Inequality, Home Production, and Monetary Policy

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Abstract

I study the role of home production in determining the labor income channel through which monetary policy affects consumption inequality. To this end, I develop a Two Agent New Keynesian model with home production. In the context of my model, hand-to-mouth households experience a sharper decline in labor income compared to richer households in response to a contractionary monetary policy shock. However, they increase home production to a greater extent than richer households do. The resulting labor income channel is therefore half the size when accounting for home production. In line with my theoretical results, I show empirically that individuals living from hand-to-mouth respond to contractionary monetary policy shocks by increasing home production significantly more than richer people do.

Keywords: Heterogeneous Agents, Home Production, Consumption

JEL Codes: E21, E32, J22

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1 Introduction

Does home production have an impact on the labor income channel through which monetary policy affects consumption inequality?[1] The literature has identified various channels through which monetary policy affects consumption inequality. One of these channels is the labor income channel: it is empirically well documented that contractionary monetary policy[2] reduces labor income by more for poor households than for rich ones, yielding an increase in consumption inequality (see, e.g., McKay and Wolf (2023)). In this context, I make the following observation: while consumption typically refers to consumption of goods bought on the market, households can also produce consumption goods at home (Becker, 1965). Compared to rich households, poor households—whose labor income is more sensitive to monetary policy shocks—may rely relatively more on home production to smooth consumption. This motivates the question stated above.

In this paper, I proceed in two steps. In the first step, I show empirically that time spent on home production is affected by monetary policy, and that this effect differs across rich and poor individuals. In the following, I refer to poor individuals as individuals whose net wealth is less than twice their monthly net labor income (Zeldes, 1989), and therefore, live hand-to-mouth (HtM), while rich individuals are called savers, because they can save and borrow in the financial market. More concretely, my empirical specification estimates how time use of the HtM and of savers changes in response to a contractionary monetary policy shock. I use monetary policy shocks from the database of Altavilla et al. (2019), and I distinguish between pure monetary policy and information shocks as in Jarociński and Karadi (2020). I obtain individual time-use data from the Socio Economic Panel (SOEP), which is an annual survey in Germany. I focus on time spent on housework and on running errands as consumption smoothing devices. I find that in response to a 100-basis-point increase in the annualized nominal interest rate, savers increase home production by 20 minutes, and individuals that are HtM by around 33 minutes per day. To be precise, I find that everyone increases time spent on housework to the same extent. However, the HtM increase time spent on running errands by more than savers.

In the second step, I develop a Two Agent New Keynesian (TANK) model that is consistent with my empirical results to assess the impact of home production on the transmission from monetary policy to aggregate output[3] and to consumption inequality. I use a TANK

[1] It is particularly interesting to study consumption inequality, as it is directly related to households' well-being (see, e.g., McKay and Wolf (2023)).

[2] Note that my analysis abstracts from asymmetries in the dynamic consequences of monetary policy shocks. However, for the sake of concreteness, I always refer to a contractionary monetary policy shock.

[3] Looking at the transmission from monetary policy to aggregate output in my model with home production demonstrates that this model yields an empirically relevant monetary transmission mechanism.

model instead of a Heterogeneous Agent New Keynesian (HANK) model for two reasons. First, in contrast to a HANK model, a TANK model is much simpler, and therefore, tractable. Second, while household heterogeneity in the form of unconstrained and constrained households is empirically relevant for aggregate fluctuations (Campbell and Mankiw, 1989), it is still an open research question whether household heterogeneity that goes beyond distinguishing constrained and unconstrained households matters empirically for explaining aggregate fluctuations.[4]

I include home production into the model as in Gnocchi et al. (2016), such that all households[5] allocate their time optimally among market work, home production, and leisure. There are two types of consumption goods—consumption goods bought on the market and consumption goods produced at home—that are aggregated via a constant elasticity of substitution (CES) aggregator. Households produce consumption goods at home with hours worked in the home sector. I consider two different degrees of wage stickiness in the sense that the wage of HtM households is sticker compared to the one of savers (see Komatsu (2023) and the references therein). As I will explain further below, this feature is needed in my model to generate different labor income responses of HtM households and savers to monetary policy shocks. I further include sticky prices into the model to allow for fluctuations in real wages. If only wages were sticky and prices flexible, the price markup and thus, also the real marginal cost would be constant (given that labor productivity is assumed to be constant in my model).[6] Through the lens of my model, I find that the gap in total consumption between HtM and savers is 0.2 percentage points (pp) on impact following a 100-basis-point increase in the annualized nominal interest rate, compared to 0.4 pp in a model without home production. Thus, home production reduces the size of the labor income channel by half. The reason is that even though HtM households experience a sharper decline in market hours and thereby in labor income compared to savers, the drop in consumption is partially offset through increased home production.

In the baseline model, I assume that the government taxes the firms' profits at rate one. I choose such an extreme form of taxation in order to isolate the effect of changes in labor income on consumption inequality. In a model extension, I show that my results are similar if households receive profit income. The reason for this small difference is that profit income and labor income decrease (in response to the monetary policy shock under

[4]For instance, the analysis in Debortoli and Galí (2025) appears to suggest that household heterogeneity that goes beyond distinguishing constrained and unconstrained households does not matter empirically for explaining aggregate fluctuations.

[5]Note that my empirical results are based on individual-level data. In the context of my theoretical model there is no distinction between a household and an individual, and I therefore use those words interchangeably.

[6]For a discussion of this point, see, e.g., Auclert et al. (2020).

consideration) to a similar extent in my model. Yet, the decrease in profit income yields slightly less substitution towards the home sector, as households compensate for the income loss with higher labor supply in the market.

My paper contributes to the empirical literature on consumption smoothing with home production. Aguiar and Hurst (2005) show that retired and unemployed people smooth consumption by increasing time spent on searching for lower prices. Cacciatore et al. (2024) and Burda and Hamermesh (2010) document cyclical adjustments in home production. To the best of my knowledge, the present paper is the first one that documents heterogeneous responses of time spent on home production due to monetary policy.

Let me also note that my paper is complementary to the work by Boerma and Karabarbounis (2021). While they focus on the effect of home production on inequality in standards of living in the context of a steady state analysis, I look at the change in consumption inequality in response to a monetary policy shock.

The theoretical part of my paper builds on the literature on home production brought forward by Becker (1965). In the field of macroeconomics, Benhabib et al. (1991), Greenwood and Hercowitz (1991), and McGrattan et al. (1997) are seminal contributions. They show that home production matters for business cycle fluctuations. More recently, Olovsson (2015) and Gnocchi et al. (2016) consider a model with a representative household and home production. The former considers an optimal taxation problem and the latter analyzes the size of the fiscal multiplier. Similar to my paper, also Aruoba et al. (2016) look at the interaction of monetary policy and home production. However, the focus in their work is on housing as a form of home capital in a representative agent New Keynesian (RANK) model. By way of contrast, my contribution analyzes the interaction of monetary policy and consumption inequality in the context of a TANK model with home production. For this reason, my paper also contributes to the large and rapidly growing literature on household heterogeneity and monetary policy.[7]

The rest of the paper is organized as follows. Section 2 presents the empirical analysis. Section 3 outlines the model, and section 4 contains the theoretical results. Section 5 conducts the robustness analysis, and section 6 concludes.

2 Empirical results

I analyze individual-level time use, both on average between 2002 and 2017 in Germany, and in response to monetary policy shocks.

[7] See, e.g., Ahn et al. (2018), Auclert (2019), Bayer et al. (2024), Bilbiie (2008) and Kaplan et al. (2018), among many others.

2.1 Data description

I use an annual panel dataset to estimate the time-use responses of HtM individuals and that of savers to monetary policy shocks. The sample period starts with the introduction of the Euro in 1999 and ends in 2019, before the start of the Covid-19 pandemic.

Monetary policy shocks. For the European Central Bank monetary policy surprises, I use the data from Altavilla et al. (2019), and I distinguish between monetary policy and information shocks as in Jarociński and Karadi (2020). They propose to look at stock prices in addition to interest rates to distinguish between monetary policy and information shocks. The reason is as follows. When interest rates increase and stock prices decrease, the shock is a classical contractionary monetary policy shock. However, when interest rates and stock prices increase simultaneously, the resulting shock is rather a positive information shock and not a contractionary monetary policy shock. As proposed by Jarociński and Karadi (2020), I use the "poor man's" sign restriction to implement the identification of a monetary policy shock. The key assumption is that in each month, either a pure monetary policy or a pure information shock can hit the economy. Thus, a simple identification with sign restrictions is sufficient to distinguish between monetary policy and information shocks. I aggregate the monthly data to the annual frequency by summing up all monetary policy surprises in one year (see, e.g., Amberg et al. (2022)).

Individual level data. For the individual-level data on the allocation of time and the HtM classification, I use data from the Socio Economic Panel (SOEP). The SOEP is a yearly panel survey with around 20,000 households per year in Germany since 1984. The survey includes information on individuals and on the corresponding households. Data on wealth is collected every 5 years, starting in 2002.[8] For more information on the SOEP see Goebel et al. (2019).

According to Aguiar and Hurst (2016) core home production includes activities related to home ownership, obtaining goods and services, and care of other adults. These activities correspond to the following four time-use variables in the SOEP: "Errands (shopping, trips to government agencies, etc.)," "Housework (washing, cooking, cleaning)," "Care and support for persons in need of care," and "Repairs on and around the house, car repairs, garden work." I use the data on the allocation of time on weekdays, as it is collected every year.

For the classification of being HtM I follow Zeldes (1989). As mentioned above, HtM are

[8] Wealth data from 2002, 2007, 2012 and 2017 is currently available. The wealth data was collected again in 2019 for administrative reasons, and then again five years later in 2024. However, the data from 2019 and 2024 is not yet available at the current point in time.

those individuals whose "net worth is less than two months of [his/her] labor income".[9]

Table 1 presents the number of observations in the raw dataset and in the processed one. In the processed dataset, wealth and wages are trimmed at the 1st and the 99th percentile.

Table 1: Observations

Observations in raw dataset	525,211
Observations in processed dataset	164,888
Observations in processed dataset with HtM information	32,777

Notes: (i) source: SOEP, DOI: 10.5684/soep.v37, (ii) period: 1999-2019.

I further exclude individuals whose time spent on leisure, market work, home production, childcare, education and training exceeds 16 hours per day,[10] and individuals who do not spend any time on home production, market work and leisure at all. Finally, I only include the working age population, as defined by the Organisation for Economic Co-operation and Development (OECD), that is individuals aged between 15 and 64 years.[11] The resulting panel is unbalanced, as individuals might drop out of the selection if they become, e.g., unemployed or retired, and individuals might enter the panel if they for example become employed. The data on wealth, and therefore also the information on being HtM, is only available every five years.

Table 2 reports the summary statistics of the individual-level data, and it shows that time spent on market work and home production is similar across the HtM and savers. As explained above, home production is the sum of housework, running errands, repairs and care for others, which amounts to a mean of 2.7 hours per day for savers and of 2.4 hours per day for the HtM between 2002 and 2017. The median time allocation of both groups is the same in all time use categories except for weekly overtime.

As savers have higher wages than the HtM, it is somewhat surprising that they do not specialize in market work compared to the HtM. However, this finding is in line with the literature. For instance, Boerma and Karabarbounis (2021) conclude from data from the American Time Use Survey that there is no negative correlation between wages and time spent in home production, and Bick et al. (2018) show in a cross-country analysis that in rich countries, hours worked are flat or even increasing in the wage.

[9] I abstract from wealthy HtM. Following Kaplan et al. (2014), the latter feature has often been used to reconcile hand-to-mouth consumption with optimal behavior (through the distinction between liquid and illiquid wealth). However, recent work in Debortoli and Galí (2025) points to a behavioral interpretation of hand-to-mouth consumption.

[10] See, e.g., Ehrenberg and Smith (2012), who argue that individuals need at least 8 hours a day for "eating, sleeping and otherwise maintaining herself/himself."

[11] See https://www.oecd.org/en/data/indicators/working-age-population.html.

Table 2: Time allocation of savers and individuals that are HtM

	HtM			Savers		
	Mean	Median	SD	Mean	Median	SD
Population share	25 %			75 %		
Net wealth	-7,300	0	61,500	142,900	75,000	345,100
Net wage monthly	1,400	1,300	770	1,900	1,700	1140
Market work	8.2	9	2.3	8.3	9	2.4
Weekly overtime	1.9	0	3.2	2.2	0.9	3.3
Hobbies	1.6	1	1.2	1.5	1	1.1
Sports	0.5	0	0.7	0.5	0	0.6
Housework	1.2	1	1.0	1.2	1	1.0
Running errands	0.8	1	0.6	0.8	1	0.6
Repairs	0.4	0	0.6	0.6	0	0.7
Care for others	0	0	0.3	0.1	0	0.3
Age	40	40	11	46	46	10
No. of minor kids	0.76	0	1.0	0.78	0	1.0
Share with minor kids	31 %			33 %		
Share cohabiting	58 %			73 %		

Notes: (i) source: SOEP, DOI: 10.5684/soep.v37, (ii) period: average from 2002, 2007, 2012 and 2017, (iii) time use is in hours per weekday except overtime which is in hours per week, and wealth and wage is in Euro, (iv) "SD" refers to the standard deviation.

The share of individuals that are HtM in the working population is 25%. This number is in line with Aguiar et al. (2025), who find that 23 % are HtM based on net worth in the US between 1999 and 2019.

2.2 Heterogeneous responses to monetary policy shocks

Specification. To study the responses of the HtM and of savers to a contractionary monetary policy shock, I estimate variants of the following empirical specification

$$tu_{it} = \alpha + \beta mps_t + \gamma(mps_t \times HtM_{it}) + \sum_j \delta_j X_{it} + \sum_k \psi_k Y_t + \epsilon_{it}. \quad (1)$$

The dependent variable, tu_{it}, is time use of individual i at time t. The monetary policy surprise is denoted by mps_t, and $mps_t \times HtM_{it}$ is an interaction term that measures the difference in the time-use reaction to monetary policy of savers and that of individuals that are HtM. Consequently, β is the response of savers to a monetary policy surprise, and $\beta + \gamma$ is the response of the HtM.

