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PRICE LEVEL CHANGES AND THE REDISTRIBUTION OF NOMINAL WEALTH ACROSS THE EURO AREA

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ABSTRACT

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JEL Classification: D14, D31 and E31
Keywords: euro area, household survey, inflation and redistribution

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Price Level Changes and the Redistribution of Nominal Wealth Across the Euro Area *

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April 28, 2014

Abstract

We document the presence of sizable distributional effects from unexpected price level movements in the Euro Area (EA) using sectoral accounts and newly available data from the Household Finance and Consumption Survey. The EA as a whole is a net winner of unexpected price level increases, with Italy, Greece, Portugal and Spain being the biggest beneficiaries, and Belgium and Malta being the largest losers. Governments are net winners of inflation, while the household (HH) sector is a net loser in the EA as a whole. HHs in Belgium, Ireland, Malta and Germany incur the biggest per capita losses, while HHs in Finland and Spain turn out to be net winners of inflation. Considerable heterogeneity exists also within the HH sector: relatively young middle class HHs are net winners of inflation, while older and richer HHs are losers. As a result, wealth inequality in the EA decreases with unexpected inflation, although in some countries (Austria, Germany and Malta) inequality increases due to presence of relatively few young borrowing HHs. We document that HHs inflation exposure varies systematically across countries, with HHs in high inflation EA countries holding systematically lower nominal exposures.

JEL-Class. No.: E31,D31,D14

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1 Introduction

Unanticipated inflation redistributes nominal wealth from lenders to borrowers, while unanticipated deflation shifts wealth in the opposite direction. Understanding which countries and which parts of society are affected by such inflation-induced redistribution is of interest for a number of reasons: it contributes to understanding the welfare implications associated with price level surprises and thereby the welfare gains associated with price stability; furthermore, in a situation with elevated inflation or deflation risk, it allows to identify those parts of society that are most exposed to such risk; finally, within a monetary union such as the Euro Area, the size and the direction of the redistribution are likely to be helpful for understanding countries' incentives to shape union-wide monetary policy outcomes and for understanding their participation incentives.

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This paper systematically quantifies the distributional effects associated with unexpected price level movements in the Euro Area (EA).[1] It documents that even a moderately sized unexpected movement in the aggregate price level induces quantitatively important wealth redistribution in the EA. We show this by integrating the newly available Household Finance and Consumption Survey (HFCS), which is collected by the European System of Central Banks, with Euro Area Accounts (EAA) data, which provide detailed sectoral balance sheets for all EA countries. Creating an integrated system of nominal accounts allows us to document which EA countries are winners and losers of unexpected inflation (or deflation), how much each of the countries is winning and losing, how different economic sectors within each country are affected by such price level movements, and how gains and losses are distributed at the individual household level.

We begin our analysis by computing the net nominal position (NNP) of each country, each sector and each household.[2] The NNP is a measure of the nominal claims minus nominal liabilities held by an economic agent or economic sector and measures how exposed it is to price level changes. It comprises the direct nominal positions, which consist of nominal claims and liabilities held outright, but also the indirect nominal positions, which arise from the ownership of firms (directly or indirectly via investment funds). Since firms are leveraged entities, the indirect nominal position can be an important component of overall inflation exposure. We fully account for this by attributing the net nominal position of the corporate sector to its ultimate owners (domestic households, domestic governments, foreigners).

The EA as a whole turns out to be a winner of unexpected inflation, as it holds a substantially negative net nominal position (NNP) vis-a-vis the rest of the world. A 10% surprise increase in the price level, for example, leads to a *per capita* gain of approximately 1080 €, which equals 4.2% of EA per capita GDP. A corresponding price level decrease would lead to an overall loss of the same amount and smaller price level adjustment lead to proportionally smaller effects. Overall, the redistribution risks associated with price level uncertainty are sizable and suggest that - to the extent that households are risk averse - there exist strong incentives for avoiding unexpected inflationary or deflationary episodes in the EA.

The aggregate gains associated with price level increases turn out to be fairly unevenly distributed within the EA. The so-calls GIPS countries (Portugal, Italy, Greece and Spain) turn out to be the biggest winners of unexpected price level increases,[3] with all of them winning between 1330 € (Portugal) and 2410 € per capita (Greece) from a 10% surprise increase in the price level. For Greece this amounts to about 14% of per capita GDP, while the gains equal about 9% of per capita GDP for Spain and Portugal and 6% for Italy. Malta and Belgium lie

[1] Section 2.6 describes in detail what we mean by unexpected price level movements. Throughout the paper we focus on unanticipated price level changes, due to lack of information about the maturity structure of bondholdings at the sectoral level (except for the government sector) and at the individual household level. This together with lack of information on whether nominal assets carry a fixed or variable coupon rate prevents a rigorous assessment of the distributional consequences of anticipated inflation.

[2] The country level analysis fully includes the government sector, i.e., next to government claims and liabilities also those held by EA central banks, e.g., via the TARGET2 payment system.

[3] Correspondingly, these countries are the biggest losers of unexpected price level decreases.

on the other end of the spectrum and are net *losers* of unexpected inflation, with each of them *losing* about 4% and 9% of per capita GDP, respectively. The per capita GDP gains in the EA thus range from -9% in Belgium to +14% in Greece.

Considerable differences exist across EA countries also at the household (HH) level. We document this fact by defining the HH's inflation exposure as its NNP per unit of net wealth owned. This measure captures how exposed a HH is to unexpected inflation (or deflation) per unit of net wealth and allows for a comparison across HHs with different wealth levels and across countries with different wealth distributions. A value equal to one, for example, indicates that the HH has invested all its net wealth in nominal assets; a value of zero indicates that the HH faces in net terms no exposure to price level risk, while a negative value indicates that the HH is on net a debtor of nominal claims, thus a winner of unexpected inflation.[4]

We then document that the cross-sectional distribution of HH inflation exposures varies considerably across EA countries. For example, the GIPS countries and the former transition countries (Slovakia and Slovenia) have comparatively many HHs with a close to zero inflation exposure, i.e., HHs owning on net only real assets. In addition, these countries have comparatively few HHs who hold virtually all their net wealth in the form of nominal claims. The opposite is true for some of the EA 'core' countries (Austria, Belgium, Finland, Germany and the Netherlands), which - across all EA countries - have the highest share of HHs holding basically all net wealth in the form of nominal assets; these countries also have the lowest share of HHs with a close to zero inflation exposure.

Considering HHs' inflation exposure across age cohorts and broad social classes (rich, middle class and poor HHs), we document that the EA as a whole looks very similar to the U.S. and Canada, as previously analyzed by Doepke and Schneider (2006) and Meh and Terajima (2008), respectively. In particular, young cohorts turn out to be net debtors of nominal claims while older cohorts are net holders of nominal claims. Quantitatively, the EA exposure numbers are very close to the U.S. numbers, when aggregating across all social classes of an age cohort.[5] As a result, unexpected inflation leads to a wealth transfer from older HHs to younger HHs. While in the U.S. the beneficiaries of unexpected inflation are young middle class and young poor HHs, the benefits in the EA are concentrated entirely among young middle class HHs. Young poor HHs in the EA hold in net terms virtually no inflation exposure.

We also explore the effects of unexpected inflation for wealth inequality in the EA. We find that surprise inflation leads to a decline in the Gini coefficient for the EA net wealth distribution, as would be the case with a progressive net wealth tax. This occurs because young borrowing HHs, who are winners of inflation, are poorer than older HHs, who are losers of inflation. Yet, important differences exist with regard to this finding across EA countries: in Austria, Germany and Malta the young middle class HHs borrow on average relatively little, so that wealth inequality actually increases following surprise inflation, similar to what would

[4] These examples assume that net wealth is positive, which is the case for the large majority of HHs. We discuss the case with negative net wealth in the main text of the paper.

[5] The main difference is that in the U.S. inflation exposure of the oldest two age cohorts (65-63, >74 years) ist about 50% higher than in the EA.

be the case with a regressive wealth tax.

Overall, we find that in the EA the 'inflation tax' is relatively ineffective in generating government revenue in the sense that it requires relative high tax rates to achieve a given level of revenue. We document this by comparing the revenue generated by a 10% surprise increase in the price level to that of a more conventional proportional tax on net wealth. For most EA countries the same government revenue can be generated by a proportional wealth tax in the range of 1-2%. For some countries (Finland and Cyprus) the wealth tax can be as low as 0.5%, although for Greece it would have to amount to approximately 4%. This result is obtained even though the wealth tax, unlike the inflation tax, fails to tax foreigners.

We also document that the cross-sectional distribution of the inflation exposures across HHs correlates at the country level strongly with the country's inflation experience since the inception of the EA: countries that experienced higher inflation rates tend to be ones where HHs are borrowing more (relative to net worth) and where fewer HHs hold their net worth predominantly in nominal assets. Indeed, grouping countries according to their past inflation experience gives rise to a first order stochastic dominance ordering with respect to the inflation exposures in the HH sector. We also find that past inflation correlates with the marginal effects of net worth on inflation exposures in the cross section. This suggests that the inflation risk exposure of HHs is influenced by past inflation experience.

In previous work, Doepke and Schneider (2006) study the distributional implications of the U.S. Great Inflation episode in the 1970's. Meh and Terajima (2008) report results for Canada. Meh, Ríos-Rull and Terajima (2010), analyze the welfare implications of inflation targeting and price-level targeting strategies, calibrating their model to the nominal wealth positions documented for Canadian data. Brunnermeier and Sannikov (2013) discuss the redistributive effects of monetary policy in a setting with financial frictions and how policy can occasionally use these effects of avoid liquidity and deflationary spirals. Coibion, Gorodnichenko, Kueng and Silvia (2012) analyze the effects of monetary policy shocks for inequality. While not providing direct evidence for wealth inequality, they show that a contractionary monetary policy shock in the U.S. raises the inequality of income, labor earnings, expenditures and consumption across households. Albanesi (2007) documents the positive cross-country relationship between inflation rates and inequality and rationalizes it using a political economy model in which low income households are more exposed to inflation than high income households.

In early work, Bach and Stephenson (1974) and Cukierman, Lennan, and Papadia (1985) study inflation induced redistribution of nominal wealth. These studies do not integrate sectoral accounts with household data, as the latter were unavailable at the time, and also do not include indirect nominal positions (INP) arising from firm ownership. Erosa and Ventura (2002) present a monetary growth model that is consistent with the evidence on heterogeneity in transaction patterns and portfolio holdings, focusing on the effects of anticipated inflation for transaction balances and their redistributive effects. The present paper studies the distributional implications of unanticipated inflation and takes into account liquid and illiquid nominal claims.

