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It's Not All Fiscal: Effects of Income, Fiscal Policy, and Wealth on Private Consumption

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Abstract

We attempt to disentangle income and wealth effects on consumption by disaggregating both the different types of income and wealth. We estimate a consumption function for a panel of quarterly data for 14 advanced economies spanning 1998 to 2012, using an error correction specification. We find a significant long-term relation between consumption and the different components of income and wealth. While fiscal policy had direct effects on consumption, the analysis suggests that wealth effects were sizeable, and therefore need to be kept in mind when analyzing consumption trends going forward.

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I. INTRODUCTION

The economic debate about what should have been the appropriate fiscal policy in the aftermath of the global financial crisis is very much open. There is considerable controversy over the impact of fiscal consolidation on economic activity and on why sluggish economic growth persists across many advanced economies several years after the onset of the financial crisis.

To add to this debate, we focus more narrowly on the behavior of private consumption. We focus on the behavior of private consumption because, on average across countries, it is the component of GDP that accounts for the largest proportion of the overall changes to real GDP. We take into account not only the possible effects of fiscal policy on private consumption, but also explore the negative wealth effects stemming from the collapse of housing and financial assets in the context of high household debt. We argue that wealth effects played an important role weighing down consumption growth, suggesting that the effect of fiscal policy on economic activity may be overestimated if such factors are overlooked.

To better understand the evolution of consumption over the recent crisis period, in this paper we attempt to disentangle income and wealth effects on consumption by disaggregating into different types of income and wealth. The marginal propensity to consume out of income and wealth subcomponents is likely to differ, and therefore each would affect overall consumption differently. Specifically, we separate the effects on private final consumption expenditure of (1) the subcomponents of disposable income, namely labor income, social benefits, and personal income taxes and social security contributions; and (2) different categories of wealth, namely financial assets, housing assets, and household debt. While there is literature on the impact of fiscal policy instruments on consumption and literature on the impact of different types of wealth on consumption, to our knowledge no other paper has looked at the two together.

We estimate a consumption function for an unbalanced panel dataset of 14 advanced economies spanning 1998Q1 to 2013Q2. The cross-country dataset allows us to exploit the substantial variations in the timing and intensity of economic activity across advanced economies. In line with previous studies, we use an error correction specification, where short-run effects can differ from long-run effects, and long-run equilibrium is reached only gradually. We rely on the pooled mean group (PMG) estimator proposed by Pesaran et al. (1999). This methodology pools the long run relationship between the countries while the short run responses are flexible and unrestricted across countries.

Our results suggest that consumption is impacted by wealth effects, in addition to fiscal policy. We find a significant long-term relation between consumption and the different components of income and wealth. Labor income remains the main driver of consumption. Personal income taxes and social security contributions are found to have a negative impact on consumption, while social benefits are found to have a larger positive impact. Financial assets and housing assets are found to have a positive coefficient, while household debt is found to have a negative coefficient. Furthermore, the results suggest that the contribution to consumption from an increase in financial or housing assets would be more than offset if financed fully through in increase in household debt.

The remainder of the paper is structured as follows. Section II reviews the existing literature on the impact of income and wealth effects on private consumption. Section III provides stylized facts on the behavior of consumption, income and wealth during the recent global crisis. Section IV describes the econometric approach used, followed in Section V by a description if the main findings. Section VI uses the empirical results to help inform the relative size of the different elements impacting consumption for selected countries. Section VII concludes.

II. LITERATURE REVIEW

The theoretical link between consumption, income, and wealth can be described by the life-cycle model of household spending behavior. According to the life-cycle model formulated by Ando and Modigliani (1963), households accumulate and deplete their wealth to keep their planned consumption spending roughly steady. Blanchard (1985) shows that aggregate consumption should be roughly proportional to the sum of current wealth and expected future non-property income.[2] The factor of proportionality is the marginal propensity to consume (MPC) out of wealth. Thus, a 1 percent increase in both wealth and non-property income is expected to raise consumption by 1 percent.

In contrast, models with precautionary savings, liquidity constraints or bequest motives suggest that consumers respond differently to changes in their economic resources. Indeed, the MPC of prudent individuals falls with household resources (Parker and Preston, 2005); liquidity constrained consumers exhibit higher MPC than households who can access credit markets to smooth consumption (Hubbard and Judd, 1986); and if bequests are luxury goods, rich individuals consume a smaller fraction of their lifetime resources (Dynan, Skinner and Zeldes, 2004). These elements can affect the consumer response to fiscal policies, as income tax changes and the lump-sum transfers may fall on households with different types of constraints. For example, transfer income tends to be received by the elderly or poor, who should have a higher propensity to consume than the rest of the population. The composition of household resources may also matter. For instance, households burdened with large debts might react to a positive change in income by reducing their debt rather than spending (Dynan, 2012; Mian and Sufi, 2010). Moreover, if most of the wealth is locked into illiquid assets, households must cut consumption even in the face of a negative transitory income shock (Kaplan and Violante, 2011).

Many studies have looked at the marginal propensity to consume out of different types of income. Several papers have estimated the effects of anticipated tax changes on consumption, using features of the tax system, such as social security payroll caps (Parker, 1999), tax refunds

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[2] "Expected future non-property income" refers to the flow of current and discounted expected future non-property income. Current real disposable non-property income is generally assumed to remain a constant share of expected future non-property income, as noted by Davis and Palumbo (2001) and Davis (2010), so that a 1 percent increase in current non-property income is equivalent to a 1 percent increase in expected future non-property income.