In my empirical specification, it is not possible to include year fixed effects and individual fixed effects to isolate the change in individual time use that is only due to monetary policy. The reason is that I am interested in a shock that is constant across individuals. I am further interested in the response of time use of the HtM to monetary policy, and the HtM classification does not vary much over time. Therefore, to obtain estimates that reflect only the change in individual time use that is due to monetary policy, I include a set of individual specific and aggregate control variables. The individual specific control variables are denoted by X_{it} and include age, the number of kids, a dummy for gender, a dummy for being married, a dummy for whether the individual lives in East Germany—the area of the former German Democratic Republic—or not, and fixed effects (FE) for the region ("Bundesland"), for housing (being a renter or an owner), and for the occupation ("International Standard Classification of Occupations", ISCO). As in Koeniger et al. (2022), I further control for the month of the interview to account for seasonal effects. The aggregate control variables are denoted by Y_t and include the Gross Domestic Product (GDP) and Consumer Price Index (CPI) inflation. I cluster the standard errors at the individual level.

As the main focus of this paper is on consumption smoothing with home production, I focus on time spent on housework and on running errands. An increase in time spent on housework could mean that individuals go less to restaurants or prepare more snacks at home instead of buying them. An increase in time spent on running errands could mean that individuals spend more time on buying groceries in general, on trying to find cheaper offers, or on going to cheaper supermarkets that are located further away from home. As mentioned above, core home production also includes time spent on repairs. However, in economically difficult times, it would be reasonable that poor individuals do not spent time on repairs that are not absolutely necessary. Thus, I do not include time spent on repairs into the main analysis on consumption smoothing with home production. The same holds true for time spent on care for other adults. Individuals could rather cut back on time spent on caring for other adults if they are living through economically difficult times. I select only those activities for which it is obvious how they can serve as consumption smoothing devices. This selection is in line with Been et al. (2020), who find that only a limited share of spending can be replaced by home production, as home-produced goods are very different to most goods bought on the market.

Results. Table 3 reports the results from estimating specification (1) with errands as the dependent variable, table 4 with housework, and table 5 with weekly overtime as the dependent variable. My main finding is that that the HtM use home production as a consumption smoothing device to a greater extent than savers do, and consistent with this finding, they also reduce weekly overtime by more than savers do.

Table 3: Heterogeneous responses of time spent on running errands to monetary policy

	(1)	(2)	(3)	(4)	(5)
mps	0.345***	0.371***	0.336***	0.121	0.114
	(7.75)	(8.03)	(7.07)	(1.50)	(1.41)
mps×HtM	0.359***	0.309***	0.289***	0.280***	0.217**
	(3.80)	(3.03)	(2.81)	(2.72)	(2.09)
East Germany			0.111***	0.111***	0.0530**
			(13.03)	(13.01)	(2.17)
Month of the interview			-0.00958***	-0.00801***	-0.00757***
			(-5.26)	(-4.34)	(-4.09)
CPI inflation				0.00181	0.00157
				(0.70)	(0.61)
GDP				-0.00552*	-0.00558*
				(-1.88)	(-1.88)
Individual controls		✓	✓	✓	✓
FE for Region, Housing & Occupation					✓
Observations	32706	28503	27611	27611	27417
R^2	0.00390	0.00543	0.00432	0.00398	0.0108

Notes: (i) t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (ii) individual controls are gender, minor kids, marital status, years of education.

More concretely, table 3 shows that the HtM increase time spent on running errands by around 0.22 hours per day more than savers do in response to a 100-basis-point increase in the nominal interest rate (see column 5, second line). This result is in line with Aguiar and Hurst (2005), who find that unemployed and retired individuals spend more time on running errands to smooth consumption, as they spend more time on searching for cheaper products, sales and offers, and thereby, try to spend less money on grocery shopping. While the size of the interaction term is fairly stable across specifications, the coefficient of all individuals varies across specifications and becomes insignificant when controlling for GDP and inflation. Thus, I conclude that only HtM households increase time spent on running errands in response to a contractionary monetary policy shock. In contrast, table 4 shows that all individuals increase time spent on housework in response to a contractionary monetary policy shock by around 0.3 hours per day (see column 5, first line), and individuals that are HtM do not react differently than savers. Thus, all individuals spend more time on washing, cooking and cleaning. Particularly, spending more time on cooking might save

Table 4: Heterogeneous responses of time spent on housework work to monetary policy

	(1)	(2)	(3)	(4)	(5)
mps	0.683***	0.607***	0.590***	0.299***	0.301***
	(10.48)	(9.32)	(8.76)	(2.69)	(2.69)
mps×HtM	0.0829	-0.0510	-0.0443	-0.0549	-0.0929
	(0.57)	(-0.35)	(-0.30)	(-0.37)	(-0.63)
East Germany			-0.106***	-0.106***	-0.0677*
			(-8.04)	(-8.09)	(-1.82)
Month of the interview			-0.00277	-0.00154	-0.00149
			(-1.06)	(-0.58)	(-0.57)
CPI inflation				0.00512	0.00315
				(1.38)	(0.85)
GDP				-0.00948**	-0.00821**
				(-2.30)	(-1.98)
Individual controls		✓	✓	✓	✓
FE for Region, Housing & Occupation					✓
Observations	32733	28530	27636	27636	27442
R^2	0.00961	0.00912	0.00842	0.0107	0.0175

Notes: (i) t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (ii) individual controls are gender, minor kids, marital status, years of education.

money, as individuals then go less often to restaurants. The HtM put even more effort than the savers on reducing their spending by also increasing time spent on running errands.

As explained above, I focus on time spent on running errands and housework, as these two activities are especially relevant for consumption smoothing. In Appendix A, I show that the change in time spent on care for people apart from their own children is slightly negative, but insignificant in most specifications, and it does not differ across the HtM and savers. I further show in Appendix A that savers increase their time spent on repairs, and that this increase is much smaller, and in some specifications even negative, for the HtM.

Table 5 shows that the HtM reduce weekly overtime by more than savers do in response to a contractionary monetary policy shock. This finding indicates that market work of the HtM is more responsive to a contractionary monetary policy shock than that of savers. However, in Appendix A, I show that the effect on total time spent on market work does not differ across the two types of individuals. One explanation could be that total market hours worked vary little, also because I only look at employed individuals to capture the trade-off

Table 5: Heterogeneous responses of weekly overtime to monetary policy

	(1)	(2)	(3)	(4)	(5)
mps	-0.211	-0.286	-0.0557	-2.801***	-2.629***
	(-0.74)	(-0.96)	(-0.18)	(-5.44)	(-5.13)
mps×HtM	-1.698***	-1.583***	-1.575***	-1.682***	-1.740***
	(-3.08)	(-2.64)	(-2.58)	(-2.75)	(-2.80)
East Germany			-0.0140	-0.0206	0.319*
			(-0.23)	(-0.34)	(1.82)
Month of the interview			0.0572***	0.0660***	0.0606***
			(4.78)	(5.48)	(5.06)
CPI inflation				0.0672***	0.0623***
				(4.12)	(3.77)
GDP				-0.101***	-0.0980***
				(-5.50)	(-5.26)
Individual controls		✓	✓	✓	✓
FE for Region, Housing & Occupation					✓
Observations	29257	25496	24739	24739	24573
R^2	0.000213	0.00208	0.00418	0.00919	0.0134

Notes: (i) t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (ii) individual controls are gender, minor kids, marital status, years of education.

between market work and home production. Thus, the estimates do not capture the effect of becoming unemployed. Yet, the relatively larger decrease in weekly overtime of the HtM compared to savers indicates that their time spent on market work decreases to a greater extent compared to savers, which allows them to spend more time on home production.

My results regarding consumption smoothing with home production are in line with the empirical literature. For instance, Cacciatore et al. (2024) and Burda and Hamermesh (2010) document cyclical adjustments in home production. Furthermore, Aguiar and Hurst (2005) show that retired and unemployed smooth consumption by increasing time spent searching for lower prices.

3 A TANK model with home production

I develop a TANK model to study the effects of home production on the labor income channel. As outlined in figure 1, my model consists of a monetary authority, a fiscal authority, firms, HtM households and savers. In the following, I explain the details of my model.

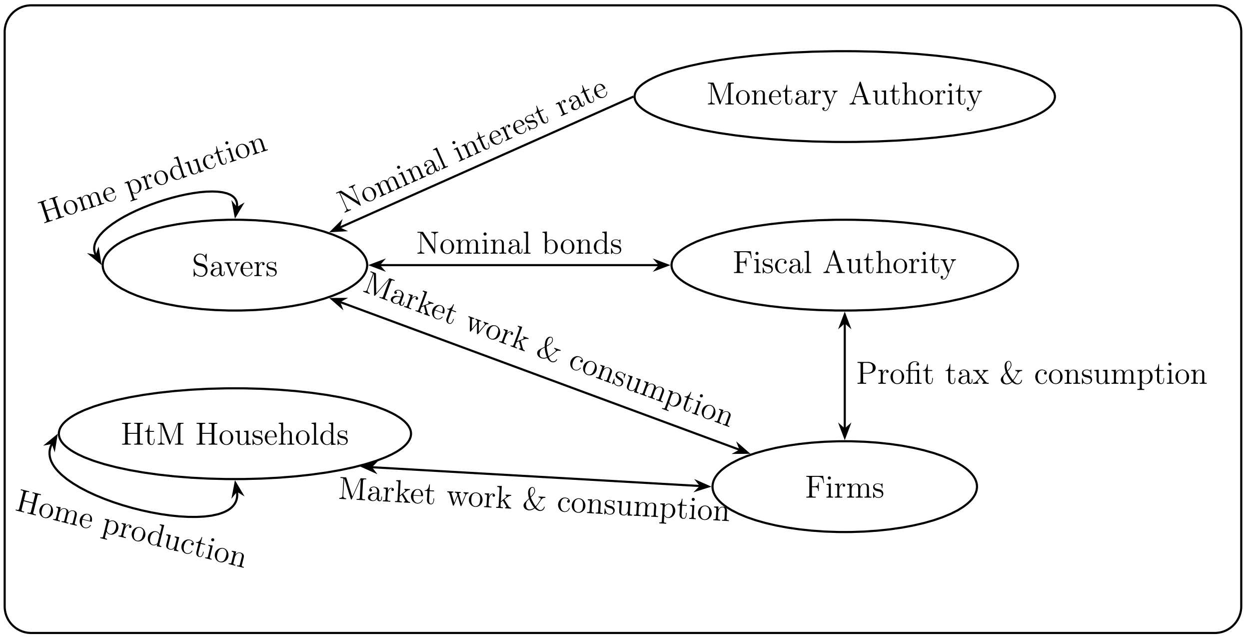


Figure 1: Bird's Eye View on the Model

3.1 Households

There is a continuum of households j, falling into two groups—HtM households and savers—denoted by $z \in (h, s)$. Both measure and identity of households belonging to each group are assumed to be constant, and both types of households maximize their lifetime utility. I follow Gnocchi et al. (2016) for the specification of preferences with home production and for the consumption aggregator of home-produced goods and goods bought on the market. In line with Gnocchi et al. (2016), I specify households' preferences as in King et al. (1988) (KPR for short),

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{[C_t^z(j)^b L_t^z(j)^{1-b}]^{1-\sigma} - 1}{1-\sigma}, \tag{2}$$

where $C_t^z(j)$ denotes consumption of household type z, $L_t^z(j)$ is leisure, and b measures the weight that the household puts on consumption, while $1 - b$ stands for the weight the household puts on leisure. Parameter σ is the inverse of the inter-temporal elasticity of substitution and $\beta \equiv \frac{1}{1+\rho}$ is the discount factor, with ρ denoting the time preference rate. KPR preferences with home production yield empirically relevant effects such as a balanced growth path, complementarity between hours worked in the market and market consumption, and a wealth effect on labor supply.

Consumption consists of market consumption, $C^z_{m,t}(j)$, and consumption of home-produced goods, $C^z_{n,t}(j)$, and is aggregated via a constant elasticity of substitution (CES) aggregator,

$$C^z_t(j) \equiv [\alpha_1 (C^z_{m,t}(j))^{b_1} + (1-\alpha_1)(C^z_{n,t}(j))^{b_1}]^{(1/b_1)}, \tag{3}$$

where $(1-b_1)^{-1}$ is the elasticity of substitution between market and home consumption and α_1 is the market consumption share. Households allocate their time to market work, $H^z_{m,t}(j)$, home production, $H^z_{n,t}(j)$, and leisure, $L^z_t(j)$. Time is normalized to 1, thus,

$$L^z_t(j) = 1 - H^z_{n,t}(j) - H^z_{m,t}(j). \tag{4}$$

Home consumption is not storable and produced according to a linear production function,

$$C^z_{n,t}(j) = H^z_{n,t}(j). \tag{5}$$

When working in the market, households earn a nominal wage, $W^n_t(j)$. Each household j chooses its nominal wage, $W^n_t(j)$, subject to the labor demand of firms. When adjusting the wage, households pay Rotemberg-type adjustment costs that differ across HtM households and savers. To be precise, wages of HtM households are stickier, and thus, in response to a contractionary monetary policy shock, the demand for labor of the HtM falls by more, and thereby, also their labor income falls by more. Unlike my model, the model in Gnocchi et al. (2016) features a representative household and flexible wages.

The budget constraint of savers is given by

$$\begin{aligned} P_t C^s_{m,t}(j) + B^s_t(j) = \\ B^s_{t-1}(j)(1+i_{t-1}) + W^n_t(j) H^s_{m,t}(j) - \frac{\xi^s}{2}\left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1\right)^2 W^n_t(j) H^s_{m,t}(j) - T_t, \end{aligned} \tag{6}$$

where T_t are lump-sum taxes and transfers, $B^s_t(j)$ are nominal bonds, and i_t denotes the nominal interest rate. The size of the wage adjustment costs is given by ξ^z. P_t denotes the aggregate price index that is defined as

$$P_t \equiv \left(\int_0^1 P_t(i)^{1-\epsilon_p} di\right)^{\frac{1}{1-\epsilon_p}}, \tag{7}$$

where $P_t(i)$ is the price of an individual good i and ϵ_p is the elasticity of substitution between differentiated goods. The budget constraint of HtM households is given by

$$P_t C^h_{m,t}(j) = W^n_t(j) H^h_{m,t}(j) - \frac{\xi^h}{2}\left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1\right)^2 W^n_t(j) H^h_{m,t}(j) - T_t. \tag{8}$$

All households choose consumption and labor supply in the home and the market sector and their nominal wage, and savers further choose nominal bonds to maximize their life-time utility in equation (2) subject to total time endowment in equation (4), the production of home goods in equation (5), and the budget constraint in equation (6) or (8) respectively. Moreover, an additional constraint in the households' optimization problems is the labor demand of firms that will be explained below.