The remainder of the paper is structured as follows. The next section presents the data sets, the procedures for integrating them into a coherent accounting framework, and the accounting methodology for computing net nominal exposures. Section 3 presents our baseline findings regarding the redistributive effects across EA countries and across different economic sectors in each EA country. It also discusses the robustness of these findings to alternative assumptions and integration approaches. Section 4 presents information about the cross-sectional distribution of inflation exposures at the HH level, documenting important differences across EA countries. It also offers a comparison with U.S. and Canadian data. Section 5 analyzes how wealth inequality is affected by unexpected inflation. Section 6 documents the relationship between past inflation experience and the cross-sectional distribution of inflation exposures at the HH level. A conclusion briefly summarizes and provides an outlook on future work. The appendices offer additional and more detailed information about individual EA countries and about the accounting methodologies.

2 Data Description and Accounting Methods

2.1 HFCS - Household Finance and Consumption Survey

The Household Finance and Consumption Survey (HFCS) is a coordinated HH survey covering all EA countries, except for Ireland. The core questionnaire is common among the countries and provides detailed household-level balance sheet information. Financial variables are all reported at market value. The survey covers about 62,000 households and the reference year for the latest available survey wave is 2010. Data is collected using a harmonized methodology to insure country-level representativeness. To maximize comparability across countries, the survey output is harmonized through usage of a common set of target variables. The survey also employes a common blueprint questionnaire to foster input harmonization. The survey is multiply imputed to account for missing data and oversamples wealthier households. Household weights are adjusted for unit non-response and calibrated to external information such as population distributions. Basic stylized facts of the survey are documented in HFCN (2013b, 2013a).

2.2 EAA - Euro Area Accounts

The Euro Area Accounts (EAA) provide detailed balance sheet information for a number of economic sectors (households, non-financial corporations, financial corporations, government and rest of the world) for each Euro Area country and for the EA as a whole. The sectoral balance sheets allow us to identify the nominal assets and liabilities held by each sector in each of the considered countries.

The EAA establish a quarterly integrated accounting system, which encompasses non-financial accounts and financial accounts. The accounts are integrated to balance the changes in transaction accounts and balance sheets. The EAA is compiled according to the European System of Accounts, ESA95(1995), which is the European application of the System of National

Accounts 1993, SNA93(1993). The EAA combines national data with EA aggregate statistics, where the latter are produced in collaboration with the national central banks, Eurostat and the national statistical institutes. The sectoral balance sheet of the HH sector is generally only indirectly estimated because little direct evidence concerning households is available. For this reason, we replace in our baseline approach the EAA HH sector balance sheet with information obtained from the HFCS, as described in the next section.

2.3 HFCS Integration

This section explains how we integrate the HFCS data with the EAA, so as to obtain a coherent accounting framework for discussing the distributional effects of unexpected inflation across countries, economic sectors and households.

We first construct from HFCS data the variables showing up in the EAA HH sector balance sheet, following the suggestions in Honkkila and Kavonius (2012), and then aggregate these across HHs to compute HFCS aggregates corresponding to the EAA positions. Appendix A explains in detail how this is achieved. The HFCS aggregates thus obtained tend to differ from their EAA counterparts, with the former typically falling short of the latter. This occurs for a number of reasons, discussed in Kavonius and Törmälehto (2010), Honkkila and Kavonius (2012) and HFCN (2013b), one of which is that the HH sector in the EAA comprises non-profit institutions, e.g., private foundations, while these institutions are not part of the HFCS data set; another one is that business wealth of the HH sector is (under certain conditions) classified as a financial asset in the EAA, while we classify it as a real asset when using the HFCS survey, see appendix A for further details.

In a second step, we integrate the HFCS data into the EAA, adopting as our baseline the integration strategy pursued also in Doepke and Schneider (2006), which adjusts the counterpart positions in the other sectors of the EAA data set pro-rata in line with the HFCS aggregates.[6] As a robustness check, we also perform the opposite approach, which amounts to rescaling the HFCS aggregates, so as to obtain the corresponding position in the HH sector balance sheet of the EAA. When considering sectoral aggregates only, the latter approach is identical to just using EAA data. We show in section 3 that these two approaches lead to very similar conclusions for the sectoral NNPs and thus for the sectoral redistribution effects associated with unexpected movements in the price level.

2.4 Computation of Net Nominal Positions (NNPs)

This section explains how we compute the net nominal positions (NNP) of the HH sector, the firm sector (F), the government sector (GOV), the rest of the world sector (ROW) and of individual HHs. The NNP is a measure of the net inflation exposure of a sector or an economic actor arising from the ownership of nominal claims and liabilities. The NNP is expressed in Euros, with a positive (negative) NNP indicating that nominal assets exceed (fall short of)

[6] This is required to retain a zero net supply of nominal claims.

nominal liabilities. Economic actors with a positive NNP are losers (winners) from unexpected price level increases (decreases). The computation of the NNPs is based on the integrated HFCS-EAA data set, as described in the previous section.

As a first step, we compute the direct net nominal position (DNP), which comprises all nominal assets and liabilities, except those arising indirectly from the ownership of equity/firms. In a second step, we add to this the indirect net nominal positions (INP) resulting from equity/firm ownership. The NNPs of a sector or of an individual HH are then defined as the sum of the DNPs and INPs of the sector or HH.

We explain below how we compute the DNP of a sector or HH. The computation of the INPs is explained in section 2.5.

The DNP of each sector includes all financial assets net of financial liabilities, except for the equity parts on the asset and liability side. We also exclude monetary gold and special drawing rights (SDRs) from the nominal positions. We do so because these (government) positions have no counterpart in the private sector accounts of the EAA, so that by excluding them the NNP of all sectors sum up to zero (except for rounding discrepancies).[7] Exclusion of these items has a quantitatively small effect on our results. Appendix A provides the list of variables used for computing the DNPs.

An important aspect for computing the HH sector NNPs regards the treatment of pension claims. In our analysis, we distinguish between pay-as-you-go social security schemes and other individual account based pension and life insurance claims. In particular, we exclude pay-as-you-go social security claims and payment obligations from our analysis, which amounts to assuming that the claims and benefits generated by these systems are fully indexed to the price level. This is partly motivated by the fact that neither the HFCS nor the EAA contain information on pay-as-you-go social security claims and benefits, but also by the fact that social security contributions tend to be a fixed share of nominal wage income, i.e., are effectively indexed.[8]

Regarding defined contribution and individual defined pension benefit and life insurance schemes, we treat these claims in the HH sector, as well as their counterparts in the financial sector of the EAA, as nominal claims. This is motivated by the fact that insurance companies in the Euro area are predominantly invested in nominal claims.[9] Moreover, pension owners often do not have a direct claim on the (relatively small) equity positions of the insurance sector, as they often own such positions only indirectly via life insurance type contracts. This represents

[7] Furthermore, monetary gold is de-facto a real asset, while SDRs represent more an outstanding credit line than a financial claim.

[8] Some EA countries apply upper caps to social security contributions, which would cause contributions not to be fully indexed to the price level absent changes to social security law.

[9] Of the € 6.7 trn of financial assets held by insurance corporations and pension funds in the EA, only about € 0.85 trn are invested in equity. A further € 1.6 trn is invested in mutual funds, but these are to a large extent themselves invested in nominal claims: the other financial intermediaries sector, which consists mainly of mutual, private equity and hedge funds, holds only about 36% of its assets in quoted and unquoted shares. This suggests that of the € 6.6. trn of pension assets in the insurance sector only about € 1.4trn (=0.85 trn+36%·1.7trn), i.e., only about 21% are invested in equities. Given that the other financial intermediaries sector contains also private equity and hedge funds, which tend to have a higher equity share, the true equity share is likely to be even lower.

an important institutional difference relative to the U.S. where individual investment accounts are much more widespread in retirement plans.

2.5 Accounting for Firm Ownership

To compute nominal exposures, we need to account for firm ownership by households (HH), the government (GOV) and the rest of the world (ROW). This is important because firms tend to be leveraged claims, i.e., entities that on net issue nominal debt, so that firm ownership represents a hedge against inflation risk.

Let E^{HH} and E^{GOV} denote the equity claims of domestic households and the domestic government, respectively.[10] We shall assume that domestic governments own domestic firms only[11] and decompose household equity claims into

$$E^{HH} = E^{HH\_D} + E^{HH\_F}, \tag{1}$$

where E^{HH_D} and E^{HH_F} denote domestic and foreign equity, respectively. Furthermore, let E^{F_A} and E^{F_L} denote the equity positions on the asset and liability side of the domestic firm sector, respectively.[12] We decompose the asset side as follows

$$E^{F\_A} = E^{F\_A\_D} + E^{F\_A\_F}, \tag{2}$$

where $E^{F\_A\_D}$ denotes ownership of domestic firms and $E^{F\_A\_F}$ ownership of foreign firms. Finally, let E^{ROW_A} and E^{ROW_L} denote the equity positions on the asset and liability side of the ROW, respectively.

Using these definitions we have

$$E^{F\_L} - E^{ROW\_A} - E^{GOV} = E^{F\_A\_D} + E^{HH\_D}, \tag{3}$$

where the l.h.s. is the total equity issued by domestic firms (E^{F_L}), net of the equity owned by the ROW (E^{ROW_A}) and the equity held by the GOV (E^{GOV}). The remaining equity must be held either by domestic firms ($E^{F\_A\_D}$) or domestic households (E^{HH_D}). We also have

$$E^{ROW\_L} = E^{HH\_F} + E^{F\_A\_F}, \tag{4}$$

which states that the equity liabilities of the ROW (E^{ROW_L}) must either be held by domestic

[10] Some countries (ES, FI, IE, SI, SK) report a (quantitatively small) equity position on the liability side of the GOV balance sheet. If so, we let E^{GOV} denote the *net* equity claim of the government sector. The household sector never has an equity position on its liability side. The equity position of a HH sector in the HFCS data, is computed by adding the HFCS counterparts of the following EEA positions: quoted shares, unquoted shares and equity mutual fund shares.

[11] None of the considered countries runs a sovereign wealth fund.

[12] In the financial accounts, the equity positions of the firm sector are not reported in consolidated form: if a domestic firm owns the equity of another domestic firm, then this position appears on the asset and liability side of the firm sector balance sheet.

households (E^{HH_F}) or domestic firms ($E^{F\_A\_F}$).[13]

Equations (1)-(4) represent four equations in the four unknown variables (E^{HH_D}, E^{HH_F}, $E^{F\_A\_D}$, $E^{F\_A\_F}$). The equations are nevertheless insufficient to determine the unknowns because the system suffers from a rank-deficiency resulting from an accounting identity: summing equations (3) and (4) and using (1) and (2) to substitute the terms on the r.h.s. of the summed equation, one obtains the identity that the net equity claims of the domestic sectors (HH, GOV and firms) must equal the negative of the net equity claim of the ROW. To identify all variables, one thus needs one additional identifying assumption. We shall consider the following scenarios which span the range of plausible assumptions:

Maximum HH Home Bias: All foreign equity is held by the domestic firm sector ($E^{F\_A\_F} = E^{ROW\_L}$), which amounts to assuming a perfect equity home bias in households' equity portfolio ($E^{HH\_F} = 0$).[14]

Identical Home Bias: Households and firms are equally internationally diversified in their equity positions, i.e., $E^{F\_A\_F}/E^{F\_A\_D} = E^{HH\_A\_F}/E^{HH\_A\_D}$.