(Souleles, 1999), preannounced tax cuts (Souleles, 2002), and the tax rebates or stimulus payments (Johnson et al., 2006; Parker et al., 2011; Agarwal et al., 2007; and Misra and Surico, 2013). These studies typically find that consumption increases in response to income changes induced by tax reductions, with relatively larger responses among low-wealth and low-income households, which is consistent with liquidity constraints. On transfers, Oh and Reis (2011) show that transfers across different groups of households will raise consumption and increase labor supply for some, while lowering it for others. They find that U.S. fiscal policy in 2007-09, which involved a large discretionary increase in transfers boosted output and employment. Using the IMF's GIMF model, Freedman et al. (2009) show that the magnitude of the effect on aggregate demand of higher real disposable incomes in the case of an increase in general transfers depends on the proportion of households that are liquidity-constrained.

Several papers have explored the effect of wealth on consumption taking into account different types of wealth. Davis (2010) provides a useful overview of this literature, which serves to emphasize the wide range of results in this area. The existence of wealth effects on consumption is little contested, but studies differ on the effects across countries and across assets. For the United States, Case, Quigley and Shiller (2013), Benjamin et al. (2004), and Caroll et al. (2011) find a larger effect of housing wealth than stock market wealth on household consumption, while Muelbauer (2008) finds the wealth effects out of liquid assets to be larger than for housing wealth.[3] Looking at 16 countries, Slacalek (2009) reports lower housing wealth effects than financial wealth effects in most countries, but not in the U.S. and the U.K. For the Euro Area as a whole, Souza (2009) concludes that financial wealth effects are relatively large but housing wealth is not significant. Using panel data estimations, several studies have found that the impact of wealth variables to be significant and positive, Slacalek (2009) and Skudelny (2009) for the case of the Euro Area, and Ludwig and Sløk (2002) for 16 OECD countries.[4]

To better understand the evolution of consumption over the recent crisis period, in this paper we attempt to disentangle income and wealth effects on consumption by disaggregating both the different types of income and wealth. Specifically, we separate the effects on private final consumption expenditure of (1) the subcomponents of disposable income, namely labor income, social benefits, and personal income taxes and social security contributions; and (2) different categories of wealth, namely financial assets, housing assets, and household debt. As seen above, there is literature on the impact of fiscal policy instruments on consumption and

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[3] Boone et al. (2001) find that the U.S. has lower financial and housing wealth effects than most other G7 countries. In contrast, Kerdrain (2011) finds that MPCs out of financial wealth is very similar for the U.S., Japan, and the euro area, but housing wealth effects are much larger for the U.S. than elsewhere. Catte et al. (2004) report higher financial wealth and lower housing wealth effects in Japan than in the U.S.

[4] Cross country differences in wealth effects could arise from differences in access to housing credit, for example availability of home equity loans and loan-to-value requirements. See Chauvin and Muellbauer (2014) for the case of France.

literature on the impact of different types of wealth on consumption, but to our knowledge no other paper has looked at the two together.

III. STYLIZED FACTS ON CONSUMPTION, INCOME, AND WEALTH

In this paper we focus on the behavior of private consumption because, on average across countries, it is the component of GDP that accounts for the largest proportion of the overall changes to real GDP. Figure 1 illustrates that in the years leading up to the crisis and in its aftermath, domestic demand was the main driver of changes in real GDP. In turn, Figure 2 shows that domestic demand, on average, is explained in significant part by the changes in private consumption. In almost all countries, changes in private consumption outweighed the impact of changes in public consumption on domestic demand. While the collapse in investment explains a large portion of domestic demand after 2008, the contribution of private consumption to changes in domestic demand still represents close to 50 percent across countries (more than one third in Ireland and Spain, where the negative impact of investment is the largest).

Figure 1. Contributions to Real GDP Growth
(cumulative percent change)
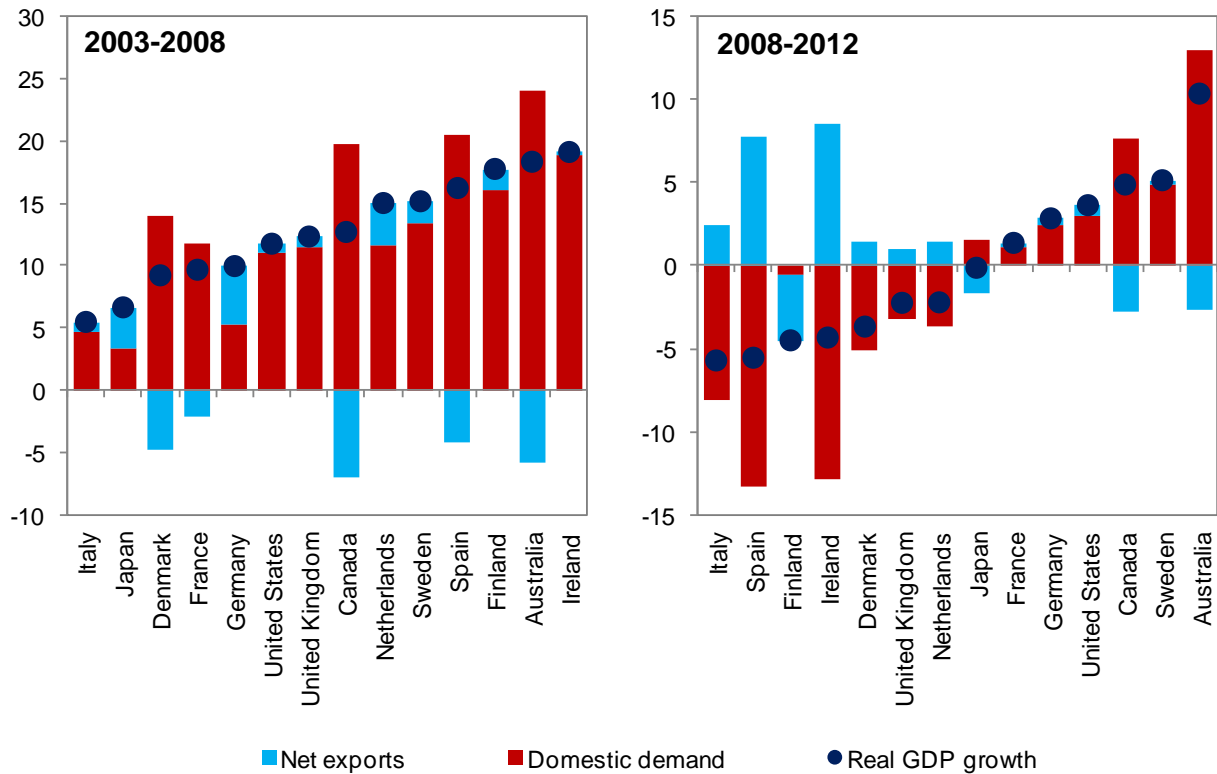
Source: World Economic Outlook and authors' estimates.

