}^{s-1} (1-\gamma^g)^\tau J_{t,s}^{o,\pi,\tau} \\
&= (1-\gamma^g)^s J_{t-1,s-1}^{o,\pi,s} + \gamma^g J_{t,s}^{o,\pi,0} + \gamma^g \sum_{\tau=0}^{s-2} (1-\gamma^g)^{\tau+1} J_{t-1,s-1}^{o,\pi,\tau} \\
&= (1-\gamma^g)^s J_{t-1,s-1}^{o,\pi} + \gamma^g J_{t,s}^{o,\pi,0}
\end{aligned} \tag{D.3}
$$

For $s = 0$, $\forall t$ (D.2) simplifies to

$$
J_{t,s}^{o,\pi,\tau} = (1-\gamma^g) J_{t,s}^{o,\pi,0} + \gamma^g J_{t,s}^{o,\pi,0} = J_{t,s}^{o,\pi,0} \tag{D.4}
$$

For $t = 0, s > 0$, and since $t \geq \tau$, the impulse response functions are only relevant if $\tau = 0$, such that

$$
J_{t,s}^{o,\pi,\tau} = (1-\gamma^g)^s J_{t,s}^{o,\pi,s} + \gamma^g J_{t,s}^{o,\pi,\tau} = \gamma^g J_{t,s}^{o,\pi,0} \tag{D.5}
$$

In period $\tau = 0$ the household has full information, i.e. paid fully attention. Since $J_{t,s}^{o,\pi,0}$ is the Jacobian for households that learn at $\tau = 0$ about shocks and as in Auclert et al. (2020) define the FIRE-Jacobian $J_{t,s}^{o,\pi,FI} \equiv J_{t,s}^{o,\pi,0}$, we get (22).

D.2. Attention Choice for Consumption

Here we follow the same procedure as in Section C while also extending the model to incorporate idiosyncratic income shocks as an additional state variable. In the full quantitative HANK model the household chooses consumption, labor and occupation contemporaneously. All these action variables will be affected by the inattention to inflation, however we maintain the assumption that only consumption is directly affected. We assume that inattention to inflation has a direct effect on consumption-saving, while labor follows as a response to that. Otherwise the approach to endogenizing attention is the same and follows Gabaix (2016). In D.3 we extend this and incorporate auction-specific attention.

The household in the full HANK economy solves the following problem:

$$
\begin{aligned}
&V_j(m_t, e_t) = \max_{c_t} \{u(c_t) + \beta \tilde{E}[V_j(m_{t+1}, e_{t+1})\} \\
&s.t. \quad P_t c_t + a_t^n = Y_{g,t} + (1 + i_t^a) a_{t-1}^n
\end{aligned} \tag{D.6}
$$

where $\tilde{E}$ is the expectation operator, we define in Definition 2. More precisely, the inattentive and fully attentive households face the following optimization problems.

Each *rational* household who observes the variables fully rational and pays full attention to the entire state of the economy solves

$$
V_j(m_t, e_t) = \max_{c_t} \{u(c_t) + \beta[V_j(Y_{g,t} + (1+i_t^a)a_{t-1}^n - P_t c_t, m_{t+1}, e_{t+1})]\} \tag{D.7}
$$

where $m_t = (a^n_{t-1}, \{\pi_{t+j}\}_{j=0}^{\infty}, \{i^a_{t+j}\}_{j=0}^{\infty}, \{Y_{g,t+j}\}_{j=0}^{\infty})$ is the macroeconomic state and we define the household's utility as

$$v_{j,t}(c_t(a_{t-1}, 1), m_t, e_t) \equiv u(c_t) + \beta[V_j(m_{t+1}, e_{t+1})] \tag{D.8}$$

The *inattentive* household is inattentive to inflation and solves

$$V_j(m_t, e_t) = \max_{c_t}\{u(c_t) + \beta[V_j(Y_{g,t} + (1 + i^a_t)a^n_{t-1} - P_t c_t, m_{t+1,}e_{t+1})]\}$$

with utility

$$v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t, e_t, \gamma^g) \equiv u(c_t) + \beta[V_j(m_t, e_t)] \tag{D.9}$$