Maximum Firm Home Bias All foreign equity is held by domestic households ($E^{F\_A\_F} = E^{ROW\_L}$), which amounts to assuming perfect equity home bias by firms ($E^{F\_A\_F} = 0$).[15]

As our baseline we shall use the 'Identical Home Bias' assumption. Section 3 shows, however, that results regarding the net nominal positions of the HH, GOV and ROW sectors are very similar when entertaining one of the other identifying assumptions instead.

We are now in a position to compute the net nominal exposure of domestic firms per unit of equity issued.[16] Let DNP^F denote the direct net nominal position of the domestic firm sector, i.e., nominal assets minus nominal liabilities of the firm sector balance sheet. DNP^F tends to be negative, as firms issue typically more nominal debt relative to the nominal claims they hold. DNP^F does not include the nominal exposures generated in the domestic firm sector due to the ownership of foreign firms, which are themselves leveraged claims. We therefore add the latter positions.

Let R denote the net nominal claims per unit of equity issued by the domestic firm sector

$$R = \frac{DNP^F}{E^{F\_L} - E^{F\_A\_D}},$$

where $E^{F\_L} - E^{F\_A\_D}$ denotes domestic firm equity issued that is not held by domestic firms themselves. In what follows we will assume that the same nominal exposure ratio R applies to foreign equity held by domestic firms. This appears justified if domestic firms' choice of R

[13] Recall that we assume that the domestic GOV does not to own foreign equities.

[14] For countries in which $E^{ROW\_L} > E^{F\_A}$ we attribute the remaining foreign equity holdings to the houshold sector, i.e., then set $E^{HH\_A\_F} = E^{ROW\_L} - E^{F\_A}$, $E^{F\_A\_D} = 0$ and $E^{F\_A\_F} = E^{F\_A}$.

[15] For countries in which $E^{ROW\_L} > E^{HH\_A}$ we attribute the remaining foreign equity holdings to the firm sector, i.e., then set $E^{F\_A\_F} = E^{ROW\_L} - E^{HH\_A}$, $E^{HH\_A\_D} = 0$ and $E^{HH\_A\_F} = E^{HH\_A}$.

[16] Using $E^{F\_A\_F}/E^{F\_A\_D} = E^{HH\_A\_F}/E^{HH\_A\_D}$ together with equations (1), (2) and (4) it is straightforward to determine (E^{HH_D}, E^{HH_F}, $E^{F\_A\_D}$, $E^{F\_A\_F}$).

reflects the preferences of domestic investors and if domestic firms and households invest abroad on average in firms with the same nominal exposure characteristics.

With this assumption we can compute the net nominal exposure of domestic firms arising from ownership of foreign firms, which equals $R \cdot E^{F\_A\_F}$, so that total net nominal position of the domestic firm sector TNP^F is given by

$$TNP^F = DNP^F + R \cdot E^{F\_A\_F}$$

We then distribute TNP^F to the HH, GOV and the ROW sectors according to their ownership shares E^{HH_D}, E^{GOV} and E^{ROW_A}. Furthermore, we attribute the nominal exposure $E^{HH\_F} \cdot R$ to the HH sector, due to outright ownership of foreign firms by HHs. Within the household sector we distribute the exposures according to the relative ownership shares of equity reported in the HFCS survey.

To preserve symmetry of the nominal balance sheet positions between domestic agents and the ROW, we furthermore need to add the following nominal exposure to the ROW balance sheet, which arises from attributing the exposure from foreign ownership of firms to HH, GOV, and ROW, as described above:

$$-R \cdot \left(E^{F\_A\_F} + E^{HH\_F}\right).$$

Proceeding this way we have incorporated nominal exposures of the firm sector and of foreign equity holdings into the balance sheets of the households, government and the ROW.

2.6 Unexpected Inflation: The Thought Experiment

In the remainder of this paper we will consider the effects of a one-time unexpected increase in the price level by 10%. By this we mean that all nominal prices increase by this amount, i.e., current prices but also all state-contingent future prices. As a result, all relative prices, including future inflation as well as current and future nominal interest rates remain unchanged. Provided the wealth redistributions generated by the price level surprise do not give rise to relative demand shifts, as would be the case, for example, when HHs have identical homothetic preferences, see Chipman (1974), the new state contingent price path remains consistent with equilibrium. Moreover, the present value of firm profits remains unchanged, so that the effects of unexpected price level changes on equity valuations can be captured by the changes in real value of firms' total net nominal position (TNP^F), as determined in the previous section. This holds true whenever equity valuations are frictionless, i.e., reflect the present value of future profits plus the value of firms' net financial claims.

While a 10% price level jump may appear large, especially given the historical experience in the EA, unexpected price level surprises repeatedly occur with smaller magnitudes.[17] The

[17] In practice, movements in the general price level are always accompanied by additional movements in relative prices. We consider purely the redistributive effects of changes in the general price level.

redistributive effects of smaller or larger price level changes can be assessed by proportionally scaling the numbers reported in the present paper for a 10% increase in the price level increase. In particular, when considering a price level decrease instead of an increase, all redistributive effects reverse their sign.

3 Winning and Losing Countries and Sectors

3.1 Baseline Findings

Using the baseline methodology described in the previous sections, table 1 reports the net nominal positions (NNPs) for the Euro Area (EA) as a whole and for all EA countries.[18] The table reports the nominal positions for the three sectors that are the ultimate holders of financial claims (GOV, HH, ROW), where the net position of the ROW is the mirror image of the joint positions reported for the GOV and the HH sectors. The nominal positions are reported once in per capita terms and once scaled by GDP of the considered country or currency area.

A positive NNP in the ROW column in table 1 indicates that the ROW is losing from unexpected price level increases. For the EA, for example, an unexpected price level increase by 10% leads to a real gain of 1080 € per capita (p.c.) at the expense of the ROW.[19] This corresponds to gain of 4.2% of GDP, i.e., a sizable wealth redistribution. Table 1 reveals, however, that the EA gains are distributed unequally within the EA: while domestic governments gain 1860 € p.c., the domestic HH sector is losing 780 € p.c.

Table 1 shows that the governments of all EA countries are winners of unexpected price level increases, except for the government of Luxembourg. The sectoral evidence for Luxemburg must, however, be interpreted with care: due to the large size of the financial sector in Luxembourg, even small margins of errors in the computation of the business sector's total net nominal position (TNP^F) can have considerable effects on the reported outcomes, whenever these are scaled by domestic variables such as domestic population or GDP.[20] In the rest of this section, we therefore ignore the data reported for Luxembourg.[21] Considerable uncertainties also exist regarding the Dutch figures: as we show in the next section, the Dutch sectoral results turn out not to be robust to alternative ways of integrating the HFCS data with the EAA data.[22]

[18] Since HFCS data is not available for Ireland, table 1 reports the EAA data for Ireland, i.e., skipping the EAA-HFCS integration step described in section 2.3. The EA aggregates reported in table 1 are obtained by summing the individual country data after integrating the HFCS into the EAA at the country level (again, for Ireland we use pure EAA data). Very similar results are obtained when instead integrating the HFCS data at the EA level.

[19] This is 10% of the reported ROW EA NNP of 10.8 thousand Euros.

[20] For Luxembourg, the NNP of the ROW before accounting for firm ownerwhip is -1.1 trn €. After incorporating firm ownership, this number shrinks to -17 bln €, which is large relative to population size, but small relative to the initial position and in absolute terms.

[21] These problems do not affect the distributional information obtained from HFCS data for Luxembourg, as reported later on.

[22] This is due to the fact that in the Netherlands there exists a large and asymmetric discrepancy between HFCS aggregates and EAA aggregates: for financial assets the HFCS/EAA coverage ratio is only 0.33, while the ratio equals 0.92 for financial liabilities. This asymmetry could be due to a variety of reasons: interest payments on mortgage debt are tax deductable in the Netherlands, thus have been declared to authorities before; tax deductability may cause debt to be very stable over time and thus mentally easier to recall; the Netherlands

The same applies for the results reported for Cyprus in table 1.[23] We shall thus also ignore the outcome for the Dutch and Cypriot data in rest of this section.

	NNP per capita			**NNP/GDP**		
	GOV	*HH*	*ROW*	*GOV*	*HH*	*ROW*
	(thousands of Euros)					
Euro Area	**-18.6**	**7.8**	**10.8**	**-0.73**	**0.30**	**0.42**
Austria	-21.7	11.6	10.1	-0.70	0.37	0.32
Belgium	-27.6	40.8	-13.2	-0.93	1.37	-0.44
Cyprus*	-9.9	-7.2	17.0	-0.52	-0.38	0.89
Finland	-3.0	-8.4	11.3	-0.10	-0.27	0.37
France	-22.3	10.6	11.7	-0.81	0.39	0.43
Germany	-17.4	15.3	2.2	-0.60	0.53	0.08
Greece	-22.9	-1.2	24.1	-1.34	-0.07	1.41
Ireland	-19.2	21.8	-2.6	-0.54	0.61	-0.07
Italy	-23.2	8.1	15.1	-0.99	0.35	0.64
Luxembourg*	22.7	12.0	-34.7	0.35	0.18	-0.53
Malta	-8.3	20.1	-11.8	-0.63	1.52	-0.89
Netherlands*	-16.5	-9.5	25.9	-0.50	-0.29	0.78
Portugal	-13.1	-0.2	13.3	-0.88	-0.01	0.89
Slovakia	-4.8	2.2	2.6	-0.54	0.24	0.29
Slovenia	-8.6	2.9	5.7	-0.56	0.19	0.37
Spain	-12.4	-6.7	19.1	-0.60	-0.32	0.93

* country result not robust to HFCS-EAA integration approach

Table 1: Net nominal position (NNP), baseline results

Table 1 reveals that most EA countries gain from the ROW following unexpected price level increases. The five largest winners are the so-called GIPS countries, with Greece winning 2410€ p.c. from a 10% price level increase, Spain winning 1910 €, Cyprus 1700 €, Italy 1510 € and Portugal 1330 € (all in p.c. terms). Two countries turn out to be net losers of inflation, with Belgium losing 1320 € p.c. and Malta losing 1180 € p.c.. In both countries this is due to the large amount of nominal claims accumulated in the HH sector. Some of the countries, e.g., Germany, Ireland, and Slovakia, remain in the aggregate largely unaffected by unexpected price level changes (although considerable wealth redistribution occurs within these countries); the remaining countries are moderate to medium-sized winners, with gains ranging from 560 € p.c.

is the only country that carried out the HFCS using computer assisted web interviews, i.e., without relying on personal contact with an interviewer, which may affect the informational content of Dutch HFCS data.

[23] As with Dutch data, see footnote 22, the Cypriot data displays a considerable asymmetry between HFCS and EAA aggregates: the former cover only 37% of EAA assets, but 87% of EAA liabilities.