Figure 2. Contributions to Domestic Demand Growth
(cumulative percent change)
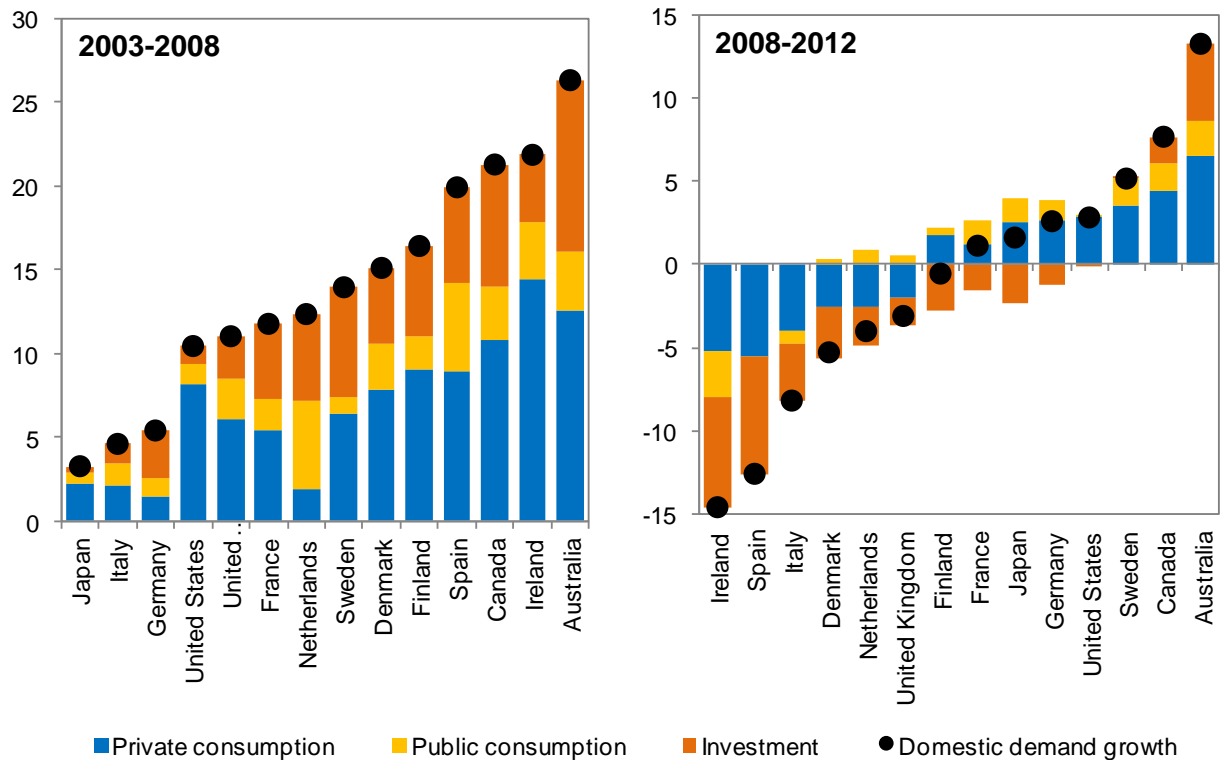
Source: World Economic Outlook and authors' estimates.

Private consumption did not fall across the board in the aftermath of the financial crisis.
Figure 3 shows that, between 2007 and 2012, private consumption fell by more than 20 percent
in Ireland and 15 percent in Spain. Other countries weathered better the storm, such as Sweden
and Australia where private consumption increased by almost 10 percent over the same period.
In several cases, the countries with a larger decline in consumption were also those that
implemented larger fiscal adjustment in 2010, 2011, and 2012 (Figure 4).

Figure 3. Change in Private Consumption, 2007Q4–2012Q4
(real logs)

Country	
Ireland	
Spain	
Netherlands	
Italy	
Denmark	
United Kingdom	
Japan	
France	
United States	
Germany	
Finland	
Canada	
Sweden	
Australia	

-0.30 -0.20 -0.10 0.00 0.10 0.20
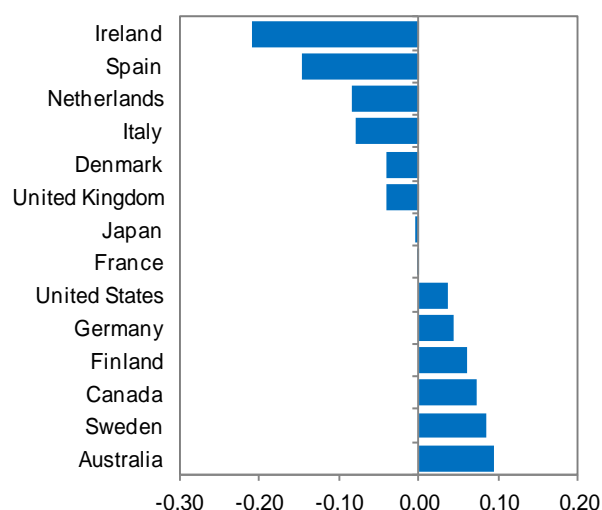
Source: OECD, and authors' estimates

Figure 4. Change in the Cyclically Adjusted Primary Balance, 2009–12
(percent of potential GDP)