HtM households consume their entire income every period, and thus, only savers have an Euler equation given by

$$\beta E_t \left(\frac{\lambda^s_{t+1}(j)}{\lambda^s_t(j)} \frac{1+i_t}{1+\pi_{t+1}}\right) = 1, \tag{9}$$

where π_t is price inflation defined as $1+\pi_t \equiv \Pi_t \equiv P_t/P_{t-1}$, and $\lambda^s(j)$ denotes saver j's marginal utility of market consumption. It is given by

$$\lambda^s_t = \alpha_1\, b\, \left(1 - H^s_{m,t} - H^s_{n,t}\right)^{(1-b)\,(1-\sigma)} \left(C^s_{m,t}\right)^{b_1-1} \left(C^s_t\right)^{b\,(1-\sigma)-b_1}. \tag{10}$$

The optimal allocation of time to home production is the same for both types of households, and is given by

$$\frac{1-b}{b(1-\alpha_1)}\left(\frac{C^z_t(j)}{C^z_{n,t}(j)}\right)^{b_1} = \frac{L^z_t(j)}{H^z_{n,t}(j)}. \tag{11}$$

Both types of households choose their optimal wage according to the following wage Phillips curves

$$\begin{aligned} &\epsilon_w MRS(j)^z_t \frac{1}{W_t} + (1-\epsilon_w) - \xi^z\left(\Pi^w_t - 1\right)\left(\Pi^w_t + \frac{1-\epsilon_w}{2}\left(\Pi^w_t - 1\right)\right) \\ &+\beta \frac{U_{C^z_{t+1}(j)}}{U_{C^z_t(j)}}\left(\frac{\partial C^z_t(j)}{\partial C^z_{m,t}(j)}\right)^{-1}\left(\frac{\partial C^z_{t+1}(j)}{\partial C^z_{m,t+1}(j)}\right)\left(\Pi_{t+1}\right)^{-1}\xi^z\left(\Pi^w_{t+1} - 1\right)\left(\Pi^w_{t+1}\right)^2 \frac{M^z_{t+1}(j)}{M^z_t(j)} = 0, \end{aligned} \tag{12}$$

where $MRS(j)^z_t$ is the marginal rate of substitution between consumption and leisure. As in Dixit and Stiglitz (1977), the aggregate nominal wage index is defined as

$$W^n_t \equiv \left(\int_0^1 W^n_t(j)^{1-\epsilon_w} dj\right)^{\frac{1}{1-\epsilon_w}}, \tag{13}$$

and the aggregate real wage rate index is given by $W_t = W^n_t/P_t$, where the aggregate price index is defined as in (7). Wage inflation is denoted by $\Pi_t^w \equiv W_t/W_{t-1}$.

The accounting identity of the different types of inflation is given by

$$\frac{W_t}{W_{t-1}} = \frac{W_t^n/P_t}{W_{t-1}^n/P_{t-1}} = \frac{W_t^n/W_{t-1}^n}{P_t/P_{t-1}} = \frac{\Pi_t^w}{\Pi_t}. \tag{14}$$

As in Debortoli and Galí (2024), I define a heterogeneity index, γ_t, as follows

$$\gamma_t \equiv 1 - \frac{C_t^h}{C_t^s}, \tag{15}$$

where C_t^h denotes consumption of HtM households aggregated over j, and C_t^s denotes consumption of savers aggregated over j. The heterogeneity index measures the consumption gap between HtM households and savers. The larger the heterogeneity index, the larger the consumption gap and therefore, the larger the consumption inequality.

See Appendix B.1 for the full derivation of the households' problems.

3.2 Firms

There is a continuum of monopolistically competitive firms denoted by i. Firm i produces output, $Y_t(i)$, according to a linear production function,

$$Y_t(i) = H_{m,t}(i), \tag{16}$$

where $H_{m,t}(i)$ denotes labor input of firm i, which is aggregated over households j as in Dixit and Stiglitz (1977),

$$H_{m,t}(i) \equiv \left(\int_0^1 H_{m,t}(i,j)^{\frac{\epsilon_w - 1}{\epsilon_w}} dj \right)^{\frac{\epsilon_w}{\epsilon_w - 1}}, \tag{17}$$

where ϵ_w is the substitutability of differentiated labor. Note that firm i employs labor of savers and HtM households, and these two types of labor are homogeneous.

The demand of firm i for labor of household j is given by

$$H_{m,t}(i,j) = \left(\frac{W_t^n(j)}{W_t^n} \right)^{-\epsilon_w} H_{m,t}(i). \tag{18}$$

This equation is based on the assumptions that firms take wages as given and that they behave optimally. See Appendix B.2.1 for the derivation of the labor demand equation.

Firms set prices as in Calvo (1983), and thus, their price-setting scheme is given by

$$P_{t+k+1}(i) = \begin{cases} P^*_{t+k+1}(i) & \text{with probability } (1-\theta), \\ P_{t+k}(i) & \text{with probability } \theta, \end{cases} \tag{19}$$

where θ is the Calvo parameter. The interpretation of the Calvo parameter is as follows. With probability θ, the price of firm i does not change, and with probability $1-\theta$ firm i can set a new price.

Firms maximize the discounted sum of current and future profits given by

$$E_t \left(\sum_{k=0}^{\infty} \theta^k Q_{t,t+k} [P_t(i) Y_{t+k}(i) - W^n_{t+k} H_{m,t+k}(i)] \right).$$

I assume that savers own the firms and thus, $Q_{t,t+k}$ denotes the savers' stochastic discount factor given by

$$Q_{t,t+k} \equiv \beta^k E_t \left(\frac{\lambda^s_{t+k}}{\lambda^s_t} (\Pi_{t,t+k})^{-1} \right).$$

Firms have three constraints. One is the production function in equation (16), the second constraint is the Calvo price-setting scheme in equation (19), and the third constraint is the goods demand constraint that is given by

$$Y_t(i) = \left(\frac{P_t(i)}{P_t} \right)^{-\epsilon_p} Y^d_t, \tag{20}$$

where Y^d_t is aggregate demand that is taken as given by firms, and $\epsilon_p > 1$ is the elasticity of substitution between differentiated market consumption goods. See Appendix B.1.1 for the derivation of the demand for good i.

Firms optimal price-setting decisions are given by the following equation that relates the ratio of the optimal price, P^*_t, and the actual price in the economy to the ratio of two auxiliary variables, $x_{t,1}$ and $x_{t,2}$ (see, e.g., Gnocchi et al. (2016)),

$$\frac{P^*_t}{P_t} = \frac{x_{1,t}}{x_{2,t}}. \tag{21}$$

The auxiliary variables are given by

$$x_{1,t} = Y_t \left(\frac{\epsilon_p}{\epsilon_p - 1} \right) MC_t + \beta\theta E_t \left(\frac{\lambda^s_{t+1}}{\lambda^s_t} (\Pi_{t+1})^{\epsilon_p} x_{1,t+1} \right), \tag{22}$$

and

$$x_{2,t} = Y_t + \beta\theta E_t\left(\frac{\lambda^s_{t+1}}{\lambda^s_t}(\Pi_{t+1})^{\epsilon_p-1}x_{2,t+1}\right). \tag{23}$$

Aggregate output, Y_t, is defined as

$$Y_t \equiv \left(\int_0^1 Y_t(i)^{\frac{\epsilon_p-1}{\epsilon_p}}di\right)^{\frac{\epsilon_p}{\epsilon_p-1}}, \tag{24}$$

and MC_t denotes the real marginal cost that is the same for all firms.

The relation between inflation and the relative price charged by re-optimizing firms is given by

$$\frac{P^*_t}{P_t} = \left(\frac{1-\theta(\Pi_t)^{\epsilon_p-1}}{1-\theta}\right)^{\frac{1}{1-\epsilon_p}}. \tag{25}$$

See Appendix B.2 for the full derivation of the firms' problem.

3.3 Government

The fiscal authority taxes profit income at rate one,

$$G_t = D_t. \tag{26}$$

I choose such an extreme taxation of the firms' profits to isolate the effects of changes in labor income, as households do not receive any profit income, if it is taxed at rate one by the government. In an extension in section 5.1, I assume a more realistic distribution of profits, and I show that the results are similar.

The fiscal authority buys market varieties $G_t(i)$ that are aggregated according to the following aggregation index

$$G_t \equiv \left(\int_0^1 G_t(i)^{\frac{\epsilon_p-1}{\epsilon_p}}di\right)^{\frac{\epsilon_p}{\epsilon_p-1}}. \tag{27}$$

The central bank sets the nominal interest rate according to a Taylor rule,

$$i_t = \rho + \phi_\pi \pi_t + \nu_t, \tag{28}$$

where $\phi_\pi > 1$ denotes the reaction of the central bank to inflation, and ν_t is the monetary policy shock.

The monetary policy shock process is given by

$$\nu_t = \rho_\nu \nu_{t-1} + \epsilon_t^\nu, \tag{29}$$

where ρ_ν denotes the persistence of the shock and ϵ_t^ν is white noise.

According to the Fisher equation, the real interest rate is given by

$$1 + r_t = \frac{1 + i_t}{1 + \pi_{t+1}}. \tag{30}$$

3.4 Market clearing

The goods market clearing condition for an individual good i is given by

$$Y_t(i) = G_t(i) + C_{m,t}(i) + Y_t(i)\psi \frac{\xi^s}{2}(\Pi_t^w - 1)^2 + Y_t(i)(1-\psi)\frac{\xi^h}{2}, \tag{31}$$

where $C_{m,t}(i), = \int_0^1 C_{m,t}(i,j)dj$ and ψ denotes the share of HtM households. Consumption of household j, $C_t(j)$, is defined as follows,

$$C_t(j) \equiv \left(\int_0^1 C_t(i,j)^{\frac{\epsilon_p - 1}{\epsilon_p}} di \right)^{\frac{\epsilon_p}{\epsilon_p - 1}}. \tag{32}$$

Using the goods market clearing condition of individual good i, I obtain the following aggregate goods market clearing condition,

$$Y_t = Y_t^d = G_t + C_{m,t} + Y_t \psi \frac{\xi^s}{2}(\Pi_t^w - 1)^2 + Y_t(1-\psi)\frac{\xi^h}{2}(\Pi_t^w - 1)^2, \tag{33}$$

with $C_{m,t} = (1-\psi)C_{m,t}^s + \psi C_{m,t}^h$. Note that $C_{m,t}^s$ and $C_{m,t}^h$ are per capita market consumption of savers and HtM households, and $C_{m,t}$ denotes total market consumption.

The labor market clearing condition is given by

$$H_{m,t} = \int_0^1 H_{m,t}(i)di = \int_0^1 \left(\int_0^1 H_{m,t}(i,j)^{\frac{\epsilon_w - 1}{\epsilon_w}} dj \right)^{\frac{\epsilon_w}{\epsilon_w - 1}} di, \tag{34}$$

where $H_{m,t}(i,j)$ is labor input of household j at firm i. It further holds that $H_{m,t} = (1-\psi)H_{m,t}^s + \psi H_{m,t}^h$, where $H_{m,t}^s$ and $H_{m,t}^h$ are per capita market labor of savers and HtM households, and $H_{m,t}$ denotes total labor.

The steady state is presented in Appendix B.3, and in Appendix B.4, I briefly describe the model solution.

3.5 Calibration

Table 6 presents the calibration of the model. The discount factor is calibrated to 0.99, as it yields a steady-state interest rate of 1%. I follow Gnocchi et al. (2016) and set the inverse of the elasticity of intertemporal substitution to 2 to obtain a wealth effect on market consumption of 0.5. The wealth effect on market consumption measures to what extent market consumption reacts to changes in wealth. The elasticity of intertemporal substitution allows me to match this wealth effect, as changes in the interest rate reflect changes in households' wealth, and the elasticity of intertemporal substitution measures how strong households' consumption reacts to changes in the interest rate. For the elasticity of substitution between market and home consumption goods, I choose $b_1 = 0.5$, as it lies in between estimates in the literature. Chang and Schorfheide (2003) find a value of 0.57, while McGrattan et al. (1997) report 0.429. This calibration yields an elasticity of substitution of $(1 - b_1)^{-1} = 2$.[12] I use the SOEP data presented in table 2 to calibrate the market consumption share, the total consumption share and the share of HtM households. The market consumption share, α_1, is set to 0.71 to match the average market to home work ratio in the data. The total consumption share, b, is set to 0.865 to match the average work to leisure ratio in the data. In line with my empirical results in 2, the share of HtM households, ψ, is set to 25%.

I follow Komatsu (2023) and choose different degrees of wage stickiness for savers and HtM households. As HtM households are usually low-skilled workers (in line with their lower hourly wage), their wages are typically negotiated to a larger extent by labor unions. These wages are typically stickier (see, e.g., Franz and Pfeiffer (2006), and Babecký et al. (2010)). As in Komatsu (2023), I calibrate the average duration of wages of HtM households to one and a half years. In line with Galí (2015), the average duration of the savers' wages is set to one year. I calculate the corresponding Rotemberg adjustment costs as in Born and Pfeifer (2020), and I find that the two Calvo probabilities corresponds to Rotemberg adjustment costs of $\xi^h = 1810$ for HtM households and $\xi^s = 740$ for savers.[13]

The Calvo parameter is calibrated to 0.75 to match the average duration of a price of four quarters as in Nakamura and Steinsson (2008). I follow Galí (2015) for the calibration of the elasticity of substitution between different labor types, the elasticity of substitution between differentiated market consumption goods, ϵ_p, and the inflation feedback of the Taylor rule. The elasticity of substitution between different market consumption goods, ϵ_p, is set to 9 to match a steady-state markup of 12.5%. The elasticity of substitution between different labor types, ϵ_w, is calibrated to 4.5, which is consistent with an average unemployment rate of 5%. The inflation feedback of the Taylor rule is calibrated to 1.5 that is consistent with

[12] In Appendix D, I show that with a value for parameter b_1 as low as 0.1, my main result still holds.

[13] See Appendix C for details.