(Slovenia) to 1170 € p.c. (France).

For the HH sector there exists considerable heterogeneity across EA countries. In some countries, the HH sector is even a net winner of inflation. For the considered 10% unexpected price level increase, HHs gain 840 € p.c. in Finland, 670 € in Spain, 120 € in Greece and 20 € in Portugal (all in p.c. terms). The HH sector is a net loser in all other countries, with the three largest losers being HHs in Belgium (-4080 € p.c.), Ireland (-2180 € p.c.) and Malta (-2010 € p.c.). In the remaining countries, the HH sector loses approximately in line with the per capita losses experienced for the EA as whole (-780 € p.c.).

	Maximum HH Home Bias			Maximum Firm Home Bias		
	GOV	*HH*	*ROW*	*GOV*	*HH*	*ROW*
	(thousands of Euros)			(thousands of Euros)		
Euro Area	**-18.6**	**7.5**	**11.1**	**-18.7**	**8.4**	**10.3**
Austria	-21.8	12.2	9.5	-21.7	10.5	11.1
Belgium	-27.6	38.2	-10.6	-27.8	45.5	-17.7
Cyprus*	-9.9	-7.6	17.4	-9.9	-6.8	16.6
Finland	-3.0	-8.2	11.2	-2.9	-8.5	11.4
France	-22.3	10.3	11.9	-22.4	12.1	10.3
Germany	-17.4	14.4	3.0	-17.6	17.5	0.1
Greece	-22.9	-1.0	24.0	-22.9	-1.3	24.2
Ireland	-19.2	19.1	0.1	-19.2	22.5	-3.3
Italy	-23.2	7.9	15.3	-23.2	8.8	14.5
Luxembourg*	22.8	7.5	-30.2	22.7	13.0	-35.6
Malta	-8.3	19.5	-11.2	-8.4	21.0	-12.7
Netherlands*	-16.5	-10.0	26.5	-16.5	-9.3	25.7
Portugal	-13.1	-0.1	13.2	-13.0	-0.9	13.9
Slovakia	-4.8	2.2	2.6	-4.8	2.2	2.6
Slovenia	-8.7	3.0	5.6	-8.4	2.4	6.0
Spain	-12.5	-5.6	18.1	-12.2	-10.1	22.3

* country result not robust to HFCS-EAA integration approach

Table 2: NNP per capita, alternative ownership assumptions

3.2 Robustness Analysis

This section documents that most of the findings reported in the previous section turn out to be robust to entertaining a range of alternative assumptions.

Table 2 below evaluates the effects of alternative ownership assumptions regarding foreign

equity. Our baseline approach assumes that firms and households hold equal portfolio shares of foreign equities, see section 2.5. The columns titled 'Maximum HH Home Bias' in table 2 assume instead that foreign equity is held by domestic firms, while the columns titled 'Maximum Firm Home Bias' explore the implications of assuming that foreign equity is held by the HH sector. Table 2 reveals that the findings previously reported in table 1 turn out to be very stable with respect to making alternative foreign ownership assumptions. The Spearman rank correlation coefficient for the three sectors and the 16 countries between the baseline results in table 1 and those reported in table 2 is above 0.99, for each of the two considered alternative ownership assumptions.

	GOV	*HH*	*ROW*
	(thousands of Euros)		
Euro Area	**-22.2**	**14.2**	**8.0**
Austria	-23.5	14.9	8.6
Belgium	-28.7	53.1	-24.4
Cyprus	-13.1	7.1	5.8
Finland	-7.3	-3.4	10.7
France	-27.0	18.0	9.0
Germany	-20.2	19.3	0.9
Greece	-27.7	4.2	23.5
Ireland	-19.2	21.8	-2.6
Italy	-30.0	11.7	18.3
Luxembourg	22.5	62.2	-84.7
Malta	-8.8	22.4	-13.6
Netherlands	-21.7	34.8	-13.1
Portugal	-15.1	4.5	10.6
Slovakia	-5.3	3.7	1.6
Slovenia	-8.8	2.4	6.4
Spain	-13.1	-6.2	19.3

Table 3: NNP per capita, alternative HFCS-EAA integration approach

Next, we explore the effects of an alternative approach for integrating HFCS data into the EAA. The baseline approach, described in section 2.3, consists of reconciling differences in HFCS and EAA aggregates by adjusting the EAA counterparts of HFCS positions, in line with the approach in Doepke and Schneider (2006). We now explore the effects of pursuing the opposite strategy, i.e., rescaling HFCS positions to match the EAA aggregates.[24] Table 3 below reports the outcomes of this approach. Along the dimensions emphasized in the previous section, results

[24] For the sectoral outcomes reported in table 3, this delivers the same results as when using EAA data only.

are fairly similar to those reported in table 1. In particular, Greece, Spain, and Italy continue to be the countries winning most from unexpected inflation, but Finland now just overtakes Portugal in terms of per capita gains. The results for Cyprus, Luxembourg and the Netherlands change significantly relative to table 1, justifying our caution in interpreting the findings for these countries reported in table 1. Abstracting from these countries, it continues to be true that Malta and Belgium are the biggest losers of unexpected inflation. For the remaining countries, the most important effect of the alternative integration approach consists of an increase in the HH sector NNP and - correspondingly - a decrease in the ROW NNP. Despite these differences, the Spearman rank correlation coefficient for the three sectors and the 16 considered countries between the baseline results in table 1 and those displayed in table 3 remains high and equal to 0.86, indicating that results in terms of countries' relative ranking reported in table 1 are rather robust to the considered alternative integration approach.

4 Winning and Losing Households

This section analyzes the redistributive effects of unexpected inflation at the level of individual HHs. It documents the distribution of inflation exposures in the EA and in individual EA countries, analyzes the HH characteristics associated with different inflation exposures and compares inflation exposures across different age cohorts and social classes. Section 4.1 compares the EA results to those previously documented for the United States and Canada. Section 4.2 presents detailed results across age cohorts and social classes for individual EA countries.

Using the HFCS data and the methods described in section 2.5, we can compute the net nominal position (NNP) of each HH in the survey. Using the same data allows computing each HH's net wealth (NW) position. Provided net wealth is positive, the ratio of the net nominal position over net wealth (NNP/NW) captures the household's exposure to unexpected moves in inflation per unit of wealth owned: a NNP to NW ratio of 0.5, for example, indicates that the HH suffers a 5% net wealth loss form an unexpected 10% increase in the price level. Conversely, a ratio of -0.5 indicates a 5% net wealth gain due to this price level adjustment. Since households cannot effectively short real assets, we have NNP$\leq$NW and thus NNP/NW$\leq$ 1, whenever the HH has positive NW.

Figure 1 depicts the distribution of inflation exposures (NNP/NW) for all HHs with a positive NW position.[25] It presents results for the Euro Area as a whole (top left panel), as well as for individual EA countries.[26] The figure abstracts from all EA household with a negative NW position (approximately 6% of all HHs), which will be discussed further below.[27]

The exposure distribution for the EA displays a peak around the zero exposure point:

[25] The distributions are computed using populations weights from the HFCS.

[26] The EA distribution in figure 1 is obtained by aggregating the individual distributions shown in the figure. Since HFCS data is not available for Ireland, the EA aggregate does not included Irish HHs, which should have a quantitatively small effect on the aggregate EA distribution.

[27] The figure also truncates the distribution below -1, thereby eliminating large negative NNP/NW positions resulting from NW position close to zero. The exluded share of HHs is negligible.

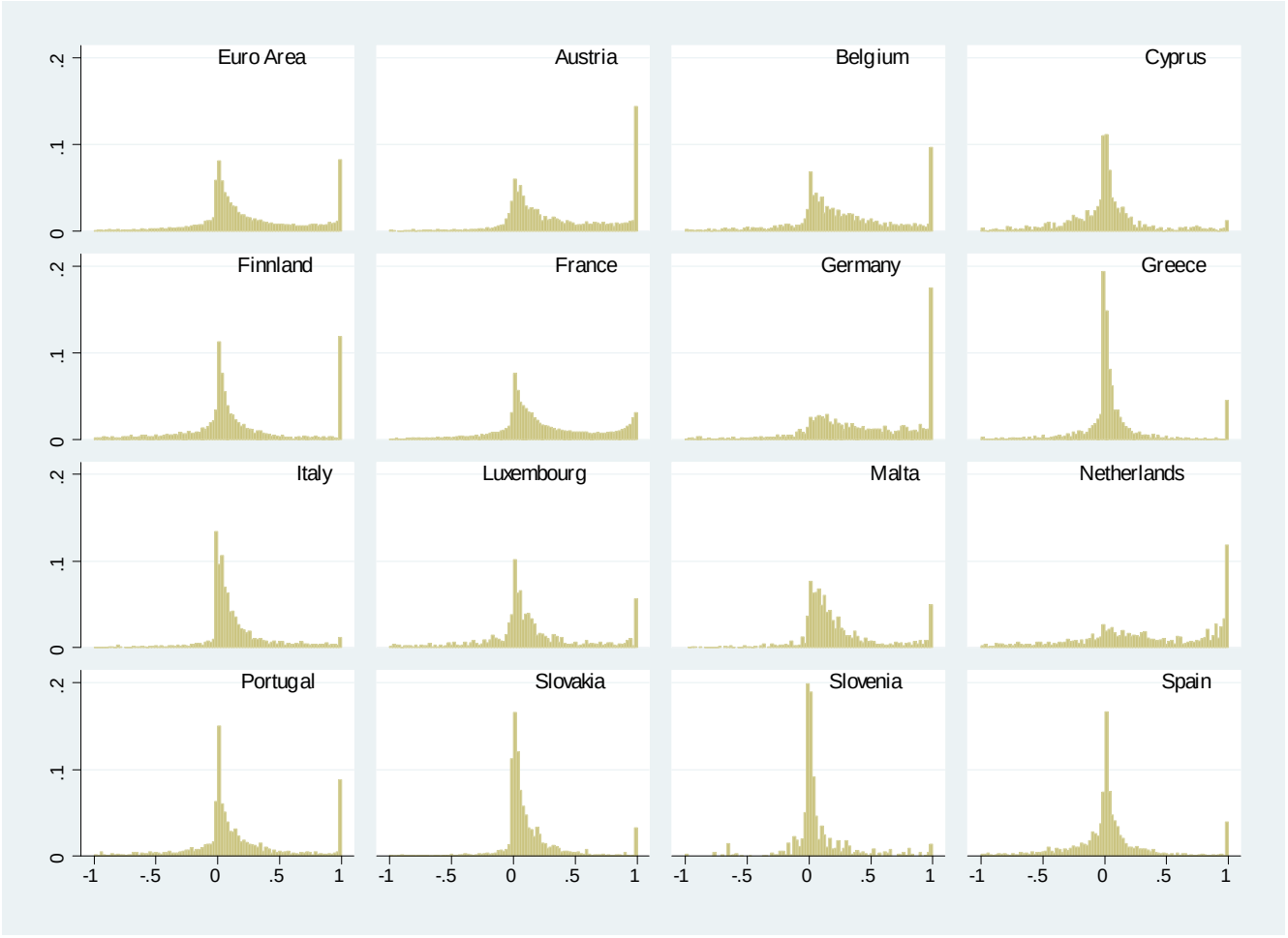

Figure 1: Empirical distribution of inflation exposures (NNP/NW) in the HH sector

about 21% of all EA HHs have virtually no inflation exposure, when defined as $NNP/NW \in [-0.05, 0.05[$. There is a thin tail to the left of this peak, consisting of about 15% of all EA HHs, which are net borrowers ($NNP/NW < -0.05$). To the right of the zero exposure position, the density first decays but later on an increases as inflation exposure rises: approximately 35% of all EA HHs are holding predominately real assets ($NNP/NW \in [0.05, 0.5[$), with a further 14% holding predominately nominal assets ($NNP/NW \in [0.5, 0.95[$). A substantial 9% of HHs are bunched at the right end of the distribution and hold almost only nominal assets ($NW/NNP \in [0.95, 1]$).