The expected loss in the agent's utility from choosing optimal consumption under limited information is

$$L = E_t(v_{j,t}(c_t(a_{t-1}, \gamma^g), m_t, e_t) - v_{j,t}(c_t(a_{t-1}, 1), m_t, e_t)) \tag{D.10}$$

Then, applying a second order approximation, the household's expected loss in utility from being inattentive to inflation, weighted by the ergodic distribution is

$$\min_{\gamma^g} \; -\frac{1}{2}\sum_e \int \frac{\partial^2 v_j(c(a^n, e, \gamma^g), m, e)}{\partial c^2} \sum_h \sum_{h'} \frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}}(\gamma^g - 1)^2 \sigma_{\pi_h \pi_{h'}} dD^g(e, da) + \chi^g \gamma^g \tag{D.11}$$

with the cost-of-inattention factor $\Lambda := -\frac{1}{2}\sum_e \int \frac{\partial^2 v_(c(a^n,e,\gamma^g),m,e)}{\partial c^2} \sum_h \sum_{h'} \frac{\partial c}{\partial \pi_h}\frac{\partial c}{\partial \pi_{h'}} \sigma_{\pi_h \pi_{h'}} dD^g(e, da)$. Solving (D.11) gives the solution we propose in Proposition 3.

D.3. Action-Specific Attention

Here we extend the analysis to action-specific attention. While in the main HANK model we maintain the assumption that attention to inflation has a direct effect on consumption and through that an indirect effect on other action variables, it is also possible to derive action-specific attention. Gabaix (2014) outlines how to to extend the sparse-max approach to multiple actions in Online Appendix XV.D which we apply now to our model. In the following we assume that the household pays attention γ^g to inflation when choosing consumption and $\gamma^{g,n}$ when choosing labor.

D.3.1. Labor under Inattention

Here we show how labor is affected by the household's inattention to inflation, given the other actions. Each *rational* household who observes the variables fully rational and pays full attention to the entire state of the economy solves

$$V_j(m_t, e_t) = \max_{n_t}\{u(n_t) + \beta[V_j(Y_{g,t} + (1 + i^a_t)a^n_{t-1} - P_t c_t, m_{t+1}, e_{t+1})]\} \tag{D.12}$$

where $m_t = (a^n_{t-1}, \{\pi_{t+j}\}_{j=0}^{\infty}, \{i^a_{t+j}\}_{j=0}^{\infty}, \{Y_{g,t+j}\}_{j=0}^{\infty})$ is the macroeconomic state and we define the household's utility as

$$v_{j,t}(n_t(a_{t-1}, 1), m_t, e_t) \equiv u(n_t) + \beta[V_j(m_{t+1}, e_{t+1})] \tag{D.13}$$

The *inattentive* household is inattentive to inflation and solves

$$V_j(m_t, e_t) = \max_{n_t}\{u(n_t) + \beta[V_j(Y_{g,t} + (1 + i^a_t)a^n_{t-1} - P_t c_t, m_{t+1,} e_{t+1})]\}$$

with utility

$$v_{j,t}(n_t(a_{t-1}, \gamma^{g,n}), m_t, e_t) \equiv u(n_t) + \beta E_t[V_j(m_{t+1}, e_{t+1})] \tag{D.14}$$

The expected loss in the agent's utility from choosing optimal labor under limited information is

$$L = E_t(v_{j,t}(n_t(a_{t-1}, \gamma^{g,n}), m_t, e_t) - v_{j,t}(n_t(a_{t-1}, 1), m_t, e_t)) \tag{D.15}$$

Applying a second order approximation around the deterministic steady state and weighting by the ergodic distribution, gives the household's minimization of its expected loss as

$$\min_{\gamma^{g,n}} \; -\frac{1}{2}\sum_e \int \frac{\partial^2 v(n(a^n, \gamma^{g,n}), m, e)}{\partial n^2} \sum_h \sum_{h'} \frac{\partial n}{\partial \pi_h} \frac{\partial n}{\partial \pi_{h'}} (\gamma^{g,n} - 1)^2 \sigma_{\pi_h \pi_{h'}} dD^g(e, da) + \chi^g \gamma^{g,n} \tag{D.16}$$