Country	
Spain	
Ireland	
United Kingdom	
Italy	
Netherlands	
Australia	
France	
United States	
Germany	
Canada	
Japan	
Denmark	
Finland	
Sweden	

-5.0 0.0 5.0 10.0
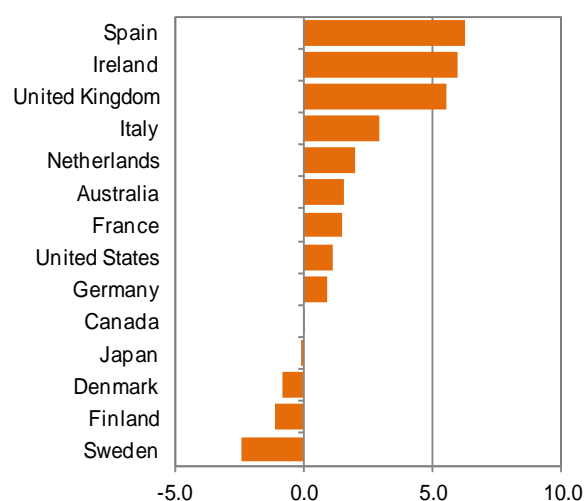
Source: IMF Fiscal Monitor, and authors' estimates
Note: Cyclically adjusted primary balance is calculated as the overall balance adjusted for the business cycle, excluding interest payments.

However, the fall in consumption cannot be attributed solely to the effect of fiscal policy. As countries implemented fiscal adjustment measures, there were many other moving parts. Indeed, private consumption in several countries had peaked well before the start of fiscal consolidation, as shown for Ireland, Spain, the United Kingdom and the United States in Figure 5. Wealth effects are likely to have also played a role. In countries such as Spain and the U.S., housing prices had started to decline since early 2008, and in mid-2007 in the case of Ireland. Stock markets in most countries fell dramatically in 2008, and remained volatile. Also, the growth rate of household debt accumulation in many countries had been mounting steadily since the mid-2000s. Figure 6 shows the bilateral correlations between changes in private consumption and household wealth variables. In particular, it suggests that changes in housing assets and financial assets are positively associated with changes in private consumption. The bilateral correlation with household debt appears weaker.

Figure 5. Private Consumption and Fiscal Adjustment

CAPB (percent of potential GDP) (left axis)   Private consumption (Index, 2007Q4 = 100) (right axis)
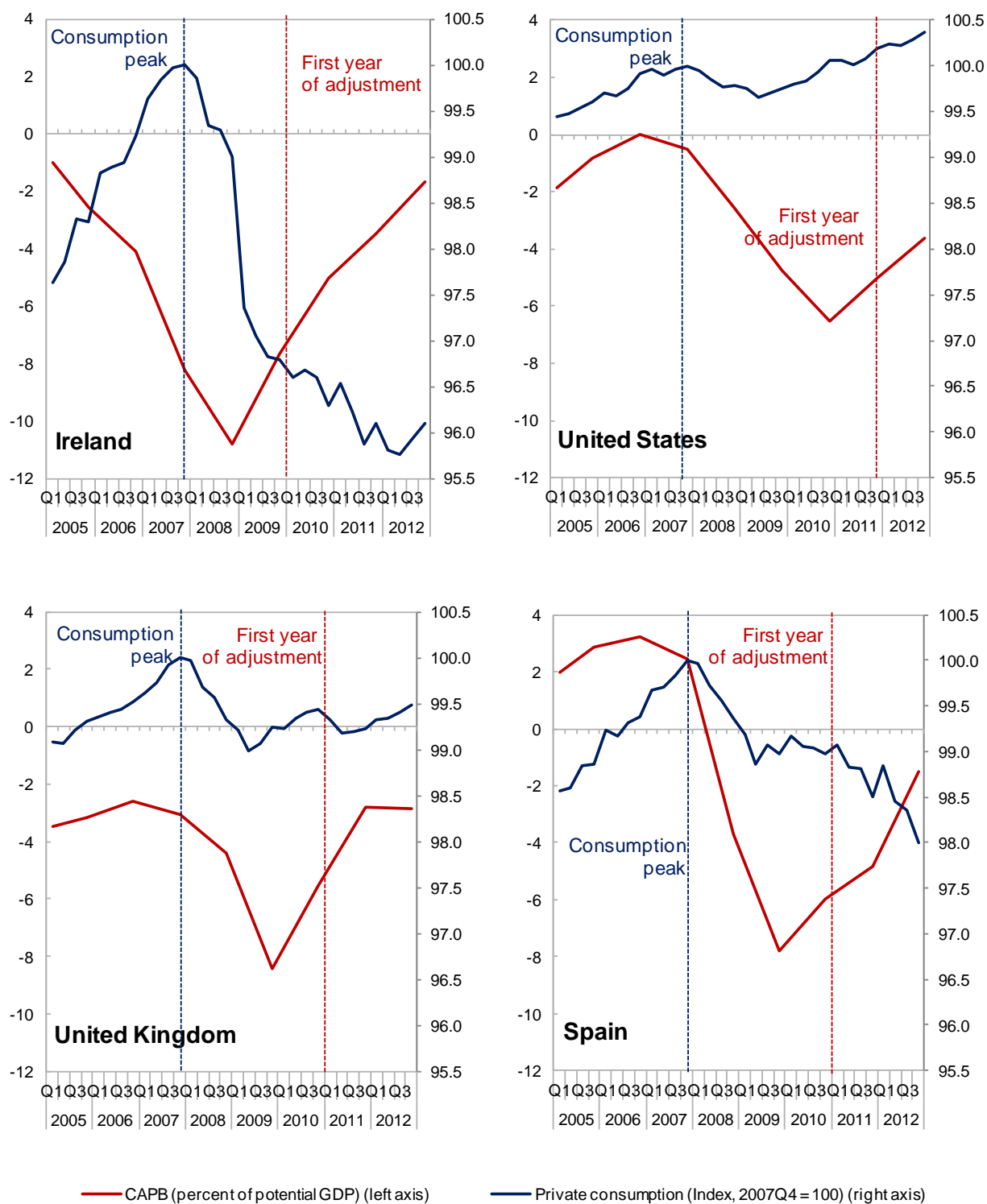
Source: IMF Fiscal Monitor, OECD, and authors' estimates.