The panels for the individual countries depicted in figure 1 show that the pattern documented for the EA as a whole exists in similar form in all EA member countries, albeit important differences exist. The share of HHs holding almost only nominal assets ($NNP/NW \in [0.95, 1]$) is particularly pronounced in some of the EA 'core' countries, reaching 17% in Germany, 15% in Austria, 13% in the Netherlands, and 11% in Finland. It is lowest in some of the current crisis countries, i.e., Cyprus (2%), Italy (2%), Greece (4%) and Spain(4%), as well as in the former transition countries Slovenia (2%) and Slovakia (3%). Furthermore, the latter two countries display a high peak around the zero exposure point, with many HHs holding virtually no inflation exposure (53% in Slovenia, 43% in Slovakia). The next highest values in this category are achieved by the crisis countries, with Greece reaching 45%, Spain and Italy both 36% and Portugal 30%. The lowest HH shares with virtually no inflation exposure are found in Germany and the Netherlands (both 7%), followed with a distance by Belgium (15%) and Austria (16%).

Table 4 below presents a number of summary statistics for EA HHs with different inflation exposures. For each HH group, table 4 reports the medium age of the HH head, the average education attained by the HH head, where education levels are discretely coded between zero (no formal education) and seven (second stage tertiary education) using the definitions of the International Standard Classification of Education (ISCED 1997)[28], the share of HHs owning real estate, the median income, the medium net wealth level and the number of HHs in the respective group.[29] For benchmark purposes, the first row in table 4 reports the characteristics when considering all EA HHs.

Table 4 reveals that HHs with negative net worth tend to be comparatively young, tend to have relatively low education levels and low income, and rarely own a house. The median net wealth position, however, is only moderately negative.[30] Nevertheless, the group of HHs with negative NW is sizable and consists of 7.7m HHs in the EA.

As table 4 shows, borrowing HHs, HHs with no inflation exposure and HHs holding predominantly holding real assets are all relatively rich and are to a vast majority real estate owners. Together, these three HH groups account for 71% of all EA HHs. Borrowing HHs thereby

[28] The coding used is as follows: 0 - no formal education or below 1; 1 - primary education; 2 - lower secondary or second stage of basic education; 3 - upper secondary; 4 - post-secondary; 5 - first stage tertiary; 6 - second stage tertiary education.

[29] The latter is computed using the population weights from the HFCS.

[30] Further investigation shows that most of these HHs tend to have a NNP/NW of close to one, indicating that their negative net wealth is approximately equal to their net nominal position (with both being negative).

have lower wealth levels than the other two groups, but the highest median income and mean education level of all HH groups. Borrowing HHs are also considerably younger. Households holding predominantly or almost exclusively nominal assets are considerably poorer: their median wealth level remains below 20% of the median net wealth levels reported for the other HH groups holding positive wealth. Their income is also lower, although some of these HHs are well-educated. HHs with predominantly nominal assets also rarely own a house.

The patterns documented for the EA in table 4 are similarly present at the country level, albeit some important differences exists. The share of HHs with negative NW, for example, varies considerably across EA countries, reaching 12% in Finland and being as low as 1% in Slovakia. Appendix B reports for each individual EA country the numbers displayed in table 4 for the EA as a whole.

Euro Area	Median Age	Mean Edu	Share of Home Owners	Median Income (thou €)	Median Net Wealth (thou €)	# of HHs (mln)	HH share
All households	53	2.9	59%	28.1	125.0	130.9	100%
Negative net worth	41	2.9	13%	20.6	-3.4	7.7	6%
Borrower	45	3.3	87%	37.9	173.2	19.1	15%
Almost no exposure	58	2.5	86%	23.0	201.2	28.1	21%
Pred. real assets	58	3.0	74%	32.4	217.6	45.7	35%
Pred. nominal assets	48	3.1	10%	28.7	30.3	18.7	14%
Almost only nom. assets	50	2.9	0%	17.9	7.3	11.6	9%

Table 4: Inflation exposure and HH characteristics

4.1 Comparison with US and Canadian Data

We now document HHs' nominal exposures across age cohorts and broad social classes, comparing results to those documented for the U.S. by Doepke and Schneider (2006) and for Canada by Meh and Terajima (2008).

Following this earlier work, we define - for any considered age cohort - 'Rich HHs' as those within the top 10% of the cohort NW distribution. The remaining HHs of the cohort are then sorted by income into two additional groups, labeled 'Middle Class' (70% of the total population) and 'Poor HHs' (20% of all HHs, at the bottom of the income distribution of all non-rich HHs). For every cohort, we compute the average NNP and normalize it by average cohort NW. The resulting measure can be interpreted as the inflation exposure of the representative or average household within the considered cohort.

Table 5a documents results for the EA. It expresses the average NNP over average NW in

percentage points and shows that young middle class HHs in the EA are on average considerably indebted, while rich and poor HHs of the youngest two cohorts have a close to zero exposure. As HHs become older, their inflation exposure increases stronger than NW, with the highest age cohorts reaching the highest exposure. The results for the U.S. and Canada are quantitatively very similar, when considering the cohort results for all social classes together (listed in the row labeled 'Total' in Table 5a). The main quantitative difference to the EA is that older HHs in the U.S. and Canada hold in relative terms a 50% higher inflation exposure.

More noticeable differences emerge when comparing different social classes. In the U.S. and Canada young poor HHs have a considerably negative inflation exposure, indicating their ability to borrow against future income, while the young poor cohorts in the EA have a close to zero exposure on average. As we shall see in the next section, there exists considerable heterogeneity across young poor cohorts across EA countries.

		Age cohort					
		≤ 34	$35-44$	$45-54$	$55-64$	$65-74$	>74
EA	Rich HHs	-1.5	5.5	10.3	13.9	12.3	20.7
	Middle Class	-80.4	-15.3	1.0	9.6	13.7	22.8
	Poor HHs	1.0	-4.2	9.4	14.5	12.4	15.5
	Total	-48.3	-11.6	3.1	11.0	13.2	19.3
US	Rich HHs	-14.0	3.8	6.6	16.3	16.7	27.5
	Middle Class	-114.0	-31.6	-4.8	14.0	25.2	38.1
	Poor HHs	-36.6	-33.8	-5.5	7.5	17.5	26.4
	Total	-42.6	-10.1	2.3	15.2	19.4	30.6
CA	Rich HHs	-2.7	2.2	16.4	17.5	27.5	29.8
	Middle Class	-89.4	-26.5	11.4	26.0	29.4	33.9
	Poor HHs	-52.1	-27.1	-3.3	20.7	14.2	23.8
	Total	-35.8	-11.2	13.1	22.1	27.9	31.9

Table 5a: Inflation exposure (NNP/NW, % points) across age cohorts

4.2 Results for Individual EA Countries

Table 5b provides detailed information about inflation exposures across age cohorts and social classes for individual EA countries. It shows that the EA figures reported in table 5a mask a considerable amount of cross-country heterogeneity.

While the overall inflation exposure of young poor HHs in the EA is approximately zero, young poor HHs in the Netherlands, Finland, Belgium, Luxembourg, Spain and Portugal hold considerably negative exposures. Yet, these HH categories typically hold sizable positive exposures in Germany, Malta, Slovenia and France. Borrowing of young low-income HHs thus displays considerable variation across EA countries, which overall gives rise to the zero exposure

documented in the previous section.

There exists also a considerable degree of heterogeneity with respect to the inflation exposure of old rich HHs. Their exposure is highest in Belgium, France, the Netherlands and Slovenia, sometimes reaching values close to 50%. It is lowest in Spain, Cyprus and Greece where even old rich HHs often have a close to zero exposure to price level risk.

Table 5b: Inflation exposure (NNP/NW, % points) across age cohorts

	Age cohort					
	<= 34	35-44	45-54	55-64	65-74	> 74
Austria						
Rich HHs	-1.42	0.61	6.16	6.93	13.71	13.09
Middle Class	-17.87	-4.44	13.90	17.54	15.57	21.89
Poor HHs	-4.95	-1.78	13.75	14.85	15.08	15.00
Total	-12.42	-3.55	13.11	15.82	15.24	18.38
Belgium						
Rich HHs	3.59	30.55	42.42	47.61	40.90	49.02
Middle Class	-37.75	-1.56	14.49	26.33	26.00	27.99
Poor HHs	-55.74	4.86	18.83	18.21	11.73	22.02
Total	-39.37	2.67	17.81	26.50	23.06	27.79
Cyprus						
Rich HHs	-1.20	3.02	2.23	5.08	6.45	3.76
Middle Class	-27.56	-18.60	-7.98	-0.49	5.53	14.46
Poor HHs	-21.74	-3.30	-21.24	2.74	5.40	7.90
Total	-24.43	-13.91	-8.48	0.51	5.56	8.67
Finland						
Rich HHs	-27.01	-6.78	-1.79	4.50	9.04	4.90
Middle Class	-341.34	-57.18	-25.21	0.77	6.52	9.70
Poor HHs	-90.07	-36.40	-8.31	3.90	12.77	12.66
Total	-243.32	-50.04	-20.49	1.77	8.90	10.79
France						
Rich HHs	-0.62	4.51	9.05	18.15	21.89	38.01
Middle Class	-67.98	-21.00	-0.20	11.70	16.43	23.54
Poor HHs	10.32	-5.71	3.29	6.71	13.14	15.89
Total	-37.11	-16.37	1.26	11.27	16.09	21.75
Germany						
Rich HHs	5.69	14.67	17.98	15.68	13.53	17.34
Middle Class	8.48	-4.91	8.13	14.48	18.95	31.58

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Table 5b – continued from previous page