Table 6: Calibration

Parameter	Description	Value	Source/Target
Households			
β	Discount factor	0.99	Match steady-state interest rate of 1%.
σ	Inverse of elasticity of intertemporal substitution	2	See Gnocchi et al. (2016).
$(1-b_1)^{-1}$	Elasticity of substitution between market and home consumption goods	2	Estimates from Chang and Schorfheide (2003) and McGrattan et al. (1997).
b	Total consumption share	0.865	Match time use from table 2.
α_1	Market consumption share	0.71	Match time use from table 2.
ψ	Share HtM households	0.25	See table 2.
Price and wage rigidities			
θ	Calvo parameter for prices	0.75	See Nakamura and Steinsson (2008).
ϵ_p	Elasticity of substitution between different types of market consumption goods	9	See Galí (2015).
ϵ_w	Elasticity of substitution between different types of labor	4.5	See Galí (2015).
ξ^h	Wage adjustment costs HtM households	1810	
	Corresponding Calvo probability	*0.83*	See Komatsu (2023).
ξ^s	Wage adjustment costs wages savers	740	
	Corresponding Calvo probability	*0.75*	See Galí (2015).
Monetary policy			
ϕ_π	Inflation feedback Taylor Rule	1.5	See Galí (2015).
ρ_ν	Persistence of monetary policy shock	0.25	Match output response in Christiano et al. (2005).

Taylor's original rule.

The persistence of the monetary policy shock is calibrated to 0.25, which yields an output response of 0.5% in the baseline model in line with the estimates in Christiano et al. (2005).

4 Results

This section presents the steady state of the model, the analysis of the impulse response functions from the baseline model, and a comparison of the baseline model to a model without home production.

4.1 Steady state

Table 7 presents the steady-state time allocation of the HtM and of savers. The model

Table 7: Time allocation in the model and in the data

	HtM		Savers	
	data	model	data	model
market work	65%	64%	64%	64%
home production	19 %	20%	21%	20%
leisure	17 %	16%	15%	16%

Note: Data source is table 2.

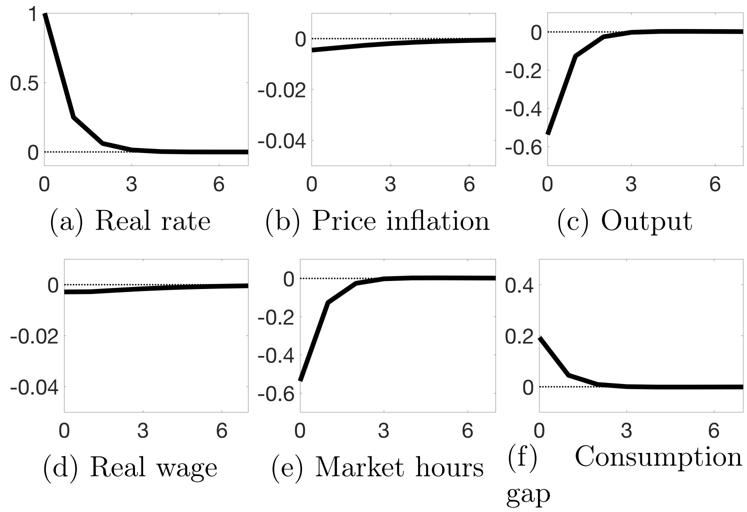
predicts the same allocation of time across savers and HtM households. The sum of time spent on market work, home production and leisure is slightly higher for savers compared to HtM households in the data (see table 2). Thus, savers spend a slightly lower share of their total time on market work compared to HtM households (64% versus 65%, see table 7), even though, the absolute time spent on market work of savers is slightly higher than that of HtM households (8.3 versus 8.2 hours per day, see table 2). Furthermore, the model does not reflect the empirical finding that savers work a bit more in home production compared to the HtM. However, the overall differences are small and it is fair to say that the model matches the allocation of time in the data very well.

4.2 Results of the model with home production

Figure 2 shows the aggregate impulse response functions (IRFs) in response to a 100-basis-point increase in the annualized nominal interest rate.

The monetary policy shock yields an increase in the nominal interest rate, and because of the nominal rigidities in my model, the real interest rate also increases (see panel 2a). The increase in the real interest rate yields a decrease in savers' demand for market goods. As prices and wages are sticky, firms cannot lower their prices to increase the demand for their goods. Therefore, firms reduce their production, and thus, their labor demand. The decrease in labor demand yields a decrease in labor income of both types of households,

Figure 2: Aggregate results



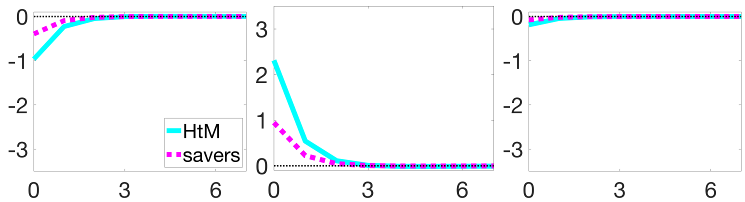
Notes: (i) shock size: 100 basis points (annualized), (ii) responses: quarterly, rates are in pp deviations and all other variables in % deviations from the steady state, (iii) inflation and interest rates are annualized.

which further amplifies the decrease in goods' demand. In line with the empirical evidence in Christiano et al. (2005), output drops by 0.5% on impact (see panel 2c), and also hours worked drop substantially (see panel 2e). Real wages do not change much (see panel 2d) and therefore, also price markups react little, which yields the relatively small response of inflation shown in panel 2b.[14] Since inflation decreases only slightly, the annualized nominal interest rate increases almost one-to-one with the shock size. The reason is the assumed form of monetary policy (see equation (28)). Furthermore, the small decrease in inflation yields an increase in the real rate (see panel 2a) that is almost of the same size as the increase in the nominal rate.

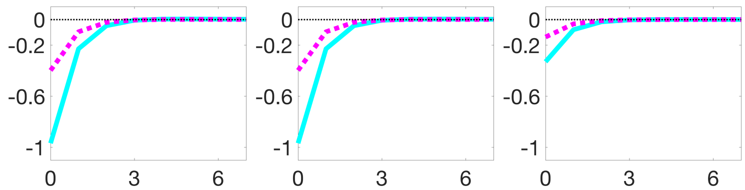
Figure 3 shows the IRFs of consumption, hours worked and income of savers (pink dotted lines) and of HtM households (turquoise solid lines) to the same shock. As explained above, labor demand of the firms decreases in response to the shock. Labor input of HtM households and savers is homogeneous, however, the wages of HtM households are stickier. Thus, the demand for labor of HtM households decreases to a greater extent. Market hours of HtM households fall twice as much as those of savers (see panel 3a). The decrease in hours worked yields a decrease in labor income of HtM households and savers (see panel 3d), which further amplifies the decrease in goods' demand. Particularly, the decrease in labor income of the HtM yields a sharp decrease in their demand for market goods, as their MPC is equal to one.

[14] See also Galí (2015) for a discussion about the small inflation response in models with sticky prices and sticky wages.

Figure 3: Distributional effects



(a) Market hours (b) Home hours (c) Total hours



(d) Income (e) Market consumption (f) Total consumption

Notes: (i) shock size: 100 basis points (annualized), (ii) responses are quarterly and in in % deviations from the steady state.

Market consumption decreases sharply for both types of households in response to the shock, and also consumption inequality increases to a great extent (see panel 3e). However, the decrease in total consumption is much smaller for both types of households (see panel 3f) compared to market consumption. Total consumption of savers decreases by 0.1% on impact and of HtM households by 0.3%. Thus, the difference in total consumption between HtM households and savers is only 0.2 pp on impact, while the difference in market consumption is 0.6 pp. The reason is that HtM households substitute towards home production by more than savers do (see panel 3b). Thus, home production can—at least partially—offset differences that arise in the market.[15]

My theoretical results are in line with my empirical findings in section 2. More concretely, in the model and in the data, both types of households increase home production in response to a contractionary monetary policy shock, and HtM households do so to a greater extent. To be precise, hours worked in the market of savers decreases by 0.4% on impact in the model and of HtM households by 1% (see panel 3a), while hours worked in the home of savers increases by 0.9% on impact in the model and of HtM households by 2.3% (see panel 3b). The model responses are expressed in percent deviations from the steady state. To compare the model responses to the estimates in section 2, I convert the model responses to the corresponding change in hours: in the model, savers increase home production by 0.1 hours per day, and HtM households by 0.3 hours per day. The empirical estimates point

[15] In section 4.3, I compare the results from this section to the IRFs from a model without home production to quantify the role of home production on consumption inequality.

toward an increase in savers' home production by around 0.3 hours per day and in HtM households' home production by 0.52. Thus, even my simple TANK model can match my empirical findings fairly well.

Moreover, my theoretical results are in line with empirical findings in the literature. For instance, a sharper decrease in market consumption of HtM households compared to savers is in line with Aguiar et al. (2025) who find that spending of HtM households is more volatile than that of savers. Furthermore, the small effect on leisure matches the empirical evidence in Cacciatore et al. (2024), who find that the cyclical effects on leisure time are modest. Finally, the increase in market consumption inequality in response to a monetary policy shock is in line with empirical evidence by, e.g., Coibion et al. (2017), and Mangiante and Meichtry (2025).

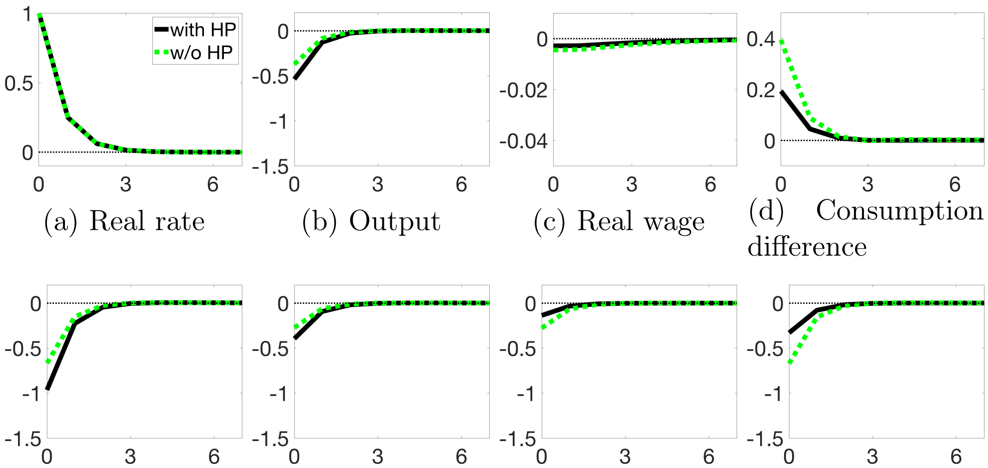
4.3 Inspecting the mechanism

To quantify the effect of home production on the labor income channel and the transmission of monetary policy to aggregate output, I compare the model with home production to a model without it.

I obtain a model without home production by setting the market consumption share and the elasticity of substitution between different types of consumption goods to one, i.e., $\alpha_1 = 1$ and $b_1 = 1$, which yields $C_t = C_{m,t}$ (see equation (3)). When households divide their time only between leisure and market work, the total consumption share, b, that matches the data decreases to 0.79, whereas in the model with home production the parameter b is set to 0.865. Figure 4 shows the results of the model without home production (green dotted lines) compared to the model with home production (black solid lines).

Comparing the responses of market hours of savers and HtM households underlines again that HtM households use home production as an additional smoothing opportunity to a greater extent than savers do. Savers decrease market hours by 0.4% on impact in the model with home production and by 0.3% in the model without home production (see panel 4f). This difference is much more pronounced for HtM households: they decrease market hours by only 0.7% on impact in the model without home production, and by 1% in the model with home production (see panel 4e). This amplification arises because the possibility of producing consumption goods at home yields a lower demand for market goods of HtM households, as they have poorer labor market conditions, and thus, rely more on home production compared to savers. The difference in total consumption across the two types of households is 0.4 pp on impact in the model without home production, but 0.2 pp in the model with home production (see panel 4d). Thus, the difference in total consumption in the model with home production

Figure 4: Results with and without home production



(a) Real rate (b) Output (c) Real wage (d) Consumption difference

(e) Market hours HtM household (f) Market hours saver (g) Total consumption savers (h) Total consumption HtM households

Notes: (i) shock size: 100 basis points (annualized), (ii) responses: quarterly, rates are in pp deviations and all other variables in % deviations from the steady state, (iii) inflation and interest rates are annualized.

is half the size compared to the model without home production, as HtM households use home production disproportionately more for consumption smoothing. The model shows that home production is a quantitatively relevant consumption smoothing device for both types of households, and particularly for HtM households. Home production can therefore partially offset inequalities that arise in the market.

The model further reveals that home production amplifies the transmission from monetary policy to output. Output falls by 0.5% on impact in the model with home production, compared to 0.4% without it (see panel 4b). The availability of home production yields a greater reduction in the demand for market goods of both types of households in an economic downturn, and in particular, of HtM households. The reason is that in a model with home production, market goods become relatively more expensive compared to leisure and to home-produced goods, while in a model without home production, households can only substitute towards leisure. Therefore, market goods become even less affordable for HtM households compared to savers, as they experience a sharper decline in labor income. Thus, home production is quantitatively relevant for the transmission of monetary policy to aggregate output, as one fifth of the decrease in output is due to the availability of home production.

5 Robustness

In the following, I present two robustness analyses. The first one is a model variation where households receive profit income, and the second one is a model variation where hourly wages differ between HtM households and savers.

5.1 The role of profits

The distribution of profits can play an important role in TANK and HANK models (see, e.g., Broer et al. (2020)). However, in the baseline analysis of this paper, I abstract from profit income. To be precise, I isolate the effects of changes in labor income by assuming that the government taxes profit income at rate one. In this section, I assume a more realistic distribution: savers and HtM households receive profit income according to the size of their profit and capital income in the data. I show that this assumption does not meaningfully alter the main results, because profit income decreases to a similar extent as labor income.