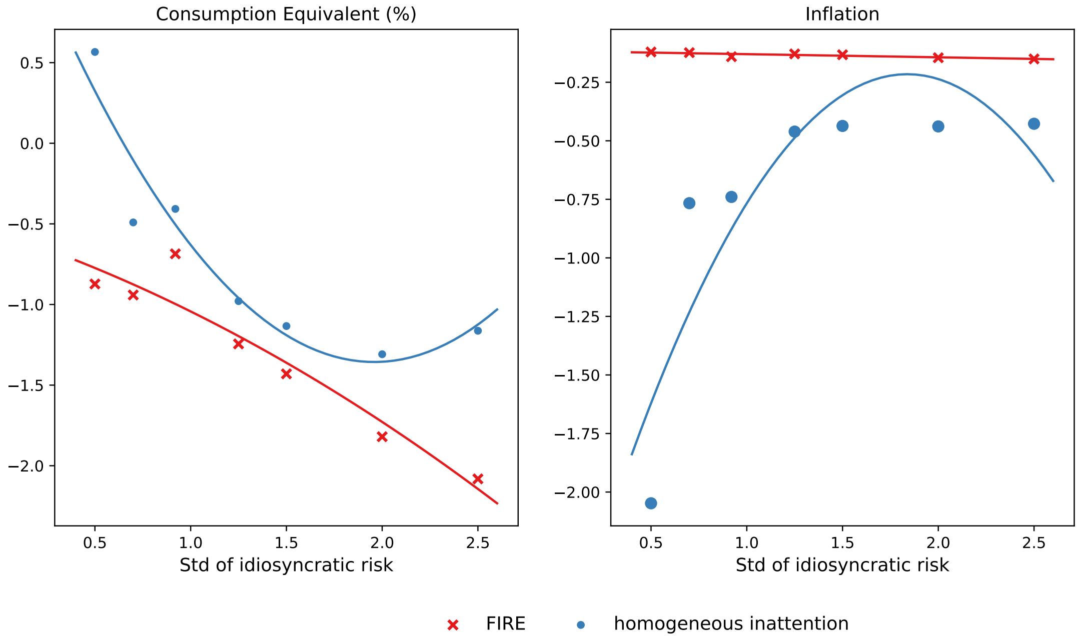
with the cost-of-inattention factor $\Lambda := -\frac{1}{2}\sum_e \int \frac{\partial^2 v(n(a^n e.\gamma^{g,n}), m, e)}{\partial c^2} \sum_h \sum_{h'} \frac{\partial n}{\partial \pi_h} \frac{\partial n}{\partial \pi_{h'}} \sigma_{\pi_h \pi_{h'}} dD^g(e, da)$. Solving (D.16) gives the solution for optimal attention

$$\gamma^{g,n} = \max\left\{0, 1 - \frac{\chi^g}{\sum_e \int \frac{\partial^2 v^g(n(a^n, e, \gamma^{g,n}), m, e)}{\partial (n^g)^2} \sum_h \sum_{h'} \frac{\partial n^g}{\partial \pi_h} \frac{\partial n^g}{\partial \pi_{h'}} \sigma^2_\pi dD^g(e, da)}\right\} \tag{D.17}$$