	Age cohort					
	<= 34	35-44	45-54	55-64	65-74	> 74
Poor HHs	30.83	11.74	30.36	37.49	23.31	31.33
Total	17.00	-0.63	12.04	19.36	19.56	30.09
Greece						
Rich HHs	-1.11	0.01	2.81	4.38	3.24	5.54
Middle Class	-23.94	-10.56	-6.47	-3.52	1.96	8.59
Poor HHs	-4.72	-15.60	-4.77	-2.13	4.83	2.45
Total	-15.55	-10.08	-5.41	-2.49	3.13	5.02
Italy						
Rich HHs	1.98	2.81	7.51	10.80	8.17	13.66
Middle Class	-10.77	0.03	3.39	9.31	9.86	14.82
Poor HHs	-7.55	1.05	-0.51	5.83	7.13	6.80
Total	-8.68	0.48	3.29	8.96	8.82	10.58
Luxembourg						
Rich HHs	-2.28	7.37	9.35	12.52	8.19	18.07
Middle Class	-81.95	-22.68	-0.30	8.75	9.12	15.97
Poor HHs	-51.30	-9.91	-3.83	4.32	6.97	7.24
Total	-66.68	-16.96	-0.19	8.32	8.40	12.63
Malta						
Rich HHs	5.68	10.38	15.67	19.18	15.29	16.30
Middle Class	3.28	4.13	16.29	20.07	13.81	24.06
Poor HHs	16.28	3.37	25.20	14.62	19.22	16.07
Total	5.02	4.62	17.29	18.84	16.24	18.46
Netherlands						
Rich HHs	-45.67	12.60	14.18	23.82	14.29	48.00
Middle Class	-774.80	-77.02	-26.34	0.94	6.49	22.81
Poor HHs	-242.55	-35.12	-3.11	3.36	7.86	37.01
Total	-598.89	-60.13	-17.77	3.72	7.74	29.96
Portugal						
Rich HHs	-15.18	-4.44	2.27	5.60	4.71	13.67
Middle Class	-50.43	-31.10	-6.47	4.82	13.61	15.29
Poor HHs	-37.00	-21.70	-1.32	5.47	11.64	14.29
Total	-44.49	-27.22	-4.76	5.05	12.07	14.62
Slovakia						
Rich HHs	7.86	4.66	7.96	10.96	14.24	7.52
Middle Class	-7.15	5.55	9.92	10.86	6.17	4.43

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Table 5b – continued from previous page

	Age cohort					
	<= 34	35-44	45-54	55-64	65-74	> 74
Poor HHs	-4.85	3.70	6.54	8.37	5.82	5.35
Total	-5.22	5.20	9.31	10.27	6.76	5.18
Slovenia						
Rich HHs	-0.27	3.42	6.41	22.21	1.56	30.26
Middle Class	2.05	3.95	1.57	5.48	3.20	5.83
Poor HHs	10.17	-7.70	-3.57	0.60	1.09	2.83
Total	2.84	2.02	0.73	5.91	2.29	6.73
Spain						
Rich HHs	-4.08	-10.27	-5.23	-1.04	-0.64	2.15
Middle Class	-62.69	-23.34	-6.44	0.82	3.23	9.34
Poor HHs	-25.82	-19.07	-0.05	2.94	4.88	6.33
Total	-51.60	-21.50	-5.46	1.03	3.54	6.71

5 Inflation Tax, Wealth Tax and Inequality

This section explores the effects of an unexpected price level increase for wealth inequality, using the Gini coefficient for the HH net wealth distribution as inequality measure. It considers the EA as a whole, as well as individual EA countries and also compares the effects of the inflation tax to that of a revenue-equivalent proportional wealth tax.

Table 6 below reports the Gini coefficient of the observed net wealth (NW) distribution (second column), the Gini coefficient after an unexpected 10% price level increase (third column), as well as the associated percentage change in the Gini coefficient (fourth column).

Table 6 reveals that net wealth inequality is highest in Austria and Germany and lowest in Slovakia and Slovenia. The results for the EA furthermore show that surprise inflation decreases net wealth inequality for the EA as a whole. The same is true for all individual EA countries, except for Austria, Germany and Malta, where unexpected inflation increases wealth inequality. In the latter countries, the young middle class cohorts are on net no or only very moderate borrowers, see table 5a. As a result, the young cohorts, which tend to be poorer in terms of accumulated net wealth (although not necessarily in terms of their expected present value of income), gain considerably less from surprise increases in the price level. Inequality therefore slightly increases following surprise inflation. Indeed, the Spearman rank correlation across countries between the changes in the Gini coefficient reported in table 6 and the average of the inflation exposures (NNP/NW) of the youngest two middle class age cohorts reported in table 5a is equal to 0.817 and statistically significantly at the 1% significance level.

The fact that the inflation tax affects the Gini coefficient of the EA net wealth distribution in the same direction as a progressive net wealth tax may appear surprising. The existing theo-

retical literature, e.g., Erosa and Ventura (2002), typically emphasizes the regressive nature of the inflation tax when restricting consideration to nominal balances held for transaction purposes. Our results show that this fails to be the case when considering the effects of unexpected inflation for the real value of nominal claims and liabilities more generally.

The last column in table 6 reports the proportional net wealth tax (in percentage points) that raises the same amount of government revenue as implied by the 10% surprise increase in the price level.[31] It shows that the revenue equivalent wealth tax is much smaller than the inflation tax.[32] This is obtained, even though the wealth tax applies to domestic HHs, i.e., unlike the inflation tax, falls short of taxing foreign wealth and emerges because HH net wealth comprises a comparatively large amount of real assets, which remains untaxed with an inflation tax.

	Gini pre inflation	Gini post inflation	Δ Gini (%)	Rev.-equivalent wealth tax (%)
Euro Area	0.652	0.650	-0.30	1.64
Austria	0.732	0.733	+0.21	1.70
Belgium	0.598	0.591	-1.21	1.80
Cyprus	0.685	0.682	-0.40	0.41
Finland	0.602	0.596	-1.02	0.37
France	0.664	0.661	-0.47	2.10
Germany	0.719	0.720	+0.04	1.73
Greece	0.546	0.544	-0.46	4.08
Italy	0.601	0.600	-0.13	2.09
Luxembourg	0.641	0.636	-0.70	-0.78
Malta	0.593	0.593	+0.02	0.64
Netherlands	0.545	0.537	-1.44	2.02
Portugal	0.658	0.654	-0.46	2.29
Slovakia	0.439	0.438	-0.28	1.64
Slovenia	0.525	0.523	-0.29	1.42
Spain	0.561	0.558	-0.52	1.11

Table 6: Effects on NW inequality (10% price level increase)

6 Inflation Exposure and Inflation Experience

This section documents that the cross-sectional distribution of HH inflation exposures, reported previously in figure 1, covaries in interesting ways with past inflation experience. To document

[31] We assume that HHs with a positive NW position are taxed, but that HHs with a negative NW position are not subsidized when levying the wealth tax.

[32] It is even negative for the case of Luxembourg, where the government holds a positive net nominal position, see table 1. The caveats expressed in section 3 apply to this result.

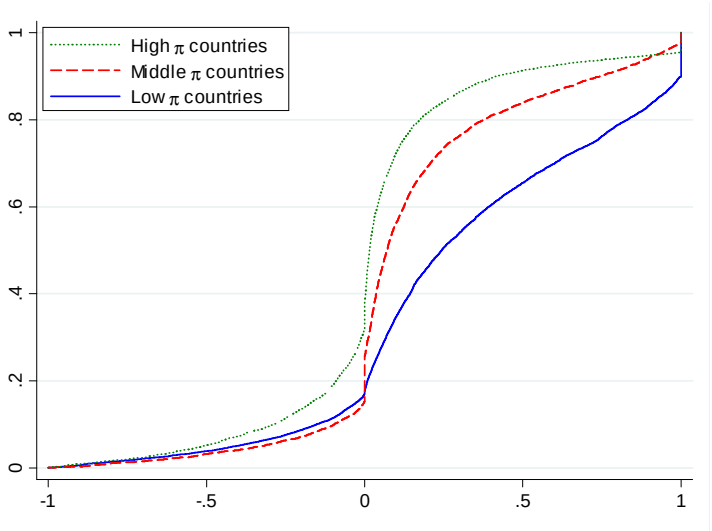

Figure 2: Inflation Exposures of all HHs (CDF over NNP/NW)

this relationship, we rank all EA countries according to the average HICP inflation rate experienced since inception of the EA and then form three equally sized country groups: a high inflation group, a middle inflation group, and a low inflation group.[33,34]

Figure 2 depicts the cumulative density functions (CDFs) for HH inflation exposures (NNP/NW, on the x-axis) for all three country groups.[35] The figure shows that the CDF in high inflation countries first order stochastically dominates the CDFs of the other groups, illustrating that HHs in high inflation countries have lower inflation exposure. A similar, albeit less clear picture emerges when comparing the middle inflation group to the low inflation group. The CDFs are similar for negative NNP positions, but HHs in the low inflation group hold a slightly more negative inflation exposure, despite inflation being lower than in the middle inflation group. As we shall argue below, this may have to do with differential access to credit in the low and middle inflation groups, as a negative NNP position can only be achieved by borrowing. Despite this fact, the CDF for the middle inflation group dominates that for the low inflation group when inflation exposure is positive. Indeed, for the middle inflation group inflation exposures are much more heavily concentrated at zero. This shows that in low inflation countries, HHs are less concerned about holding large part of net wealth in nominal assets, when compared to middle or high inflation EA countries.

Figure 3 depicts the CDF for the subpopulation of house owners that hold a mortgage. This group has - by definition - access to credit. The figure shows that the CDF of high inflation

[33] Each group comprises 5 countries; the high inflation group consists of Greece, Portugal, Slovakia, Slovenia and Spain; the middle inflation group comprises Cyprus, Italy, Luxembourg, Malta and the Netherlands; the low inflation group is composed of Austria, Belgium, Germany, Finnland and France.

[34] Forming instead five groups that comprise three countries each, delivers very similar results. Similarly, using average inflation rates that extend further back, say to 1990, leads to very similar outcomes.

[35] In line with the results reported in figure 1, we exclude HHs with a negative NW from the analysis, due to the discontinuity that negative NW creates for the inflation exposure measure (NNP/NW). We also cut-off the distribution below -1 to exclude HHs with NW very close to zero.