Model adjustment. The baseline model and the model with profit income are identical, except that in the latter, profit income is added to the budget constraint. The budget constraint of savers is then given by

$$\begin{aligned} P_t C^s_{mjt} + B^s_t(j) =& B^s_{t-1}(j)(1+i_{t-1}) + W^n_t(j)H^s_{m,t}(j) - \frac{\xi^s}{2}\left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1\right)^2 W^n_t(j)H^s_{m,t}(j) \\ & - T_t(j) + \frac{1-\tau_r}{1-\psi}P_t D_t, \end{aligned} \tag{35}$$

and of HtM households it is then given by

$$P_t C^h_{m,t}(j) = W^n_t(j)H^h_{m,t}(j) - \frac{\xi^h}{2}\left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1\right)^2 W^n_t(j)H^h_{m,t}(j) - T_t(j) + \frac{\tau_r}{\psi}P_t D_t. \tag{36}$$

Recall that D_t denotes real profits and $(1-\psi)$ is the population share of savers. Profit income is redistributed across households at rate τ_r.

I use the SOEP to calculate the profit income of HtM households and savers. More concretely, I use the selection of individuals, as described in section 2.1. I then calculate the per capita profit income in each household,[16] as the information regarding the profit income is only available at the household level. Table 8 presents the different income sources that I use to calibrate the profit income distribution in the model. Monthly capital income as shown in the first line of table 8 is negligible for both types of households. Capital income

[16] Note that per capita refers to adults in the household, thus, it does not include children.

Table 8: Per capita profit income of savers and HtM households

	HtM		Savers	
	Mean	Median	Mean	Median
Capital income	0	0	30	0
Home repayment	310	300	210	100
Rent	300	280	340	300
Share home owners	36 %		86 %	
Share home paid	20 %		45 %	

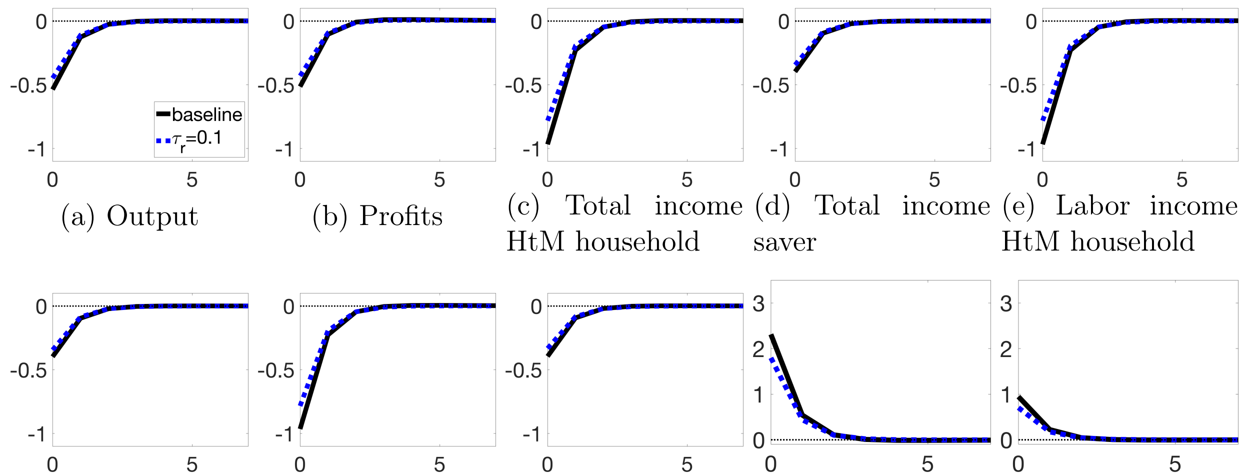
Notes: (i) source: SOEP, DOI: 10.5684/soep.v37, (ii) period: average from 2002, 2007, 2012 and 2017, (iii) capital income, home repayment and rent are monthly in Euro, (iv) no. of observations is 18,750.

in the data includes interest income from assets and income from renting and leasing less the interest and maintenance costs. To account for home ownership, I add owner-occupied housing to the profit income in the model. To be precise, I calculate the saved rent by multiplying the share of home-owning households with the rent paid by renters. Monthly capital income of savers is then 320 Euro, and of HtM households it is 110 Euro, on average between 2002 and 2017 in Germany. Adding the saved rent to capital income may seem problematic when a large share of households still repays their house, and thus, has monthly home repayment costs. However, the home repayment costs lead to capital accumulation, whereas rent payment does not, so I treat rent payment and home repayment differently. Hence, profit income of savers is three times larger than that of HtM households. Thus, I set the profits redistribution parameter, τ_r, to 10 %.[17]

Results. Figure 5 presents the results when households receive profit income (blue dotted lines) compared to the baseline results (black solid lines). As wages are sticky, profits decrease, and thus, households experience a large drop in their total income. To compensate for the income loss, labor supply of both types of households is higher compared to the model without profit income (see panel 5c and 5d), and thus, also labor income of both types of households falls by less (see panel 5e and 5f). In response to the shock, both types of households work more in the market in the model with profit income compared to the model without it. Consequently, they increase home production to a smaller extent compared to the model without profit income. However, the effect of profit income on the results is small. The reason is that, as wages are sticky, profits decrease to a similar extent as labor income. The income composition channel—heterogeneous effects of monetary policy on different types of income—is weak in this model. Empirically, it is still an open question which

[17] HtM households then receive $\frac{0.1}{0.25}D_t = 0.4D_t$ per capita profit income, and savers $\frac{0.9}{0.75}D_t = 1.2D_t$.

Figure 5: The role of profit income for both types of households



(a) Output (b) Profits (c) Total income HtM household (d) Total income saver (e) Labor income HtM household

(f) Labor income hours saver (g) Market hours HtM household (h) Market hours saver (i) Home hours HtM household (j) Home hours saver

Notes: (i) shock size: 100 basis points (annualized), (ii) responses: quarterly, and in % deviations from the steady state.

channel is more important. While Coibion et al. (2017) find empirical evidence for a strong income composition channel for the effects of monetary policy on consumption inequality in the United States, Lenza and Slacalek (2024) find that the labor income channel is more important for the effect of monetary policy on income and wealth inequality in Europe.

5.2 The role of income differences across HtM households and savers

As shown in table 2, the median HtM household works the same amount of time as the median saver, but earns less. To be precise, in both groups, the median worker spends 9 hours per day on market work. While the median saver earns 1.700 Euro net per month, the median HtM household only earns 1.300 Euro. Thus, it is a natural question to ask how these hourly wage differences affect the results in this paper.

To answer that question, I include a productivity wedge between HtM households and savers into the model. More concretely, efficiency units of market labor, $M_t^z(j)$, are given by

$$M_t^s(j) = H_{m,t}^s(j), \tag{37}$$

and

$$M_t^h(j) = \omega H_{m,t}^h(j), \tag{38}$$

where $\omega \in (0, 1]$ denotes a productivity wedge between HtM households and savers. For savers, each hour worked in the market is equal to one efficiency unit of market labor, while for HtM households, one hour worked yields ω efficiency units of labor. Thus, I assume in the this model variation that the wage paid per efficiency unit of labor, $M_t^z(j)$, is the same for both types of households, as also the efficiency units of labor are homogeneous. However, HtM households need ω^{-1} times more time for one efficiency unit of labor, and consequently, their hourly wage is ω times lower than the hourly wage of savers. The productivity wedge is calibrated to 0.76 to match the income differences outlines above.

The resulting steady state is presented in table 9. The model now predicts that HtM

Table 9: Time allocation in the model with productivity wedge and in the data

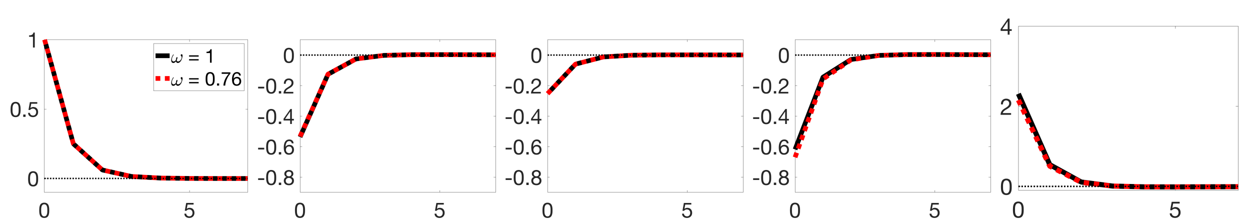
	HtM		Savers	
	data	model	data	model
market work	65%	60%	64%	64%
home production	19 %	24%	21%	20%
leisure	17 %	16%	15%	16%

Note: Data source is table 2.

households do more home production than savers, while savers work more time in the market compared to HtM households. The reason is that in home production, both types of households are equally productive, while savers have a higher hourly wage in the market compared to savers. The steady-state labor income ratio of the HtM relative to savers is 0.71 in the model and 0.74 in the data. Thus, there is a trade-off between matching the steady-state income differences and matching the steady-state allocation of time. While the baseline model matches the allocation of time better (see table 7), the model with the productivity wedge can match the income differences well.

Figure 6 presents the IRFs with a productivity wedge (red dotted lines) compared to the baseline IRFs (black solid lines). In the baseline model, the difference in the change in

Figure 6: Results with and without a productivity wedges across households



(a) Real rate (b) Output (c) Market hours savers (d) Market hours HtM household (e) Home hours HtM household

Notes: (i) shock size: 100 basis points (annualized), (ii) responses: quarterly, rates are in pp deviations and all other variables in % deviations from the steady state, (iii) inflation and interest rate are annualized.

market hours between HtM households and savers is due to a different effect on labor demand across the two types of households, as wages of HtM households are stickier compared to savers. In the model with a productivity wedge, there is a second reason why hours worked of HtM households fall more compared to those of savers: labor supply of HtM households compared to that of savers in response to the monetary policy shock. The reason is that they have lower hourly wages due to their lower productivity, and since they can produce consumption goods at home, they substitute towards the home sector to a great extent (see panel 3b) than in the model without a productivity wedge. To be precise, the productivity wedge yields, on impact, a 0.1 pp larger decrease of market hours worked of HtM households, and therefore, also a larger increase in home hours of HtM households. However, the size of the effect is very small. The IRFs of the aggregate variables are almost identical in the two models. The reason is that, first, the change in the reaction is HtM households is small, and second, savers represent 75% of the population, so when their responses remain unchanged, also the aggregate responses remain similar to the baseline model.

6 Conclusion

In this paper, I show empirically that individuals living from HtM increase home production by more than savers do in response to a contractionary monetary policy shock. Through the lens of a TANK model with home production that is consistent with my empirical result, I find that HtM households reallocate hours worked to the home sector by more than savers do, because their labor income decreases to a greater extent compared to savers. The possibility of producing consumption goods at home yields a labor income channel (through which monetary policy affects consumption inequality) that is half the size of the corresponding outcome in a model without home production. Furthermore, the transmission from monetary policy to aggregate output is stronger in a model with home production.

My paper contributes to the large literature on the interaction of household heterogeneity and macroeconomic policy, and it is the first one to study the role of home production in that context. I use a TANK model instead of a HANK model, as it is empirically well established that the presence of HtM households matters for aggregate fluctuations (Campbell and Mankiw, 1989), while it is still an open question whether household heterogeneity that goes beyond distinguishing HtM households and savers matters empirically for aggregate fluctuations (see, e.g., Debortoli and Galí (2025)).[18] Home production is relevant for the analysis of inequality and macroeconomics, because it affects key macroeconomic variables

[18]Note, however, that there are other research questions for which HANK models are clearly relevant. For instance, only in a HANK models the fraction of borrowing-constrained households is endogenous, and Schmidt and Seidl (2025) show that this fraction matters for the transmission of changes in loan-to-value constraints to output.

such as hours worked, and thereby, output, and it is particularly relevant for households with limited access to financial markets, as my paper shows. Policy implications include the provision of goods by the government that would otherwise be part of home production, and how the access is distributed across HtM households and savers.

An avenue for future research is to investigate how the size of the home sector influences state dependencies of monetary policy, as it varies largely across countries (see, e.g., Miranda (2011)). Furthermore, the substitutability of home-produced goods and goods bought on the market might vary over time and across countries. This substitutability is crucial for the size of the fluctuations in market labor supply, and thereby, output. Home production might also impact other channels through which monetary policy affects consumption inequality. Taking a stand on the overall impact of home production on the transmission from monetary policy to consumption inequality requires an evaluation of how other channels are affected by home production. Finally, one might also look at the role of gender in consumption smoothing with home production, and how gender inequality impacts this relationship.

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A Additional empirical results

Table 10: Heterogeneous responses of time spent on market work to monetary policy

	(1)	(2)	(3)	(4)	(5)
mps	-0.355**	-0.149	-0.130	-0.564**	-0.640***
	(-2.57)	(-1.05)	(-0.88)	(-2.32)	(-2.62)
mps×HtM	0.168	0.253	0.233	0.202	0.262
	(0.52)	(0.75)	(0.68)	(0.59)	(0.78)
East Germany			0.504***	0.501***	0.519***
			(14.38)	(14.35)	(5.08)
Month of the interview			0.00540	0.00989	0.00691
			(0.84)	(1.52)	(1.07)
CPI inflation				-0.00570	0.00349
				(-0.67)	(0.41)
GDP				-0.00584	-0.0136
				(-0.61)	(-1.42)
Individual controls		✓	✓	✓	✓
FE for Region, Housing & Occupation					✓
Observations	32777	28568	27673	27673	27479
R^2	0.0000317	0.0127	0.0130	0.0149	0.0359

Notes: (i) t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (ii) individual controls are gender, minor kids, marital status, years of education.

Table 11: Heterogeneous responses of time spent on care for others to monetary policy

	(1)	(2)	(3)	(4)	(5)
mps	-0.0506**	-0.0393	-0.0467*	-0.0573	-0.0704
	(-2.03)	(-1.47)	(-1.69)	(-1.23)	(-1.49)
mps×HtM	-0.0684	-0.0409	-0.0334	-0.0324	0.0133
	(-1.54)	(-0.85)	(-0.67)	(-0.65)	(0.26)
East Germany			0.00996**	0.00990*	0.0211*
			(1.96)	(1.95)	(1.91)
Month of the interview			-0.000623	-0.000966	-0.000855
			(-0.67)	(-1.02)	(-0.89)
CPI inflation				0.00178	0.00181
				(1.20)	(1.20)
GDP				-0.00144	-0.00147
				(-0.86)	(-0.87)
Individual controls		✓	✓	✓	✓
FE for Region, Housing & Occupation					✓
Observations	32717	28514	27620	27620	27426
R^2	0.000887	0.00140	0.00140	0.00242	0.00910

Notes: (i) t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (ii) individual controls are gender, minor kids, marital status, years of education.