Figure 6. Private Consumption, Income, and Household Wealth Variables
(Year on year change, in real logs)
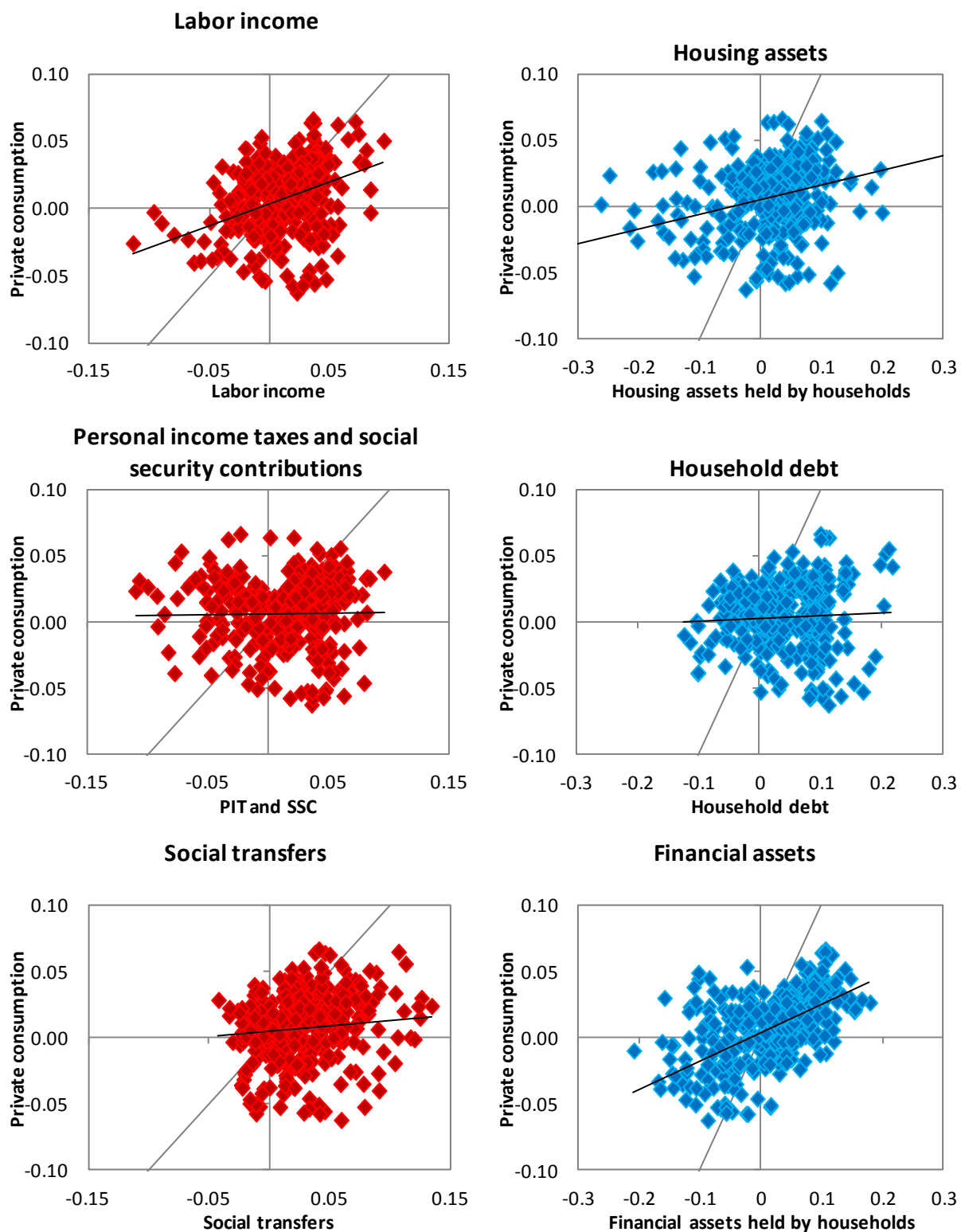
Source: IMF Fiscal Monitor, OECD, Eurostat, NiGEM, and authors' estimates.

IV. ECONOMETRIC APPROACH

A. Model

We rely on an error correction specification of the consumption function, as first proposed in Davidson et al. (1978). Davidson et al. (1978) asked whether consumption might move in the current period to actively "correct" a previous error. If consumption exhibits this tendency, referred to as error correction, then short-run wealth effects could look quite different than those estimated to occur over longer periods of time. Tinsley (1993) formally demonstrates that an extended life cycle theory, which incorporates slowly changing household spending habits and adjustment lags in the response to economic news, implies that spending exhibits error correction-type behavior in the short run. A number of studies have estimated error correction framework where short-run effects can differ from long-run effects, and long-run equilibrium is reached only gradually (Boone et al., 2001; Case, Quigley, and Shiller, 2013; Catte et al., 2004; Davis and Palumbo, 2001; Kerdrain, 2011).

Among the various estimators suggested in the literature, the pooled mean group (PMG) estimator proposed by Pesaran et al. (1999) is particularly attractive. It pools the long run relationship between the countries while the short run responses are flexible and unrestricted across countries. Averages of the short run coefficients across countries are computed, which is the so-called mean group estimator (MG) in the fashion of Pesaran and Smith (1995). Therefore, this likelihood-based estimation procedure is an intermediate procedure to pooling the panel data and fully unconstrained estimation. For the consumption function, Ludwig and Sløk (2002) and Barrell, Byrne and Dury (2003) have used a pooled-mean-group methodology.