E. Appendix to Section 5: Additional Results and Figures

E.1. The Role of Transitory Income Inequality

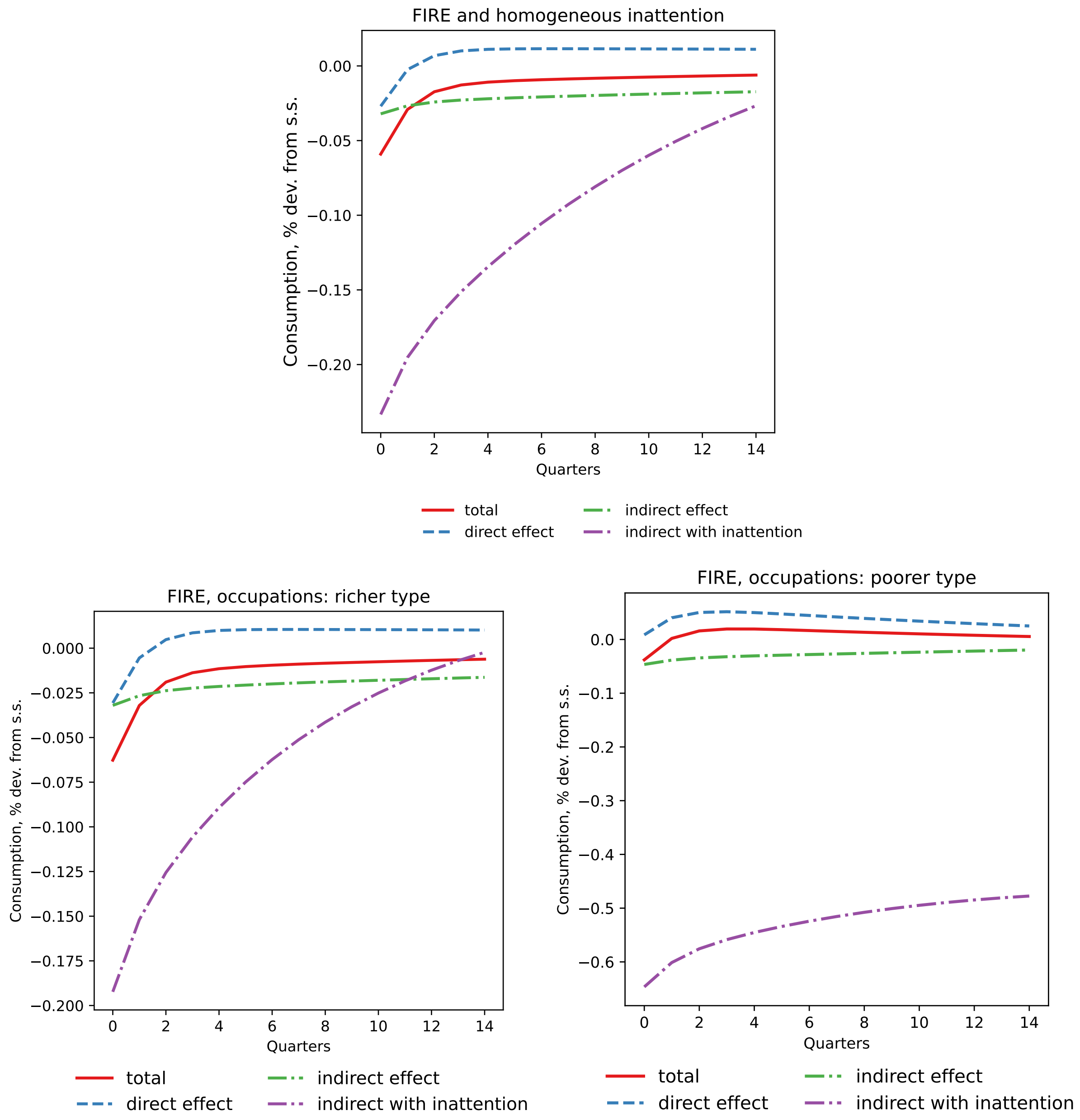
Figure 12: The role of Transitory Income Inequality



Notes: The figure shows the change of consumption equivalent welfare variation and inflation relative to the change of the standard deviation of households' idiosyncratic risk under full information rational expectations and homogeneous inattention. Each dot shows a cumulative loss in consumption equivalent terms.