Table 12: Heterogeneous responses of time spent on repairs to monetary policy

	(1)	(2)	(3)	(4)	(5)
mps	1.505***	1.554***	1.521***	0.922***	0.930***
	(27.01)	(26.67)	(25.34)	(9.39)	(9.58)
mps×HtM	-1.126***	-1.048***	-1.061***	-1.087***	-0.533***
	(-10.20)	(-8.85)	(-8.77)	(-8.95)	(-4.46)
East Germany			0.176***	0.175***	0.107***
			(14.29)	(14.23)	(3.24)
Month of the interview			-0.00491**	-0.00197	0.00101
			(-2.27)	(-0.91)	(0.48)
CPI inflation				0.0106***	0.00628**
				(3.37)	(2.01)
GDP				-0.0193***	-0.0144***
				(-5.44)	(-4.08)
Individual controls		✓	✓	✓	✓
FE for Region, Housing & Occupation					✓
Observations	32717	28514	27622	27622	27428
R^2	0.0270	0.0286	0.0274	0.0257	0.0412

Notes: (i) t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; (ii) individual controls are gender, minor kids, marital status, years of education.

B Model derivations

B.1 Derivation of the households' problems

Household j of type $z \in (h, s)$ maximizes lifetime utility given by

$$E_0 \sum_{t=0}^{\infty} \beta^t U(C_t^z(j), L_t(j)) = E_0 \sum_{t=0}^{\infty} \beta^t \frac{[C_t^z(j)^b L_t^z(j)^{1-b}]^{1-\sigma} - 1}{1-\sigma}$$

subject to the following four constraints that are the same for each type of households.

$$C_t^z(j) = [\alpha_1 C_{m,t}^z(j)^{b_1} + (1-\alpha_1) C_{n,t}^z(j)^{b_1}]^{1/b_1}$$

$$L_t^z(j) = 1 - H_{m,t}^z(j) - H_{n,t}^z(j)$$

$$C_{n,t}^z(j) = H_{n,t}^z(j)$$

$$M_t^z(i,j) = \left(\frac{W_t^n(j)}{W_t^n}\right)^{-\epsilon_w} M_t^z(i)$$

HtM households have the following additional constraint:

$$W_t^n(j) H_{m,t}^h(j) - \frac{\xi^h}{2}\left(\frac{W_t^n(j)}{W_{t-1}^n(j)} - 1\right)^2 W_t^n(j) H_{m,t}^h(j) - T_t \leq P_t C_{m,t}^h(j)$$

Savers have the following additional constraint:

$$W_t^n(j) H_{m,t}^s(j) - \frac{\xi^s}{2}\left(\frac{W_t^n(j)}{W_{t-1}^n(j)} - 1\right)^2 W_t^n(j) H_{m,t}^s(j) + B_t^s(j) - T_t \leq E_t\{Q_{t,t+1} B_{t+1}^s(j)\} + P_t C_{m,t}^s(j)$$

The Lagrange function of savers is given by:

$$\begin{aligned}
\mathcal{L} \equiv E_0 \sum_{t=0}^{\infty} \beta^t & \left(\frac{\left[\left([\alpha_1 C_{m,t}^s(j)^{b_1} + (1-\alpha_1) C_{n,t}^s(j)^{b_1}]^{1/b_1}\right)^b (1 - H_{m,t}^s(j) - H_{n,t}^s(j))^{1-b}\right]^{1-\sigma} - 1}{1-\sigma} \right) \\
& + \lambda_t^s(j)[W_t^n(j) H_{m,t}^s(j) - \frac{\xi^s}{2}\left(\frac{W_t^n(j)}{W_{t-1}^n(j)} - 1\right)^2 W_t^n(j) H_{m,t}^s(j) + B_t^s(j) \\
& \qquad - T_t - E_t\{Q_{t,t+1} B_{t+1}^s(j)\} - P_t C_{m,t}^s(j)] \\
& + \mu_t^s(j)\left[H_{m,t}^s(i,j) - \left(\frac{W_t^n(j)}{W_t^n}\right)^{-\epsilon_w} H_{m,t}^s(i)\right] \\
& + \chi_t^s(j)\left[H_{n,t}^s(j) - C_{n,t}^s(j)\right]
\end{aligned}$$

The first order conditions are derived as follows.

$$\frac{\partial \mathcal{L}}{\partial C^s_{m,t}(j)} : U_{C^s_t(j)} \frac{\partial C^s_t(j)}{\partial C^s_{m,t}(j)} - P_t \lambda^s_t(j) = 0 \leftrightarrow \lambda^s_t(j) = \frac{U_{C^s_t(j)}}{P_t} \frac{\partial C^s_t(j)}{\partial C^s_{m,t}(j)}$$

$$\frac{\partial \mathcal{L}}{\partial H^s_{m,t}(j)} : U_{H^s_{m,t}(j)} + \lambda^s_t(j)(W^n_t(j) - \frac{\xi^s}{2} \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right)^2 W^n_t(j)) + \mu^s_t(j) = 0$$

$$\leftrightarrow \mu^s_t(j) = -U_{H^s_{m,t}(j)} - \frac{U_{C^s_{m,t}(j)}}{P_t} \frac{\partial C_t(j)}{\partial C_{m,t}(j)} (W^n_t(j) - \frac{\xi^s}{2} \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right)^2 W^n_t(j))$$

$$\frac{\partial \mathcal{L}}{\partial H_{n,t}(j)} : \frac{U_{L^s_t(j)}(C^s_t(j), L^s_t(j))}{(1-\alpha_1) U_{C^s_t(j)}(C^s_t(j), L^s_t(j))} \left(\frac{C^s_{n,t}(j)}{C^s_t(j)} \right)^{1-b_1} = \frac{C^s_{n,t}(j)}{H^s_{n,t}(j)}$$

$$\leftrightarrow \frac{1-b}{b(1-\alpha_1)} \left(\frac{C^s_t(j)}{C^s_{n,t}(j)} \right)^{b_1} = \frac{L^s_t(j)}{H^s_{n,t}(j)}$$

$$\frac{\partial \mathcal{L}}{\partial W^n_t(j)} : \lambda^s_t(j) \left(H^s_{m,t}(j) - \frac{\xi^s}{2} H^s_{m,t}(j) \left[2 \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right) \frac{1}{W^n_{t-1}(j)} W^n_t(j) + \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right)^2 \right] \right)$$

$$+ \mu^s_t(j) \left[-\epsilon_w \left(\frac{W^n_t(j)}{W^n_t} \right)^{-\epsilon_w - 1} \frac{1}{W^n_t} H^s_{m,t}(i) \right]$$

$$+ \beta \lambda^s_{t+1}(j) \left[-\xi^s \left(\frac{W^n_{t+1}(j)}{W^n_t(j)} - 1 \right) W^n_{t+1}(j) H_{m,t+1}(j) \frac{W^n_{t+1}(j)}{W^n_t(j)^2} (-1) \right] = 0$$

$$\leftrightarrow \frac{U_{C^s_t(j)} H^s_{m,t}(j)}{P_t} \frac{\partial C^s_t(j)}{\partial C^s_{m,t}(j)} \{ \epsilon_w MRS(j)^s_t \frac{1}{\frac{W^n_t(j)}{P_t}} + (1-\epsilon_w)$$

$$- \xi^s \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right) (\frac{W^n_t(j)}{W^n_{t-1}(j)} + \frac{1-\epsilon_w}{2} \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right))$$

$$+ \beta \frac{U_{C^s_{t+1}(j)}}{U_{C^s_t(j)}} \left(\frac{\partial C^s_t(j)}{\partial C^s_{m,t}(j)} \right)^{-1} \left(\frac{\partial C^s_{t+1}(j)}{\partial C^s_{m,t+1}(j)} \right) \frac{P_t}{P_{t+1}} \xi^s \left(\frac{W^n_{t+1}(j)}{W^n_t(j)} - 1 \right) \frac{W^n_{t+1}(j)}{W^n_t(j)} \frac{W^n_{t+1}(j) H^s_{m,t+1}(j)}{W^n_t(j) H^s_{m,t}(j)} \}$$

$$= 0$$

$$\frac{\partial \mathcal{L}}{\partial B^s_{t+1}(j)} : -\lambda^s_t(j) Q_{t,t+1} + E_t \beta \left(\lambda^s_{t+1}(j) \right) = 0 \leftrightarrow \lambda^s_t(j) Q_{t,t+1} = \beta E_t \left(\lambda^s_{t+1}(j) \right)$$

$$\leftrightarrow Q_{t,t+1} = \beta E_t \left(\frac{\lambda^s_{t+1}(j)}{\lambda^s_t(j)} \right) = \beta E_t \left(\frac{U_{C^s_{t+1}(j)}}{U_{C^s_t(j)}} \left(\frac{\partial C^s_t(j)}{\partial C^s_{m,t}(j)} \right)^{-1} \left(\frac{\partial C^s_{t+1}(j)}{\partial C^s_{m,t+1}(j)} \right) \Pi^{-1}_{t+1} \right)$$

With the no arbitrage condition, $Q_{t,t+1} \equiv (1+i_t)^{-1}$, the Euler equation is given by:

$$\beta \left(\frac{U_{C^s_{t+1}(j)}}{U_{C^s_t(j)}} \left(\frac{\partial C^s_t(j)}{\partial C^s_{m,t}(j)} \right)^{-1} \left(\frac{\partial C^s_{t+1}(j)}{\partial C^s_{m,t+1}(j)} \right) (1+i_t)\Pi^{-1}_{t+1} \right) = 1.$$

As HtM households cannot save or borrow in bonds, their per period consumption is given by

$$C^h_t(j) = \left(1 - \frac{\xi^h}{2} \left(\frac{W^n_t(j)}{W^n_{t-1}(j)} - 1 \right)^2 \right) W_t(j) H_{m,t}(j) - T_t.$$

The optimality condition with respect to home hours is the same for both types of households.

The marginal utilities of consumption and leisure are also the same for both types of households, and are given by the following equations.

$$\begin{aligned}
U_{C^z_t(j)} &= bC^z_t(j)^{b(1-\sigma)-1} \left(1 - H^z_{m,t}(j) - H^z_{n,t}(j)\right)^{(1-b)(1-\sigma)} \\
U_{H^z_{m,t}(j)} &= (b-1)(C^z_t(j))^{b(1-\sigma)} \left(1 - H^z_{m,t}(j) - H^z_{n,t}(j)\right)^{\sigma(b-1)-b} \\
U_{L^z_t(j)} &= -U_{H^z_{m,t}(j)} = (1-b)C^z_t(j)^{b(1-\sigma)} \left(1 - H^z_{m,t}(j) - H^z_{n,t}(j)\right)^{\sigma(b-1)-b}
\end{aligned}$$

$$\frac{\partial C^z_t(j)}{\partial C^z_{m,t}(j)} = \alpha_1 \left(\frac{C^z_{m,t}(j)}{C^z_t(j)} \right)^{b_1-1}$$

$$\begin{aligned}
\left(\frac{\partial C^z_t(j)}{\partial C^z_{m,t}(j)} \right)^{-1} \left(\frac{\partial C^z_{t+1}(j)}{\partial C^z_{m,t+1}(j)} \right) &= \left(\alpha_1 \left(\frac{C^z_{m,t}(j)}{C^z_t(j)} \right)^{b_1-1} \right)^{-1} \left(\alpha_1 \left(\frac{C^z_{m,t+1}(j)}{C^z_{t+1}(j)} \right)^{b_1-1} \right) \\
&= \left(\frac{C^z_{m,t+1}(j)}{C^z_{t+1}(j)} \frac{C^z_t(j)}{C^z_{m,t}(j)} \right)^{b_1-1}
\end{aligned}$$

$$MRS^z_t(j) = \frac{-U_{H^z_{m,t}(j)}}{U^z_{C_t(j)}} = -\frac{b-1}{b} \frac{C^z_t(j)}{1 - H^z_{m,t}(j) - H^z_{n,t}(j)}$$

In a last step, the optimality conditions with respect to market work, market consumption and wages are used to derive the wage Phillips curve for both types of households. As in Broer et al. (2020), I look for a symmetric solution in which $W^n_t(j) = W^n_t(k) = W^n_t$ for all j, k. The labor demand equation shows that if $W^n_t(j) = W^n_t(k)$ then also $H_{m,t}(j) = H_{m,t}(k)$. Wage inflation is defined as follows

$$\Pi^w_{t+1} \equiv \frac{W^n_{t+1}(j)}{W^n_t(j)} = \frac{W^n_{t+1}}{W^n_t},$$

and price inflation is defined as

$$\Pi_{t+1} \equiv \frac{P_{t+1}}{P_t}.$$

The accounting identity for the evolution of the average real wage is given by

$$\frac{W_t^n/P_t}{W_{t-1}^n/P_{t-1}} = \frac{W_t^n}{W_{t-1}^n}\left(\frac{P_t}{P_{t-1}}\right)^{-1} = \frac{\Pi_t^w}{\Pi_t^p} \leftrightarrow W_t = W_{t-1}\frac{\Pi_t^w}{\Pi_t^p}$$

Since $\frac{U_{C_t^z(j)}M_t^z(j)}{P_t}\left(\frac{\partial C_t^z(j)}{\partial C_{m,t}^z(j)}\right)$ is not stochastic, it can be shortened out. Hence, the first order condition with respect to wages is given by

$$\begin{aligned}
&\epsilon_w MRS_t^z(j)\frac{1}{W_t} + (1-\epsilon_w) \\
&-\xi^z\left(\Pi_t^w - 1\right)\left(\Pi_t^w + \frac{1-\epsilon_w}{2}\left(\Pi_t^w - 1\right)\right) \\
&+\beta\frac{U_{C_{t+1}^z(j)}}{U_{C_t^z(j)}}\left(\frac{\partial C_t^z(j)}{\partial C_{m,t}^z(j)}\right)^{-1}\left(\frac{\partial C_{t+1}^z(j)}{\partial C_{m,t+1}^z(j)}\right)\left(\Pi_{t+1}^p\right)^{-1}\xi^z\left(\Pi_{t+1}^w - 1\right)\left(\Pi_{t+1}^w\right)^2\frac{M_{t+1}^z(j)}{M_t^z(j)} = 0
\end{aligned}$$