An identical form of the long-run consumption function is assumed for all countries, where the long run relationship between consumption, income and the wealth measures is given by:

$$C_{it} = \theta_{0i} + \theta'_{1i} y_{it} + \theta'_{2i} w_{it} + u_{it} \tag{1}$$

$$i = 1,2,\dots,N, \quad t = 1,2,\dots,T$$

Where C_{it} is the logarithm of real consumption, y_{it} includes the determinants of consumption linked to income, and w_{it} includes the determinants of consumption linked to wealth effects. We assume that all of these variable are I(1) and cointegrated, making u_{it} an I(0) process for all i.

Deviations from the long run relationship given by equation (1) are possible in the short run. We assume the maximum lag to be 1, thus the autoregressive distributed lag (ARDL) (1,1,1) equation is:

$$C_{it} = \mu_i + \delta'_{10i} y_{it} + \delta'_{11i} y_{i,t-1} + \delta'_{20i} w_{it} + \delta'_{21i} w_{i,t-1} + \lambda_i c_{it-1} + \varepsilon_{it} \tag{2}$$

The error correction equation is:

$$\Delta C_{it} = \phi_i\left[C_{i,t-1} - \theta_{0i} - \theta'_{1i}y_{i,t-1} - \theta'_{2i}w_{i,t-1}\right] + \delta'_{1i}\Delta y_{it} + \delta'_{2i}\Delta w_{it} + \varepsilon_{it} \qquad (3)$$

$$\phi_i = -(1 - \lambda_i); \qquad \theta_{0i} = \frac{\mu_i}{1 - \lambda_i}; \qquad \theta_{1i} = \frac{\delta'_{10i} + \delta'_{11i}}{1 - \lambda_i}; \qquad \theta_{2i} = \frac{\delta'_{20i} + \delta'_{21i}}{1 - \lambda_i}$$

Where ϕ_i is the speed of error correction. In this framework, Pesaran et al. (1999) have suggested to restrict the coefficients of the error correction term to be equal across countries while all other short run coefficients are allowed to vary. The equation is then estimated by maximum likelihood.

The PMG specification has several advantages for the purpose of our analysis. First, similar to a dynamic fixed effects (DFE) estimator, the PMG estimator pools coefficients of long-run factors (θ) to improve the statistical inference and comply with theoretical predictions, which are general and should not vary from country to country. In our analysis, we focus on OECD countries because this group of economies most likely shows similar behavior. Second, unlike the DFE estimator, it is flexible enough to allow country-specific variations in short-run coefficients (δ_i). This in turn allows a differentiated response to changes in short-term factors depending on country-specific characteristics. Finally, the PMG specification can be tested against a more flexible means-group (MG) estimator that allows for both long-run and short-run coefficients to vary across countries using the Hausman test. If the PMG poolability restrictions are not rejected, then this would imply a statistical support to the long-run coefficient homogeneity assumption imposed by the DFE estimator.

B. Data

Our econometric analysis is based on an unbalanced panel dataset for 14 advanced economies, from 1998Q1 to 2012Q.[5] This approach allows us to bring significant cross-country variation into the analysis.[6] The model includes as long-run determinants of private consumption those variables related to labor income, fiscal variables (social benefits, and personal income taxes and social security contributions), and wealth (housing assets, financial assets, and household debt). As part of the robustness checks, some of these variables are netted: net taxes (personal income taxes and social security contributions minus social benefits), net financial assets

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[5] Countries include Australia, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom, and United States.

[6] The dataset is comprehensive and exploits a wide spectrum of geographic variation. However, there are also substantial institutional differences among countries, such as variations in the taxation of wealth and capital gains and in constraints affecting borrowing and saving.

(financial assets minus and household debt), and housing equity (housing assets minus household debt).

Following the existing literature, two additional short-run determinates are also included to capture uncertainty: changes in the unemployment rate and changes in the long-term sovereign bond yields. To capture the effects of expectations of fiscal adjustment, the primary gap (calculated as the difference between the debt stabilizing primary balance and the actual primary balance) is used a proxy.

Note that the fiscal variables used capture both discretionary and non-discretionary changes in fiscal policy. We also recognize that the fiscal variables we include only capture direct effects on consumption but not indirect effects. Fiscal adjustment plans, depending on the country, may have included change to indirect taxation, spending on goods and services and investment cuts, which could also have indirect effects on consumption.

The private sector is made up of households and non-profit institutions serving households (NPISH). Private final consumption expenditure, gross disposable income and total labor cost (as a proxy for labor income) are from OECD. Personal income taxes, social security contributions, and social benefits are from Eurostat where available and OECD for the remaining countries. Financial assets held by households are from the European Central Bank where available, and from the OECD for remaining countries.[7] Debt of households is from the BIS.[8] Housing assets are from OECD where available (interpolated using OECD nominal housing price index), and from NiGEM for the remaining countries.[9] The consumer price index, unemployment rate, and long-term sovereign bond yields are from IFS.

We use quarterly, seasonally adjusted data, deflated by the consumer price index. We adopt a logarithmic form of the consumption function. Therefore, the estimates reported below are the estimated elasticities of consumption in changes of the right hand side variables.

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[7] Financial assets held by households refer to: currency and deposits; securities other than shares, except financial derivatives; shares and other equity, except mutual fund shares; mutual fund shares; net equity in life insurance reserves; and, net equity in pension funds. It excludes financial derivatives, loans, prepayments of premiums and reserves against outstanding insurance claims, and other accounts receivable which are generally less significant.

[8] The debt of households mainly consists of home mortgage loans, but also other types of liabilities such as credit lines and credit cards, and other consumer credit (such as automobile loans or student loans).

[9] Household assets include dwellings and other buildings and structures and land improvements. Household assets are valued at market prices at the time to which the balance sheet relates, and are recorded net of depreciation.