E.2. Direct and Indirect Effects

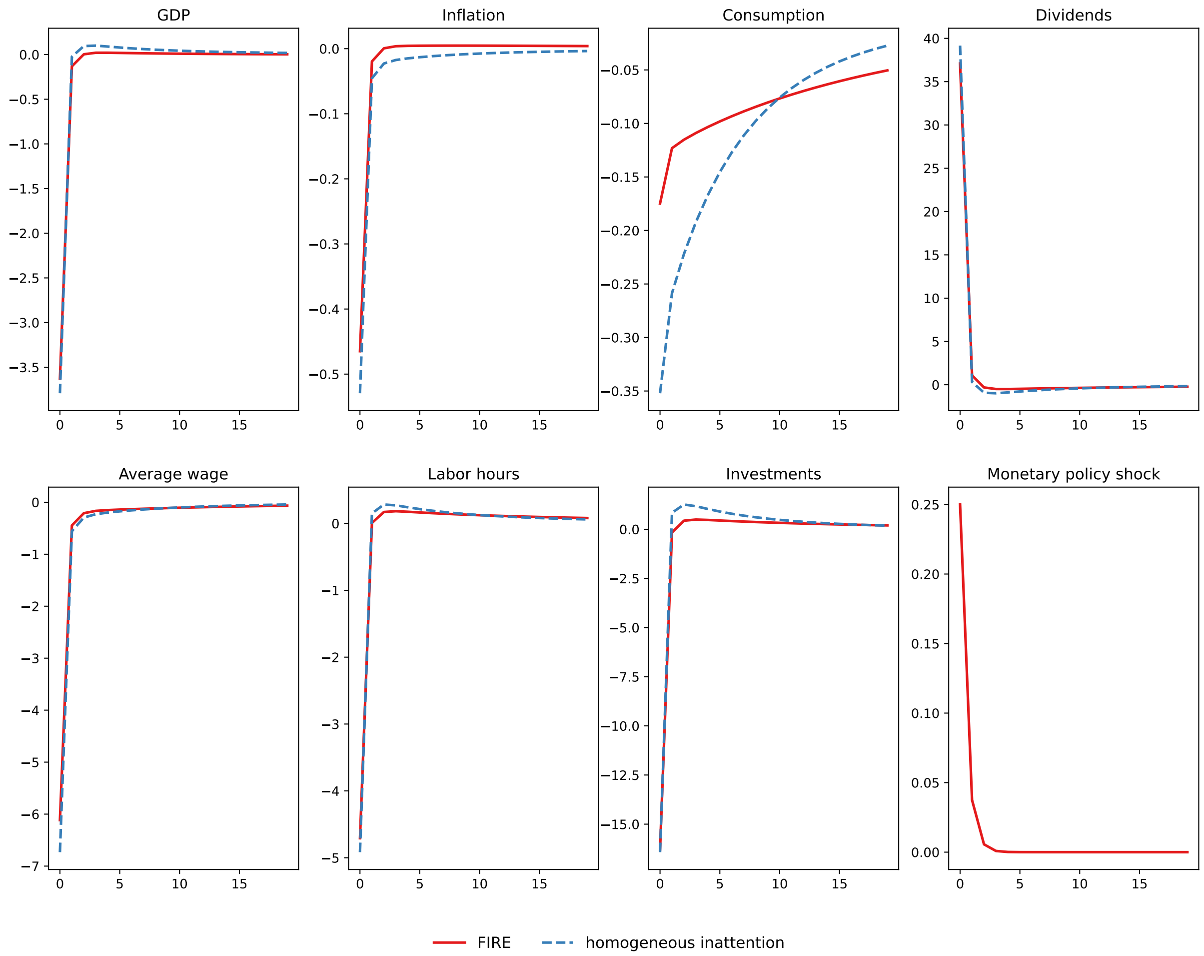
Figure 13: Direct and Indirect Effects



Notes: The figure shows direct and indirect effects for the model without occupational choice (first panel), and for each type of households (second and third panels) in a model with occupational choice. Indirect effects in our model include dynamics of wages and prices (inflation).