Recall that $W_t^n(k) = W_t^n(j) = W_t^n$ due to symmetry, thus, also $H_{m,t}^h(k) = H_{m,t}^h(j) = H_{m,t}^h$, and therefore $C_{m,t}^h(k) = C_{m,t}^h(k) = C_{m,t}^h$, because recall that consumption of HtM households is given by

$$\begin{aligned}
C_{m,t}^h(j) &= \left(1 - \frac{\xi^h}{2}\left(\frac{W_t^n(j)}{W_{t-1}^n(j)} - 1\right)^2\right)W_t(j)H_{m,t}^h(j) - T_t \\
\leftrightarrow C_{m,t}^h &= \left(1 - \frac{\xi^h}{2}\left(\Pi_t^w - 1\right)^2\right)W_t H_{m,t}^h - T_t.
\end{aligned}$$

Therefore, it also holds that $MRS_t^h(k) = MRS_t^h(j) = MRS_t^h$, since $U_{C_t^h(k)} = U_{C_t^s(j)} = U_{C_t^s}$ if $C_{m,t}^h(k) = C_{m,t}^h(k) = C_{m,t}^h$, and $U_{H_{m,t}^h(k)} = U_{H_{m,t}^s(j)} = U_{H_{m,t}^s}$ if $H_{m,t}^h(k) = H_{m,t}^h(k) = H_{m,t}^h$. Thus, the wage Phillips curve of HtM households is thus given by

$$\begin{aligned}
&\epsilon_w MRS_t^h\frac{1}{W_t} + (1-\epsilon_w) - \xi^h\left(\Pi_t^w - 1\right)\left(\Pi_t^w + \frac{1-\epsilon_w}{2}\left(\Pi_t^w - 1\right)\right) \\
&+\beta\frac{U_{C_{t+1}^h}}{U_{C_t^h}}\left(\frac{\partial C_t^h}{\partial C_{m,t}^h}\right)^{-1}\left(\frac{\partial C_{t+1}^h}{\partial C_{m,t+1}^h}\right)\left(\Pi_{t+1}^p\right)^{-1}\xi^h\left(\Pi_{t+1}^w - 1\right)\left(\Pi_{t+1}^w\right)^2\frac{H_{m,t+1}^h}{H_{m,t}^h} = 0.
\end{aligned}$$

As shown in Erceg et al. (2000), also optimizing households have the same level of consumption, $C_{m,t}^s(k) = C_{m,t}^s(j) = C_{m,t}^s$, and hence also $MRS_t^s(k) = MRS_t^s(j) = MRS_t^s$ as explained above. Thus, the wage Phillips curve of savers is given by

$$\epsilon_w MRS_t^s \frac{1}{W_t} + (1-\epsilon_w) - \xi^s \left(\Pi_t^w - 1\right)\left(\Pi_t^w + \frac{1-\epsilon_w}{2}\left(\Pi_t^w - 1\right)\right)$$
$$+\beta \frac{U_{C_{t+1}^s}}{U_{C_t^s}} \left(\frac{\partial C_t^s}{\partial C_{m,t}^s}\right)^{-1} \left(\frac{\partial C_{t+1}^s}{\partial C_{m,t+1}^s}\right) \left(\Pi_{t+1}^p\right)^{-1} \xi^s \left(\Pi_{t+1}^w - 1\right)\left(\Pi_{t+1}^w\right)^2 \frac{H_{m,t+1}^s}{H_{m,t}^s} = 0.$$

Note that the wage Phillips curves of HtM households and savers look identical, the only differences are that the adjustment costs differ and also the marginal utilities are different as the level of consumption and hours worked differs.

B.1.1 Derivation of the households' demand for good i

The households' demand for good i is derived as follows. The household optimization problem for choosing the optimal consumption bundle is given by

$$\max_{C_t(i)} \quad C_t \equiv \left(\int_0^1 C_t(i)^{\frac{\epsilon-1}{\epsilon}} di\right)^{\frac{\epsilon}{\epsilon-1}}$$

$$\text{s.t.} \quad \int_0^1 P_t(i) C_t(i) di = Z_t$$

and the corresponding Lagrangian is given by

$$\mathcal{L} \equiv \left(\int_0^1 C_t(i)^{\frac{\epsilon-1}{\epsilon}} di\right)^{\frac{\epsilon}{\epsilon-1}} - \lambda_t \left(\int_0^1 P_t(i) C_t(i) di - Z_t\right)$$

The first order condition with respect to a particular good k is then given by

$$\frac{\partial \mathcal{L}}{\partial C_t(k)} = \frac{\epsilon}{\epsilon-1}\left(\int_0^1 C_t(i)^{\frac{\epsilon-1}{\epsilon}} di\right)^{\frac{\epsilon}{\epsilon-1}-1} \frac{\epsilon-1}{\epsilon} C_t(k)^{\frac{\epsilon-1}{\epsilon}-1} - \lambda_t P_t(k) = 0$$
$$\Leftrightarrow \left(\int_0^1 C_t(i)^{\frac{\epsilon-1}{\epsilon}} di\right)^{\frac{\epsilon}{\epsilon-1}-1} C_t(k)^{-\frac{1}{\epsilon}} = \lambda_t P_t(k)$$
$$\Leftrightarrow \left(\int_0^1 C_t(i)^{\frac{\epsilon-1}{\epsilon}} di\right)^{\frac{\epsilon}{\epsilon-1}-1} C_t(n)^{-\frac{1}{\epsilon}} = \lambda_t P_t(n)$$

with n denoting another variety out of the goods bundle. Dividing the two last lines by each other yields

$$\left(\frac{C_t(k)}{C_t(n)}\right)^{-\frac{1}{\epsilon}} = \frac{P_t(k)}{P_t(n)} \Leftrightarrow \frac{C_t(k)}{C_t(n)} = \left(\frac{P_t(k)}{P_t(n)}\right)^{-\epsilon} \Leftrightarrow C_t(k) = P_t(k)^{-\epsilon} P_t(n)^{\epsilon} C_t(n)$$

Hence, it follows that

$$Z_t = \int_0^1 P_t(i)C_t(i)di = \int_0^1 P_t(i)P_t(i)^{-\epsilon}P_t(n)^{\epsilon}C_t(n)di = P_t(n)^{\epsilon}C_t(n)\int_0^1 P_t(i)^{1-\epsilon}di$$

$$\Leftrightarrow Z_t = P_t(n)^{\epsilon}C_t(n)\left(\left(\int_0^1 P_t(i)^{1-\epsilon}di\right)^{\frac{1}{1-\epsilon}}\right)^{1-\epsilon} = P_t(n)^{\epsilon}C_t(n)P_t^{1-\epsilon}$$

$$\Leftrightarrow C_t(n) = \left(\frac{P_t(n)}{P_t}\right)^{-\epsilon}\frac{Z_t}{P_t} \Leftrightarrow C_t(i) = \left(\frac{P_t(i)}{P_t}\right)^{-\epsilon}\frac{Z_t}{P_t}$$

B.2 Derivation of the firms' problem

Firm i maximizes profits,

$$\max_{H_{m,t}(i),Y_t(i),P_t(i)} P_t(i)Y_t(i) - W_t^n H_{m,t}(i),$$

subject to the production function,

$$Y_t(i) = H_{m,t}(i),$$

the demand constraint,

$$Y_t(i) = \left[\frac{P_t(i)}{P_t}\right]^{-\epsilon_p} Y_t^d,$$

where aggregate demand, Y_t^d, is taken as given, and subject to a Calvo price-setting scheme,

$$P_{t+k+1}(i) = \begin{cases} P^*_{t+k+1}(i) & \text{with probability } (1-\theta), \\ P_{t+k}(i) & \text{with probability } \theta. \end{cases}$$

The discounted sum of current and future profits is given by

$$E_t\left(\sum_{k=0}^{\infty}\theta^k Q_{t,t+k}[P_t(i)Y_{t+k}(i) - W_{t+k}^n H_{m,t+k}(i)]\right),$$

where $Q_{t,t+k}$ denotes the stochastic discount factor given by

$$Q_{t,t+k} = \beta^k E_t\left(\frac{\lambda^s_{t+k}}{\lambda^s_t}(\Pi_{t,t+k})^{-1}\right).$$

The Lagrangian in then given by

$$\mathcal{L} \equiv E_t \left(\sum_{k=0}^{\infty} \theta^k Q_{t,t+k} \{ [P_t^*(i) Y_{t+k}(i) - W_{t+k}^n H_{m,t+k}(i)] \right)$$
$$- \lambda_{t+k}(i) \left(Y_{t+k}(i) - \left[\frac{P_t^*(i)}{P_{t+k}} \right]^{-\epsilon_p} Y_{t+k}^d \right) - \mu_{t+k}(i)(Y_{t+k}(i) - H_{m,t+k}(i)) \},$$

where Lagrange multipliers are re-parametrized. The first order conditions are given by

$$\frac{\partial \mathcal{L}}{\partial H_{m,t+k}(i)} = -W_{t+k}^n + \mu_{t+k}(i) = 0 \leftrightarrow MC_{t+k}^n \equiv \mu_{t+k}(i) = W_{t+k}^n \leftrightarrow MC_{t+k} = W_{t+k},$$

$$\frac{\partial \mathcal{L}}{\partial Y_{t+k}(i)} = P_t^* - \lambda_{t+k}(i) - \mu_{t+k}(i) = 0 \leftrightarrow \lambda_{t+k}(i) = P_t^* - \mu_{t+k}(i) = P_t^* - MC_{t+k}^n,$$

$$\frac{\partial \mathcal{L}}{\partial P_t^*(i)} = E_t \left(\sum_{k=0}^{\infty} \theta^k Q_{t,t+k} [Y_{t+k}(i) - \lambda_{t+k}(i) \epsilon_p \left[\frac{P_t^*}{P_{t+k}} \right]^{-\epsilon_p - 1} \frac{1}{P_{t+k}} Y_{t+k}^d \right) = 0$$
$$\leftrightarrow E_t \left(\sum_{k=0}^{\infty} \theta^k Q_{t,t+k} [Y_{t+k}(i) - \lambda_{t+k}(i) \epsilon_p \frac{Y_{t+k}(i)}{P_t^*}] \right) = 0$$
$$\leftrightarrow E_t \left(\sum_{k=0}^{\infty} \theta^k Q_{t,t+k} Y_{t+k}(i) \left[\frac{P_t^*}{P_t} - MC_{t+k} \left(\frac{\epsilon_p}{\epsilon_p - 1} \right) \right] \right) = 0.$$

Rewrite the condition as

$$\frac{P_t^*}{P_t} = \frac{x_{1,t}}{x_{2,t}}$$

with

$$x_{1,t} = [C_{m,t} + G_t] \left(\frac{\epsilon_p}{\epsilon_p - 1} \right) MC_t + \beta \theta E_t \left(\frac{\lambda_{t+1}^s}{\lambda_t^s} (\Pi_{t+1})^{\epsilon_p} x_{1,t+1} \right)$$

and

$$x_{2,t} = [C_{m,t} + G_t] + \beta \theta E_t \left(\frac{\lambda_{t+1}^s}{\lambda_t^s} (\Pi_{t+1})^{\epsilon_p - 1} x_{2,t+1} \right).$$

From Calvo pricing it follows that

$$\frac{P_t^*}{P_t} = \left(\frac{1 - \theta \Pi_t^{\epsilon_p - 1}}{1 - \theta} \right)^{\frac{1}{1 - \epsilon_p}}.$$

B.2.1 Derivation of the firms' demand for labor input of household j

The firms' demand for labor of household j is derived as follows. Optimizing behavior of firm i implies the following maximization problem

$$\max_{H_{m,t}(i,j)} H_{m,t}(i) = \left(\int_0^1 H_{m,t}(i,j)^{\frac{\epsilon_w-1}{\epsilon_w}} dj\right)^{\frac{\epsilon_w}{\epsilon_w-1}} \quad \text{subject to} \quad \int_0^1 W_t^n(j)H_{m,t}(i,j)dj = Z_t(i),$$

where $Z_t(i)$ is any given level of labor costs of firm i. The corresponding Lagrangian is then given by

$$\mathcal{L} \equiv \left(\int_0^1 H_{m,t}(i,j)^{\frac{\epsilon_w-1}{\epsilon_w}} dj\right)^{\frac{\epsilon_w}{\epsilon_w-1}} - \lambda_t \left(\int_0^1 W_t^n(j)H_{m,t}(i,j)dj - Z_t(i)\right)$$

The first order condition with respect to a particular labor unit k is then given by

$$\frac{\epsilon_w}{\epsilon_w-1}\left(\int_0^1 H_{m,t}(i,j)^{\frac{\epsilon_w-1}{\epsilon_w}} dj\right)^{\frac{\epsilon_w}{\epsilon_w-1}-1} \frac{\epsilon_w-1}{\epsilon_w} H_{m,t}(ik)^{\frac{\epsilon_w-1}{\epsilon_w}-1} - \lambda_t W_t^n(k) = 0,$$

and with respect to a particular labor unit n is given by

$$\frac{\epsilon_w}{\epsilon_w-1}\left(\int_0^1 H_{m,t}(i,j)^{\frac{\epsilon_w-1}{\epsilon_w}} dj\right)^{\frac{\epsilon_w}{\epsilon_w-1}-1} \frac{\epsilon_w-1}{\epsilon_w} H_{m,t}(in)^{\frac{\epsilon_w-1}{\epsilon_w}-1} - \lambda_t W_t^n(n) = 0.$$

Dividing the two first order conditions by each other yields

$$\begin{aligned}
\left(\frac{H_{m,t}(ik)}{H_{m,t}(in)}\right)^{\frac{\epsilon_w-1}{\epsilon_w}-1} &= \frac{W_t^n(k)}{W_t^n(n)} \\
\leftrightarrow H_{m,t}(ik) &= W_t^n(k)^{-\epsilon_w} W_t^n(n)^{\epsilon_w} H_{m,t}(in) \\
\leftrightarrow H_{m,t}(i,j) &= W_t^n(j)^{-\epsilon_w} W_t^n(n)^{\epsilon_w} H_{m,t}(in)
\end{aligned}$$