V. EMPIRICAL RESULTS

Before turning to the estimations, we apply panel unit root tests on the variables used in the regression analysis. We use four different unit root tests: Im-Peseran-Shi, Fisher, Breitung, and Hadri. The first three tests are based on the null of unit root and different alternative hypotheses, while the last test is based on the null of stationarity. As shown in Table 1, all tests support the unit root hypothesis across the different variables, which justify the use of the cointegration model.[10]

Table 1. Panel Unit Root Tests
(P-values)

	Im-Pesaran-Shin	Fisher	Breitung	Hadri
Null hypothesis	All panels contain unit roots	All panels contain unit roots	All panels contain unit roots	All panels are stationary
Alternative hypothesis	Some panels are stationary	At least one panel is stationary	All panels are stationary	Some panels are stationary
Household consumption	0.3	0.4	1.0	0.0
Labor income	0.4	0.7	1.0	0.0
Personal income taxes and social security contributions	0.4	0.2	1.0	0.0
Social benefits	0.9	0.9	1.0	0.0
Housing assets	0.7	0.5	1.0	0.0
Household debt	0.1	0.2	1.0	0.0
Financial assets	0.3	0.4	1.0	0.0
Long-term interest rate	1.0	1.0	1.0	0.0
Unemployment rate	1.0	0.5	1.0	0.0

Note: Some of the tests require balanced panel and were applied to a balanced version of the dataset.

Table 2 presents the results of the PMG model under alternative specifications. Column 1 is our preferred specification, which has all the different subcomponents of the income and wealth variables. Columns 2 is the same as Column 1, but includes the primary gap in the short-run variables. Column 3 uses net financial assets, and Column 4 housing equity. Column 5 groups taxes and social benefits into net taxes. Column 6 has net taxes and net financial assets and Column 7 has net taxes and housing equity. Columns 8 and 9 include gross disposable income rather than its subcomponents, with net financial assets and housing equity.

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[10] Results for panel unit root tests confirm the presence of a unit root also when individual intercepts and trends are included in the test equation.

Table 2. Determinants of Private Consumption, Alternative Specifications

	1	2	3	4	5	6	7	8	9
Long-run coefficients									
Gross disposable income								0.939***	0.968***
								(0.011)	(0.018)
Labor income	0.569***	0.772***	1.038***	1.037***	1.003***	0.865***	0.773***		
	(0.103)	(0.092)	(0.046)	(0.087)	(0.053)	(0.025)	(0.101)		
PIT and SSC	-0.081*	-0.117***	-0.098**	-0.223***					
	(0.042)	(0.044)	(0.045)	(0.040)					
Social benefits	0.331***	0.212***	-0.025	0.254***					
	(0.048)	(0.056)	(0.035)	(0.070)					
Net taxes					-0.012***	-0.018***	-0.017***		
					(0.002)	(0.005)	(0.004)		
Financial assets	0.333***	0.310***		-0.050	-0.085*		0.170**		0.016
	(0.032)	(0.026)		(0.034)	(0.052)		(0.075)		(0.013)
Housing assets	0.195***	0.130***	0.044***		0.099***	0.102***		0.095***	
	(0.035)	(0.039)	(0.016)		(0.032)	(0.022)		(0.013)	
Household debt	-0.370***	-0.336***			-0.163***				
	(0.025)	(0.022)			(0.023)				
Net financial assets			0.009***			0.012***		0.051***	
			(0.002)			(0.002)		(0.007)	
Housing equity				0.011***			0.006**		0.008***
				(0.003)			(0.003)		(0.001)
Speed of adjustment (error correction)	-0.071**	-0.085**	-0.056***	-0.061**	-0.025	-0.023	-0.024**	-0.066**	-0.083***
	(0.030)	(0.040)	(0.020)	(0.030)	(0.021)	(0.024)	(0.011)	(0.030)	(0.032)
Short-run coefficients									
Gross disposable income								0.500***	0.510***
								(0.055)	(0.054)
Labor income	0.155**	0.168***	0.199***	0.206***	0.213***	0.238***	0.274***		
	(0.067)	(0.064)	(0.061)	(0.065)	(0.060)	(0.073)	(0.049)		
PIT and SSC	0.023	0.020	0.120**	0.102					
	(0.081)	(0.081)	(0.055)	(0.074)					
Social benefits	0.001	0.111**	0.004	0.018					
	(0.056)	(0.044)	(0.036)	(0.075)					
Net taxes					-0.007	-0.004	0.062		
					(0.015)	(0.022)	(0.050)		
Financial assets	0.095**	0.088***		0.115***	0.129***		0.134***		0.100***
	(0.042)	(0.022)		(0.036)	(0.050)		(0.034)		(0.035)
Housing assets	0.174	0.104	0.143***		0.126**	0.222***		0.022	
	(0.109)	(0.065)	(0.047)		(0.063)	(0.086)		(0.023)	
Household debt	0.091	0.084			0.070				
	(0.086)	(0.070)			(0.079)				
Net financial assets			0.105*			0.087**		0.081***	
			(0.058)			(0.035)		(0.026)	
Housing equity				0.197			0.022		-0.005
				(0.132)			(0.015)		(0.011)
Sovereign bond yield (10y)	-0.002***		-0.002**	-0.000	-0.003***	-0.002**	-0.002	0.000	0.004
	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0001)	(0.001)
Unemployment rate	-0.003***	-0.002*	-0.004***	-0.004***	-0.005**	-0.004***	-0.003***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Primary gap		-0.002***							
		(0.000)							
Observations	549	537	549	549	549	549	549	567	567
Countries	14	14	14	14	14	14	14	14	14
St. deviation of residuals	0.018	0.022	0.080	0.022	0.014	0.067	0.027	0.017	0.017

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; PIT: Personal income tax; SSC: social security contributions. Variables are in log real terms, except for the unemployment rate, bond yield and the primary gap that are in percent.

Table 3 reports the MG and DFE estimates for our preferred specification.[11] Hausman tests do not reject the validity of the PMG estimator, suggesting that the association between household consumption and its long-run determinants is the same across all advanced economies in the sample.