E.3. Results for Australia

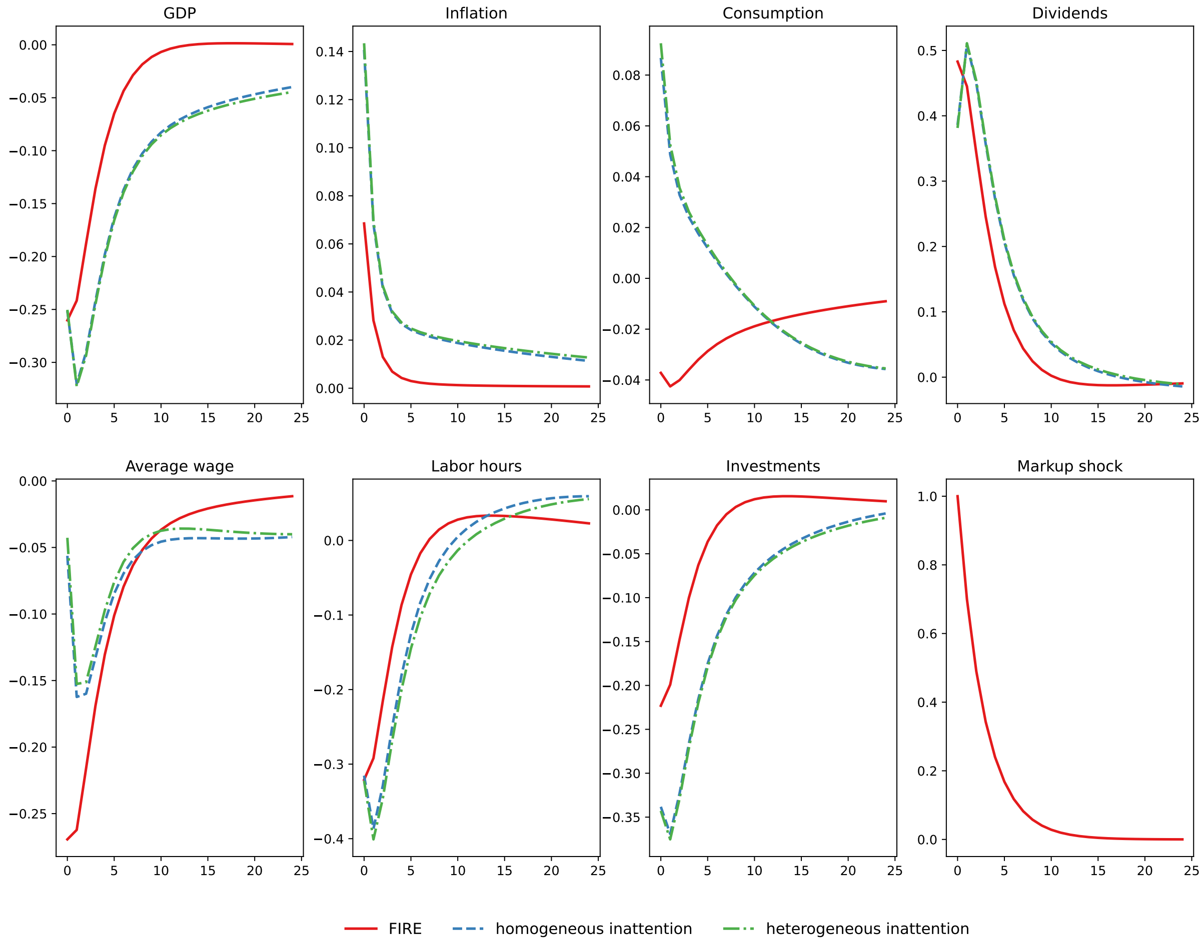
Figure 14: Impulse Response Functions to a Monetary Policy Shock, AUS



Notes: The figure shows in percentage points the impulse responses of output, inflation, consumption, dividends, average wage, labor hours, investments to a contractionary 25 bps monetary policy shock for Australia. The red lines show the impulse response function under full information rational expectations and the dashed blue lines shows the results under homogeneous inattention.