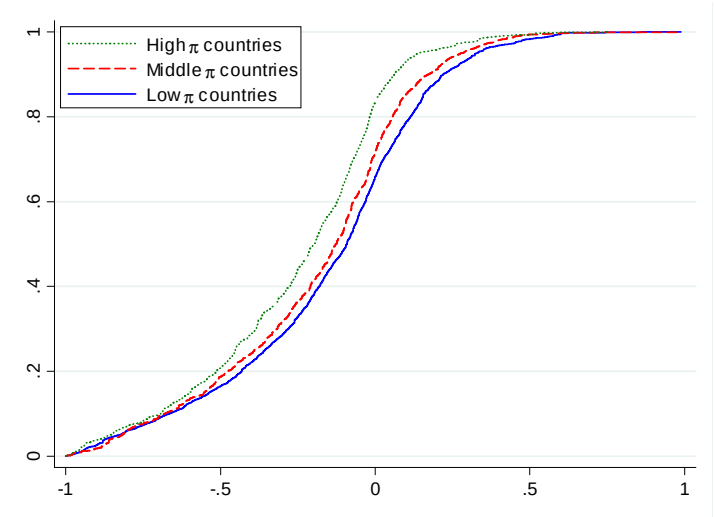

Figure 3: Inflation Exposure, Homeowners with Mortgage (CDF over NNP/NW)

countries stochastically dominates that of middle inflation countries, which in turn stochastically dominates that of low inflation countries. Past inflation rates thus strongly correlate with inflation exposures, with higher inflation rates being associated with more borrowing and less accumulation of nominal claims.[36]

Table 7 provides further evidence for individual countries and various HH subpopulations. The table reports the outcome of regressing HHs' inflation exposure (NNP/NW) on log net worth (NW), thus illustrates the marginal effects of NW on inflation exposure in the cross-section.[37] The estimates are provided for outright homeowners (second column), homeowners with a mortgage (third column), renting HHs (forth column) and for all HHs jointly (last column). The table shows that for outright owners there exists a weak positive cross-sectional tendency to increase inflation exposure as NW increases. This tendency is very strong for owners holding a mortgage, presumably because repayment of mortgages is a key channel of NW accumulation for these HHs. For renters, however, there is a tendency to reduce inflation exposure as NW increases.

The second to last row in table 7 reports the Spearman rank correlation between the reported estimates and the country's HICP inflation experience since inception of the EA. It shows that the rank correlation is negative and statistically significant, except for the case of homeowners with a mortgage, where the correlation turns out to be insignificant at conventional significant levels. These results highlight that there again exists a systematic relationship between past inflation experience and the cross sectional distribution of NNPs: HHs in high inflation countries

[36] Appendix C reports the CDFs for the remaining subgroups (outright homeowners without a mortgage and renters). Similar findings regarding the relative ordering across inflation groups can be observed for these subpopulations.

[37] As with figure 1, we only consider HHs with positive NW and NNP/NW>-1. Each column of the table reports the outcome of a pooled regression of NNP/NW on a constant, the interaction between a country dummy and log NW, and a number of HH control variables (log HH income, education dummies and age group dummies). The coefficient reported in table 7 is the one pertaining to the interaction between the country dummy and log NW.

are in the cross-section less likely to increase inflation exposures as NW increases (renting HHs tend to decrease inflation exposures faster as NW increases in high inflation EA countries).

Understanding further the economic forces creating the systematic relationship between HHs' inflation exposures and inflation experience appears to be of considerable interest, but is beyond the scope of the present paper

	Outright homeowners	Homeowners with mortgage	Renters	All HHs
Austria	0.012***	0.182***	-0.020***	-0.091***
Belgium	0.018***	0.187***	-0.016***	-0.091***
Cyprus	0.005	0.168***	-0.054***	-0.106***
Finland	0.010***	0.176***	-0.030***	-0.098***
France	0.006	0.175***	-0.046***	-0.108***
Germany	0.017***	0.182***	-0.013***	-0.087***
Greece	0.006	0.174***	-0.058***	-0.112***
Italy	0.009**	0.173***	-0.042***	-0.100***
Luxembourg	0.009**	0.168***	-0.030***	-0.096***
Malta	0.015***	0.185***	-0.015***	-0.09***
Netherlands	0.017***	0.175***	-0.004	-0.091***
Portugal	0.011***	0.178***	-0.033***	-0.107***
Slovakia	0.013***	0.191***	-0.024***	-0.109***
Slovenia	0.007*	0.192***	-0.046***	-0.109***
Spain	0.009**	0.174***	-0.031***	-0.109***

*/**/*** indicates significance at 10%/5%/1% level

Spearman rank correlation with HICP inflation				
correlation	-0.45	0.13	-0.55	-0.60
p-value	0.09	0.66	0.04	0.02

Table 7: NNP elasticity w.r.t. NW and inflation experience

7 Conclusions and Outlook

We document that quantitatively important redistributive effects are associated with unexpected price level movements in the Euro area (EA). While the EA as whole is a sizable net winner of unexpected inflation, these gains are unevenly distributed across countries, with some countries winning well above average and others even losing in net terms. The gains are also unevenly distributed across the household (HH) and government sectors, with the former typically being a loser and the latter being a winner of price level increases. Within the HH sector,

gains and losses are also fairly unevenly distributed: rich older HHs turn out to be the largest losers and young middle class HHs the largest winners of unexpected inflation.

Since risk averse households dislike wealth redistribution risk, the present findings highlight that achieving price stability in the EA can contribute in important ways to HH welfare.

Overall, the heterogeneity of HHs' inflation exposure across EA countries, documented in the present study, highlights the need to understand further what motivates HHs to choose certain net nominal positions. Why are HHs in some countries, say rich older HHs in Belgium, so much more exposed to inflation than their counterpart in Spain, which hold virtually no inflation exposure? Understanding these and related questions appears important and requires additional structural modeling efforts.

A Integrating Survey Data and Financial Accounts

We compute NNPs in the EAA using the following financial variables (variable names and variable codes are as defined in ESA95(1995)): Currency and deposits (F2), Short-term debt securities (F331) Long-term debt securities (F332), Short-term loans (F41), Long-term loans (F42), Quoted shares (F511), Unquoted shares and other equity (F51M), Mutual funds shares (F52), Net equity of households in life insurance reserves and in pension funds reserves (F61), Prepayments of insurance premiums and reserves for outstanding claims (F62), Other accounts receivable and financial derivatives (F7+F34). We derive the DNP of a sector using all of these variable, except for F511, F51M and F52. The INP of a sector is computed using the DNP of the firm sector and as described in section 2.5 and the ownership information contained in F511, F51M and F52. The sector NNP is then simply the sum of the sector's INP and DNP.

When integrating HFCS data into EAA data, we construct from the HFCS data the positions that correspond to those appearing in the EAA, essentially following the suggestions made in Honkkila and Kavonius (2012). On the asset side we proceeded as follows:

Currency and deposits (F2): corresponds to 'Deposits' (DA2101) in the HFCS plus imputed currency. Currency has to be imputed in the HFCS, as information on it is not available. For this purpose we distribute the aggregate stock of currency (F21) recorded in the HH sector of the EAA to HHs in the HFCS proportionally to their deposit holdings.

Short-term debt securities (F331) and Long-term debt securities (F332): correspond to 'Bonds' (DA2103). Since no maturity information is available in the HFCS and since according to the EAA F331 amounts to only 0.1% of F332 in the HH sector of the EA, we attribute all of DA2103 to F332 and the set the HFCS counterpart of F331 to zero.

Short-term loans (F41) and Long-term loans (F42): corresponds to 'Amount owned to households' (DA2107) in the HFCS.

Quoted Shares (F511): corresponds to 'Shares, publicly traded' (DA2105) in the HFCS.

Unquoted Shares and other equity (F51M): corresponds in the HFCS to 'Net wealth in businesses, non-self-employment and not publicly traded' (DA2104) plus 'Self-employed business wealth' (DA1140), unless it is a sole proprietorship. Sole proprietorships are not included because the national account statistics record these assets as real assets of the HH sector instead of recording them in the firm sector.

Mutual Fund Shares (F52): corresponds to ´Mutual funds, total' (DA2102).

Net equity of households in life insurance reserves and in pension funds reserves (F61): corresponds in the HFCS to the sum of 'Public or social security account with account balance' (PF0510), 'Occupational pension plans with account balance' (PF0710), and 'Voluntary Pension/whole life insurance schemes' (DA2109).[38]

[38] Honkkila and Kavonius (2012) and Kavonius and Törmälehto (2010) explain that in the national accounts F61 contains defined contribution pension plans and individual defined benefit plans because the EAA covers only the funded system. As stated in HFCN (2008) the HFCS pension wealth variables PF0510, PF0710, and DA2109 also only includes funded plans, i.e., the value of individual pension plans and the value of all defined contribution occupational plans.

Prepayments of insurance premiums and reserves for outstanding claims (F62): since there exists no HFCS counterpart to this variable, we assign a zero value to it in the HFCS. Quantitatively, F62 amounts to 6% of F61 in the EAA for the EA as a whole.

Other accounts receivable and financial derivatives (F7+F34): corresponds to 'Other financial assets' (DA2108) in the HFCS.

The HFCS variable 'Managed accounts' (DA2106) has no single conceptual counterpart in the EAA, as the EAA does not distinguish whether or not an investment account is self-managed or not. We deal with this by distributing DA2106 to the HFCS variables DA2101, DA2102, DA2105 (the counterparts of F51M) and DA2108 proportionally before applying the matching scheme described above. We do so to capture the fact that managed accounts typically comprise assets from these asset categories.

On the liability side we apply the following scheme:

Loans, short-term (F41) and Loans, long-term (F42): corresponds in the HFCS to the sum of 'Mortgages or loans using household main residence as collateral' (HB170$x and HB2100), 'Mortgages or loans using other properties as collateral' (HB370$x and HB4100), 'Non-collateralised loans' (HC080$x and HC1100), 'Outstanding credit line/overdraft balance' (HC0220), 'Outstanding credit cards balance' (HC0320).

Derivatives (F34): we assign a zero here, as the HFCS value is included on the asset side (HFCS counterpart to F7+F34). The national accounts, assign - by convention - derivative values to the liability side, recording a negative value, if required. The latter does not affect results as we are interested in net values only.

Net equity of households in life insurance reserves and in pension fund reserves (F61): in the EAA this covers the pension commitment of small enterprises in Italy, which are classified into the HH sector in Italian EAA. The HFCS does not provide information on this item and we set it to zero. In Italy F61 amounts to about 3.5% of total HH sector liabilities.

Other accounts receivable/payable (F7): there exists no counterpart to this in the HFCS so that we set it to zero.

A further issue with integrating HFCS data into EAA data arises because the HH sector in the EAA includes all households and non-profit institutions serving households (NPISH), e.g., churches, political parties, and non-profit universities, while the HFCS only covers households in the narrow sense and also excludes some households, e.g., elderly living in institutionalized households. When aggregating HFCS data to obtain HH sector aggregates we adjust the aggregates by the NPISH item-specific shares provided by Honkkila and Kavonius (2012) to obtain EAA counterparts. We also adjust for population coverage using the numbers provided by the same authors.