When plugging the optimality condition into the constraint one obtains

$$\begin{aligned}
Z_t(i) &= \int_0^1 W_t^n(j) W_t^n(j)^{-\epsilon_w} W_t^n(n)^{\epsilon_w} H_{m,t}(in) dj \\
&= W_t^n(n)^{\epsilon_w} H_{m,t}(in) \int_0^1 W_t^n(j)^{1-\epsilon_w} dj = W_t^n(n)^{\epsilon_w} H_{m,t}(in)(W_t^n)^{1-\epsilon_w} \\
\leftrightarrow H_{m,t}(in) &= \left(\frac{W_t^n(n)}{W_t^n}\right)^{-\epsilon_w} \frac{Z_t(i)}{W_t^n} \leftrightarrow H_{m,t}(i,j) = \left(\frac{W_t^n(j)}{W_t^n}\right)^{-\epsilon_w} \frac{Z_t(i)}{W_t^n}
\end{aligned}$$

In a last step, it is shown that $\int_0^1 W_t^n(j)H_{m,t}(i,j)dj = W_t^n H_{m,t}(i)$, and therefore, $\frac{Z_t(i)}{W_t^n} = H_{m,t}(i)$.

$$H_{m,t}(i) = \left(\int_0^1 \left(\left(\frac{W_t^n(j)}{W_t^n}\right)^{-\epsilon_w} \frac{Z_t(i)}{W_t^n}\right)^{\frac{\epsilon_w - 1}{\epsilon_w}} dj\right)^{\frac{\epsilon_w}{\epsilon_w - 1}}$$
$$= \frac{Z_t(i)}{W_t}(W_t^n)^{\epsilon_w} \left(\int_0^1 (W_t^n(j)^{1-\epsilon_w})dj\right)^{\frac{\epsilon_w}{\epsilon_w - 1}} = \frac{Z_t(i)}{W_t^n}(W_t^n)^{\epsilon_w}(W_t^n)^{-\epsilon_w} = \frac{Z_t(i)}{W_t^n}$$

Thus, since $\frac{Z_t(i)}{W_t^n} = H_{m,t}(i)$, the demand curve for labor type j of firm i is given by

$$H_{m,t}(i,j) = \left(\frac{W_t^n(j)}{W_t^n}\right)^{-\epsilon_w} H_{m,t}(i).$$

The firm's marginal costs are equal to the real wage (due to the linear production function), because the aggregated wage of households is equal to the firm's demand for labor.[19]

B.3 Steady state

I assume a zero inflation steady state, $\bar{\Pi} = 1$ and $\bar{\Pi}^w = 1$. The monetary policy shock is zero in steady state, $\bar{\epsilon}^\nu = 0$, so $\bar{\nu} = 0$. The Euler equation yields $(1 + \bar{i}) = \frac{1}{\beta}$.

The two auxiliary equation give the steady state of the real marginal costs, $\bar{MC}$,

$$\bar{x}_1 = [\bar{C}_m + \bar{G}]\left(\frac{\epsilon_p}{\epsilon_p - 1}\right)\bar{MC} + \beta\theta\frac{\bar{\lambda}^s}{\bar{\lambda}^s}\bar{\Pi}^{\epsilon_p}\bar{x}_1 \leftrightarrow \bar{x}_1(1 - \beta\theta\bar{\Pi}^{\epsilon_p}) = [\bar{C}_m + \bar{G}]\left(\frac{\epsilon_p}{\epsilon_p - 1}\right)\bar{MC}$$

$$\bar{x}_2 = [\bar{C}_m + \bar{G}] + \beta\theta\frac{\bar{\lambda}^s}{\bar{\lambda}^s}\bar{\Pi}^{\epsilon_p - 1}\bar{x}_2 \leftrightarrow \bar{x}_2(1 - \beta\theta\bar{\Pi}^{\epsilon_p - 1}) = \bar{C}_m + \bar{G}$$

since $\bar{\Pi} = 1$, $\bar{\Pi}^{\epsilon_p - 1} = \bar{\Pi}^{\epsilon_p} = 1$ and $\bar{P} = \bar{P}^*$, and because $\frac{\bar{x}_1}{\bar{x}_2} = \frac{\bar{P}^*}{\bar{P}} = 1$, it follows that $\bar{x}_1 = \bar{x}_2$. This gives

$$[\bar{C}_m + \bar{G}]\left(\frac{\epsilon_p}{\epsilon_p - 1}\right)\bar{MC} = \bar{C}_m + \bar{G} \leftrightarrow \bar{MC} = \frac{\epsilon_p - 1}{\epsilon_p}$$

Using the production function, the real wage in steady state is given by

$$\bar{W} = \bar{MC}\left(\frac{\bar{Y}}{\bar{M}}\right) = \bar{MC}.$$

[19]See Erceg et al. (2000), section 2.1, equation (5).

The wage setting decision of both types of households in steady state is given by

$$\frac{\epsilon_w}{\alpha_1}\left(\frac{-\bar{U}_{M^z}}{\bar{U}_{C^z}}\right)\left(\frac{\bar{C}^z_m}{\bar{C}^z}\right)^{-(b_1-1)}\frac{1}{\bar{W}}+(1-\epsilon_w)-\xi^z\left(\bar{\Pi}^w-1\right)(\bar{\Pi}^w+\frac{1-\epsilon_w}{2}\left(\bar{\Pi}^w-1\right))$$
$$+\beta\frac{\bar{U}_{C^z}}{\bar{U}_{C^z}}\left(\frac{\bar{C}^z_m}{\bar{C}^z}\frac{\bar{C}^z}{\bar{C}^z_m}\right)^{b_1-1}\left(\bar{\Pi}\right)^{-1}\xi^z\left(\bar{\Pi}^w-1\right)\left(\bar{\Pi}^w\right)^2\frac{\bar{H}^z_m}{\bar{H}^z_m}=0$$
$$\leftrightarrow\frac{\epsilon_w}{\alpha_1}\left(\frac{-\bar{U}_{M^z}}{\bar{U}_{C^z}}\right)\left(\frac{\bar{C}^z_m}{\bar{C}^z}\right)^{-(b_1-1)}\frac{1}{\bar{W}}+(1-\epsilon_w)=0$$
$$\leftrightarrow\frac{\epsilon_w}{\alpha_1(\epsilon_w-1)}\left(\frac{-\bar{U}_{M^z}}{\bar{U}_{C^z}}\right)\left(\frac{\bar{C}^z_m}{\bar{C}^z}\right)^{-(b_1-1)}=\bar{W}$$

Note that due to sticky wage model, the MRS is only up to a fraction equal to the real wage.

The utility trade-off of savers is given by

$$\frac{-\bar{U}_{H^s_m}}{\bar{U}_{C^s}}=\frac{-(b-1)\left(\bar{C}^s\right)^{b(1-\sigma)}\left(1-\bar{H}^s_m-\bar{H}^s_n\right)^{\sigma(b-1)-b}}{b\left(\bar{C}^s\right)^{b(1-\sigma)-1}\left(1-\bar{H}^s_m-\bar{H}^s_n\right)^{(1-b)(1-\sigma)}}=\frac{1-b}{b}\frac{\bar{C}^s}{(1-\bar{H}^s_m-\bar{H}^s_n)},$$

and when plugging in the previous equation, this yields

$$\frac{\epsilon_w}{\alpha_1(\epsilon_w-1)}\left(\frac{1-b}{b}\frac{\bar{C}^s}{(1-\bar{H}^s_m-\bar{H}^s_n)}\right)\left(\frac{\bar{C}^s_m}{\bar{C}^s}\right)^{-(b_1-1)}=\bar{W}$$
$$\leftrightarrow\bar{W}(1-\bar{H}^s_m-\bar{H}^s_n)=\frac{(1-b)\epsilon_w}{b\alpha_1(\epsilon_w-1)}\bar{C}^s\left(\frac{\bar{C}^s_m}{\bar{C}^s}\right)^{-(b_1-1)},$$

When plugging in for the MRS of HtM households, it yields

$$\frac{\epsilon_w}{\alpha_1(\epsilon_w-1)}\left(\frac{1-b}{b}\frac{\bar{C}^h}{(1-\bar{H}^h_m)}-\bar{H}^h_n\right)=\bar{W}$$
$$\leftrightarrow\bar{W}(1-\bar{H}^h_m-\bar{H}^h_n)=\frac{(1-b)\epsilon_w}{b\alpha_1(\epsilon_w-1)}\bar{C}^h\left(\frac{\bar{C}^h_m}{\bar{C}^h}\right)^{-(b_1-1)}.$$

I use the function *fsolve* in Matlab to solve for output, and hours worked and consumption of savers and HtM at home and in market.

B.4 Model solution

I solve the model using Dynare 5.0 in Matlab R2024b. My code is based on two replication codes: The replication code of Galí (2015) by Johannes Pfeifer (Github repository "JohannesPfeifer/DSGE_mod") and the replication code of Gnocchi et al. (2016) from the Macroeconomic Model Data Base.

C Details on the calibration of wage stickiness

I follow Born and Pfeifer (2020) to calculate the Rotemberg adjustment parameter from the Calvo probabilities of resetting the wage. Following Born and Pfeifer (2020) section 2.4., it holds that

$$\frac{(1-\theta_w)(1-\beta\theta_w)}{\theta_w(1+\epsilon_w\epsilon_{tot}^{mrs})} = \frac{(\epsilon_w - 1)(1-\tau^n)\chi}{\xi}$$

$$\leftrightarrow \xi = (\epsilon_w - 1)(1-\tau^n)\chi\frac{\theta_w(1+\epsilon_w\epsilon_{tot}^{mrs})}{(1-\theta_w)(1-\beta\theta_w)}$$

In case of multiplicatively separable preferences, the total elasticity is given by

$$\epsilon_{tot}^{mrs} = \left[1 - \frac{(1-b)(\sigma-1)}{b(1-\sigma)-1}\right] \times \frac{N}{1-N},$$

with $N/(1-N)$ being the ratio of hours worked to leisure. The steady-state labor share χ without fixed costs is given by

$$\chi = \frac{WN}{\Xi} = \frac{\epsilon_p - 1}{\epsilon_p}(1-\alpha),$$

where Ξ are the nominal adjustment cost base, and $(1-\alpha)$ is the steady-state elasticity of the production function with respect to labor.

The baseline calibration in this model is given by $\alpha = 0$, $\epsilon_p = 9$, $\epsilon_w = 4.5$, $\beta = 0.99$, $\sigma = 2$, $b = 0.865$ and $\tau^n = 0$. It follows that $\chi = \frac{\epsilon_p - 1}{\epsilon_p}(1-\alpha) = 0.89$. The ratio of market work to leisure is given by $0.64/0.16 = 4$ for both types of households. The total elasticity of substitution is then given by $\epsilon_{tot,h}^{mrs} = \left[1 - \frac{(1-0.865)(2-1)}{0.865(1-2)-1}\right] \times 4 = 1.07 \times 4 = 4.3$. Born and Pfeifer (2020) report much smaller values for the total elasticity of substitution, as assume a work leisure share of around 0.5.

For savers, I target a Calvo parameter for wage stickiness of 3/4, which yields the following Rotemberg adjustment costs parameter,

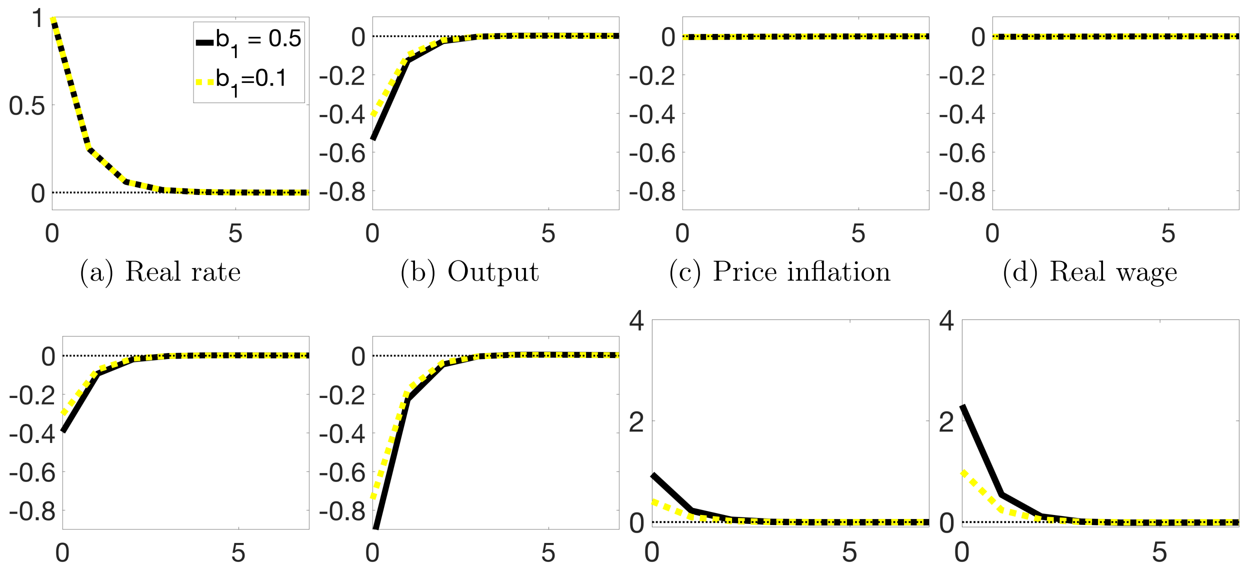
$$\xi^s = (4.5-1) \times 0.89 \times \frac{0.75(1+4.5\times 4.3)}{(1-0.75)(1-0.99\times 0.75)} \approx 740,$$

and for HtM households I target a Calvo parameter for wage stickiness of 5/6, and this yields the following Rotemberg adjustment costs parameter,

$$\xi^h = (4.5-1) \times 0.89 \times \frac{5/6(1+4.5\times 4.3)}{(1-5/6)(1-0.99\times 5/6)} \approx 1810.$$

D Results with different substitutabilities of goods bought on the market and produced at home

Figure 7: Results with different substitutabilities of goods bought on the market and produced at home



(a) Real rate (b) Output (c) Price inflation (d) Real wage

(e) Market hours savers (f) Market hours HtM household (g) Home hours savers (h) Home hours HtM household

Notes: (i) shock size: 100 basis points (annualized), (ii) responses: quarterly, rates are in pp deviations and all other variables in % deviations from the steady state, (iii) inflation and interest rate are annualized.