E.4. Markup Shocks

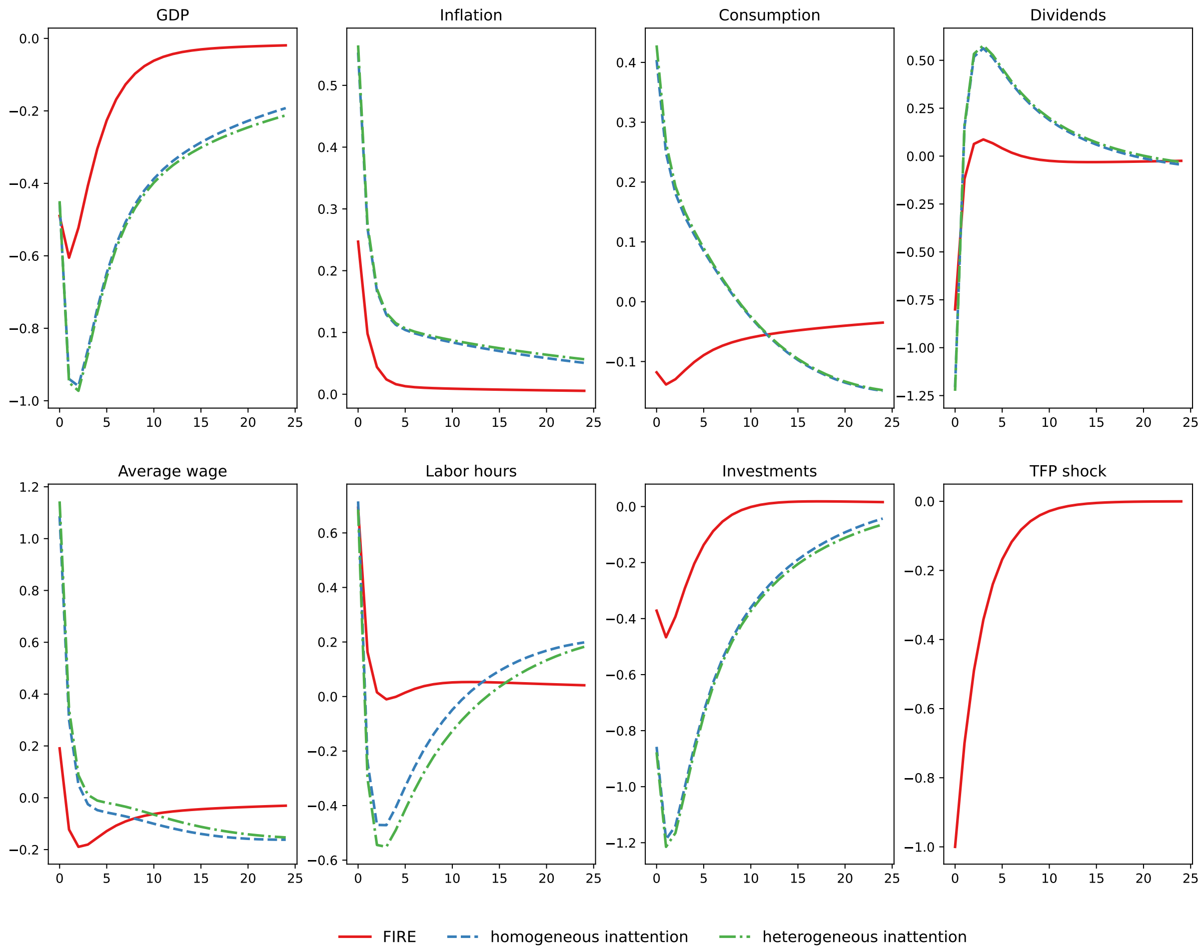
Figure 15: Markup Shock, Heterogeneity across Types



Notes: The graph shows impulse responses to a 1% markup shock. The red lines show the responses in a HANK with FIRE, the dashed blue line for the HANK with homogeneous inattention and the dash-dotted green line for the HANK with heterogeneous inattention.