B Household Characteristics Across the NNP/NW Distribution: Country Level Information

Table A1: Inflation Exposure and HH Characteristics

	Median Age	Mean Edu	Share of Homeowners	Median Income (thou €)	Median Wealth (thou €)	# of HHs (mill)	HH share
Austria							
All households	51	3.1	48%	32.2	86.9	3.7	100%
Negative net worth	42	2.9	11%	24.0	-6.6	0.2	6%
Borrower	42	3.2	73%	43.5	144.2	0.3	9%
Almost no exposure	56	3.0	86%	33.8	252.4	0.6	16%
Pred. real assets	55	3.2	67%	37.2	186.6	1.3	36%
Pred. nominal assets	49	3.2	7%	31.7	33.7	0.6	17%
Almost only nom. assets	50	3.0	0%	18.8	5.0	0.5	15%
Belgium							
All households	52	3.4	69%	33.5	226.3	4.4	100%
Negative net worth	40	3.2	4%	17.7	-1.4	0.2	4%
Borrower	41	3.7	91%	47.6	173.5	0.6	14%
Almost no exposure	58	2.9	88%	25.6	232.9	0.7	15%
Pred. real assets	57	3.5	89%	41.0	361.6	1.9	42%
Pred. nominal assets	50	3.5	38%	33.5	67.6	0.7	15%
Almost only nom. assets	39	3.0	0%	15.0	3.4	0.4	10%
Cyprus							
All households	51	3.2	76%	32.2	289.2	0.3	100%
Negative net worth	52	2.2	12%	10.8	-0.3	0.0	6%
Borrower	43	3.8	87%	38.1	297.7	0.1	31%
Almost no exposure	56	2.9	87%	27.3	367.7	0.1	32%
Pred. real assets	53	3.3	83%	33.0	386.5	0.1	24%
Pred. nominal assets	55	3.4	16%	32.2	57.2	0.0	6%
Almost only nom. assets	80	1.5	0%	10.5	15.5	0.0	2%
Finland							
All households	53	3.3	67%	34.6	105.5	2.3	100%
Negative net worth	31	3.5	36%	34.0	-7.4	0.3	12%
Borrower	46	3.7	90%	54.1	151.0	0.5	21%
Almost no exposure	61	3.3	88%	35.0	188.0	0.5	23%
Pred. real assets	61	3.3	79%	34.0	163.1	0.6	28%
Pred. nominal assets	49	3.2	17%	29.2	14.7	0.1	5%
Almost only nom. assets	50	2.9	2%	16.3	1.3	0.2	11%
France							

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Table A1 – continued from previous page

	Median Age	Mean Edu	Share of Homeowners	Median Income (thou €)	Median Wealth (thou €)	# of HHs (mill)	HH share
All households	53	2.7	54%	28.7	132.3	26.3	100%
Negative net worth	39	2.7	5%	26.1	-4.5	1.0	4%
Borrower	42	3.3	82%	39.3	172.5	4.1	16%
Almost no exposure	59	2.4	82%	28.0	228.6	4.9	19%
Pred. real assets	58	2.7	64%	29.8	207.7	9.9	38%
Pred. nominal assets	47	2.6	8%	22.6	10.6	4.7	18%
Almost only nom. assets	48	2.7	0%	21.4	19.5	1.6	6%
Germany							
All households	52	3.5	43%	32.0	61.5	37.7	100%
Negative net worth	43	3.0	8%	17.2	-2.3	3.4	9%
Borrower	47	3.7	87%	48.8	145.2	4.1	11%
Almost no exposure	56	3.4	81%	34.4	207.3	2.7	7%
Pred. real assets	58	3.6	73%	40.0	213.7	13.0	35%
Pred. nominal assets	46	3.6	10%	34.2	41.5	8.1	21%
Almost only nom. assets	52	3.1	0%	17.2	6.2	6.4	17%
Greece							
All households	54	2.6	72%	21.9	105.2	3.9	100%
Negative net worth	40	2.5	4%	13.3	0.0	0.2	6%
Borrower	47	2.9	83%	29.0	130.0	0.7	18%
Almost no exposure	57	2.3	87%	19.5	120.8	1.8	45%
Pred. real assets	55	2.9	73%	25.5	122.0	1.0	24%
Pred. nominal assets	43	3.1	16%	27.9	16.9	0.1	3%
Almost only nom. assets	30	2.9	0%	10.1	1.0	0.2	4%
Italy							
All households	55	2.4	69%	26.2	182.2	23.3	100%
Negative net worth	48	2.0	1%	11.8	-0.3	0.6	3%
Borrower	45	2.9	86%	37.7	180.0	2.0	8%
Almost no exposure	58	2.3	81%	21.7	209.9	8.3	36%
Pred. real assets	57	2.6	76%	32.0	223.9	9.8	42%
Pred. nominal assets	52	2.4	5%	22.2	20.1	2.2	9%
Almost only nom. assets	63	2.1	0%	15.5	6.7	0.4	2%
Luxembourg							
All households	50	2.9	66%	65.0	447.9	0.2	100%
Negative net worth	41	2.1	10%	38.5	-11.9	0.0	4%

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Table A1 – continued from previous page

	Median Age	Mean Edu	Share of Homeowners	Median Income (thou €)	Median Wealth (thou €)	# of HHs (mill)	HH share
Borrower	44	3.1	85%	74.1	380.5	0.0	19%
Almost no exposure	58	2.6	86%	62.0	567.3	0.0	24%
Pred. real assets	56	3.1	76%	79.0	644.7	0.1	36%
Pred. nominal assets	40	3.3	11%	51.5	64.9	0.0	11%
Almost only nom. assets	45	2.5	0%	23.0	4.8	0.0	5%
Malta							
All households	-	2.4	78%	21.5	222.0	0.1	100%
Negative net worth	-	1.6	0%	9.1	0.0	0.0	2%
Borrower	-	2.9	95%	30.0	162.1	0.0	7%
Almost no exposure	-	2.4	94%	17.4	233.4	0.0	19%
Pred. real assets	-	2.5	92%	24.6	292.9	0.1	56%
Pred. nominal assets	-	2.3	20%	20.8	35.3	0.0	10%
Almost only nom. assets	-	2.0	0%	10.2	37.0	0.0	6%
Netherlands							
All households	52	3.3	52%	39.5	128.3	6.5	100%
Negative net worth	36	3.8	38%	42.9	-24.5	0.9	13%
Borrower	50	3.4	95%	46.4	196.5	1.4	21%
Almost no exposure	57	3.1	85%	37.5	262.8	0.5	7%
Pred. real assets	57	3.3	79%	44.1	329.0	1.6	25%
Pred. nominal assets	58	3.1	6%	34.7	46.9	1.3	20%
Almost only nom. assets	51	2.9	0%	30.5	51.6	0.8	13%
Portugal							
All households	55	1.8	70%	14.4	81.6	3.7	100%
Negative net worth	46	1.4	14%	9.4	-0.5	0.2	5%
Borrower	44	2.4	92%	20.0	114.6	0.6	17%
Almost no exposure	60	1.5	91%	12.2	100.3	1.1	30%
Pred. real assets	58	1.9	76%	16.1	106.3	1.2	33%
Pred. nominal assets	53	1.8	25%	14.0	23.5	0.2	7%
Almost only nom. assets	60	1.4	0%	9.0	1.1	0.3	9%
Slovakia							
All households	50	3.2	90%	11.2	64.3	1.9	100%
Negative net worth	45	2.9	14%	5.5	-0.5	0.0	1%
Borrower	42	3.4	96%	12.8	56.0	0.1	8%
Almost no exposure	55	3.1	99%	10.2	68.7	0.8	43%

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Table A1 – continued from previous page

	Median Age	Mean Edu	Share of Homeowners	Median Income (thou €)	Median Wealth (thou €)	# of HHs (mill)	HH share
Pred. real assets	51	3.4	94%	13.0	71.2	0.8	40%
Pred. nominal assets	41	3.5	46%	15.5	30.2	0.1	4%
Almost only nom. assets	40	3.1	0%	7.0	1.1	0.1	3%
Slovenia							
All households	53	3.2	82%	17.7	104.1	0.8	100%
Negative net worth	47	2.2	0%	8.5	0.0	0.0	4%
Borrower	50	3.3	91%	22.9	78.9	0.1	13%
Almost no exposure	55	3.0	93%	13.8	134.5	0.4	53%
Pred. real assets	53	3.6	86%	24.2	142.9	0.2	24%
Pred. nominal assets	39	3.6	16%	29.5	10.7	0.0	6%
Almost only nom. assets	58	2.3	0%	9.5	5.9	0.0	2%
Spain							
All households	52	2.6	83%	24.2	194.4	16.0	100%
Negative net worth	38	2.4	23%	23.0	-6.2	0.7	4%
Borrower	44	3.1	90%	29.3	201.9	4.3	27%
Almost no exposure	58	2.2	95%	19.7	206.7	5.7	36%
Pred. real assets	58	2.7	85%	27.5	256.0	4.1	26%
Pred. nominal assets	47	3.1	30%	23.7	39.4	0.5	3%
Almost only nom. assets	47	2.3	0%	12.2	1.3	0.6	4%

Median age is unavailable for Malta where age information is coded using age bracket information only.

C Inflation Experience and Inflation Exposure: Further Details

Figure 4 redraws figure 2 for the subpopulation of outright homeowners that do not hold a mortgage; it confirms the findings reported in figure 2 for the overall population. Figure 5 depicts the outcomes for the subpopulation of renters (who do not own a house). It shows that the for the middle inflation group of countries there is relatively large jump around zero, which may again be the due to credit restrictions.

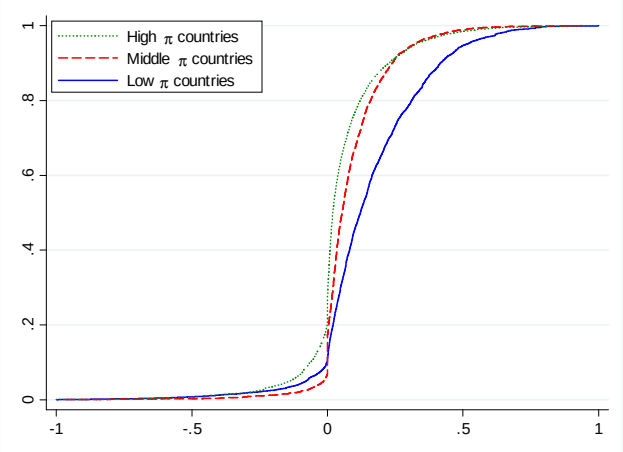

Figure 4: Inflation Exposure, Outright Homeowners (CDF over NNP/NW)

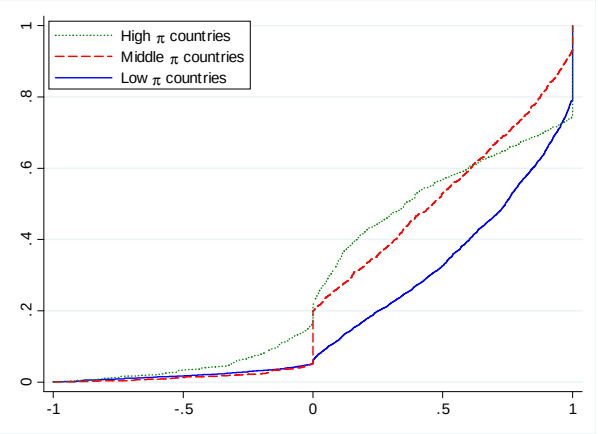

Figure 5: Inflation Exposure, Renters (CDF over NNP/NW)

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