E.5. TFP shocks

Figure 16: TFP Shock, Heterogeneity across Types

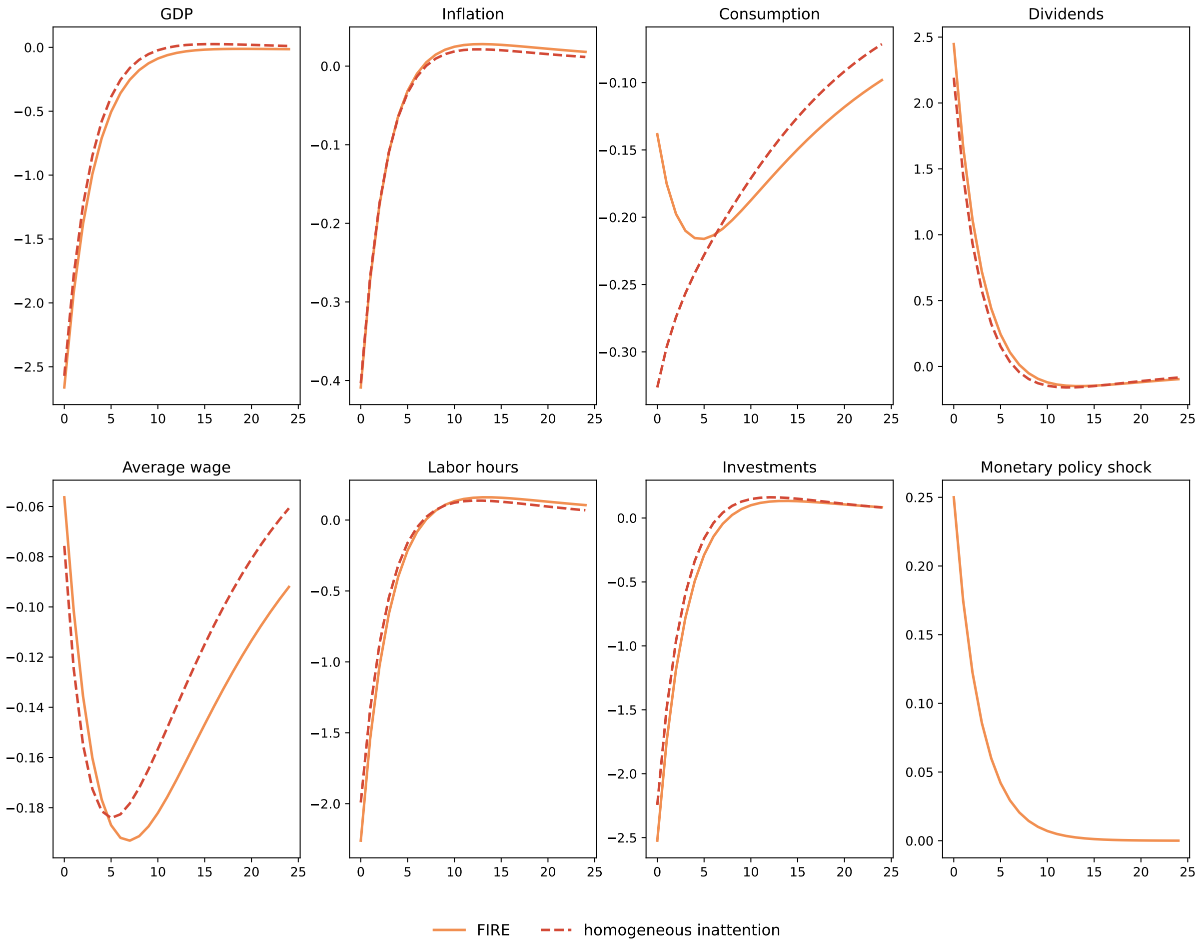


Notes: The shows the impulse responses to a 1% TFP shock. The red lines show the responses in a HANK with FIRE, the dashed blue lines for the HANK with homogeneous inattention and the dash-dotted green lines for the HANK with heterogeneous inattention.

E.6. Sticky Wages

Figure 17 shows the impulse response functions in the model with sticky wages and fully-flexible prices after a contractionary 25 bps monetary policy shock.

Figure 17: Real Wage Rigidity, USA



Notes: The figure shows the impulse responses to a contractionary 25 bps monetary policy shock in a model with real wage rigidity. The orange line shows the responses in a HANK with FIRE and the red dotted line shows the responses in a HANK with homogeneous inattention.