The results in Table 2 tend to confirm that there is indeed a strong long-term relation between consumption and the different components of income and wealth, though labor income remains its main driver. While the sign and significance of the coefficients is consistent across the different specifications, the size varies somewhat across specifications, and so any numerical conclusion must be tentative.

The different income components are found to have significant effects on consumption. The effect of gross disposable income—with a coefficient of 0.9 (Table 2, columns 8 and 9)— is aligned with previous findings. The breakdown of gross disposable income into its subcomponents shows interesting results. As expected, the labor income shows the largest positive effect on consumption, with a coefficient of 0.6 (Column 1). Personal income taxes and social security contributions are found to have a negative impact on consumption, while social benefits are found to have a larger positive impact. Net taxes (Columns 5-7) are found to have a negative coefficient overall, which is expected as the overall size of taxes is typically larger than that of social transfers.

In terms of size of the coefficient, for every 1 percent increase in social benefits, consumption is expected to increase by 0.3 percent. However, social benefits in nominal terms are on average about 30 percent of the size of labor income, which implies that a one dollar increase in social benefits would be expected to have a higher impact on consumption than a one dollar increase in labor income. Table 4 shows that the estimated MPC out of social benefits is close to 1, which suggests that transfers are mostly aimed at liquidity-constrained households with very high marginal propensity to consume out of current income. For every 1 percent increase in personal income taxes and social security contributions, consumption would fall by 0.1 percent. Taxes in nominal terms are on average about one third of labor income, so the impact on consumption from a one dollar change in taxes would be smaller than that of a one dollar change in labor income. The MPC out of personal income taxes and social security contributions is -0.2, which is within the range found in other studies.[12]

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[11] Coefficients in the MG estimation often lose significance due to large estimates for variances, an issue identified by Pesaran et al. (1999). The large variance of MG estimates is not surprising because the MG model estimates both long-run and short-run coefficients with a more limited number of observations given by each country's own time series.

[12] In terms of size, the literature has found a broad range for the effect of tax rebates on consumption. For example, for the United States, Parker et al. (2011) finds an MPC of between 0.1 and 0.3; while Johnson et al (2006) find an MPC of 0.2 to 0.4.

Table 3. Determinants of Private Consumption, Alternative Estimation Techniques

	Pooled mean group (PMG)	Mean group (MG)	Dynamic fixed effects (DFE)
Long-run coefficients			
Labor income	0.569***	0.588	0.565***
	(0.103)	(0.626)	(0.168)
PIT and SSC	-0.081*	-0.172	-0.103
	(0.042)	(0.217)	(0.0928)
Social benefits	0.331***	0.203	0.317***
	(0.048)	(0.195)	(0.0746)
Financial assets	0.333***	0.365	0.156***
	(0.032)	(0.318)	(0.0505)
Housing assets	0.195***	0.207	0.137**
	(0.035)	(0.214)	(0.0564)
Household debt	-0.370***	-0.382	-0.175***
	(0.025)	(0.362)	(0.068)
Speed of adjustment	-0.071**	-0.072***	-0.078***
(error correction)	(0.030)	(0.019)	(0.015)
Short-run coefficients			
Labor income	0.155**	0.210***	0.203***
	(0.067)	(0.058)	(0.044)
PIT and SSC	0.023	0.063	0.091***
	(0.081)	(0.080)	(0.033)
Social benefits	0.001	0.014	0.081**
	(0.056)	(0.076)	(0.036)
Financial assets	0.095**	0.072*	0.017**
	(0.042)	(0.038)	(0.007)
Housing assets	0.174	0.088	0.102***
	(0.109)	(0.112)	(0.017)
Household debt	0.091	0.118	0.066*
	(0.086)	(0.078)	(0.034)
Sovereign bond yield (10y)	-0.002***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
Unemployment rate	-0.003***	-0.001	-0.002**
	(0.001)	(0.001)	(0.001)
Observations	549	549	549
Countries	14	14	14
St. deviation of residuals	0.018	0.033	0.018

Note: Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$; PIT: Personal income tax; SSC: social security contributions. Variables are in log real terms, except for the unemployment rate, bond yield and the primary gap that are in percent.

Across all specifications, the long-run equations always show a statistically significant role for the different wealth components in accounting for movements in consumption. Financial assets and housing assets are found to have a positive coefficient, while household debt is found to have a negative coefficient. In terms of size, the coefficient on financial assets tends to be larger

than that of housing assets in most of the specifications. The marginal propensity to consume out of financial assets is also larger than out of housing assets (Table 4). Smaller housing wealth effects may be found for several reasons: (i) the positive effect of higher house values can be offset by the increase in opportunity cost of housing services (Buiter, 2004); (ii) the benefits of higher house prices to incumbents is offset by costs to new entrants and higher rental for tenants (Aoki et al.,2002); and (iii) housing may be held as an end in itself and people may be unaware of short-run gains and losses (Case et al., 2005). In addition, the results suggest that the contribution to consumption from an increase in financial or housing assets would be more than offset if financed fully through in increase in household debt.

The results for net financial assets allow us to compare with earlier findings in the literature. The coefficient on net financial assets (Table 2, columns 3 and 6) of 0.01 is on the lower end of the range found in other studies. The coefficient on housing assets of 0.2 is somewhat higher than those found in previous studies, but our specification explicitly includes household debt which would have an offsetting effect.

Table 4. Marginal Propensity to Consume

	Long-run coefficients	Marginal propensity to consume
Labor income	0.569	0.543
PIT and SSC	-0.081	-0.212
Social benefits	0.331	0.996
Financial assets	0.333	0.030
Housing assets	0.195	0.021
Household debt	-0.370	-0.083

Note: To calculate the MPC, coefficients are divided by the ratio of the respective variable to consumption (average values of these ratios over the sample period).

The speed of adjustment coefficient is negative and significant in all regressions. A coefficient of -0.07 suggests that close to 30 percent of the deviation of household consumption from its long-run equilibrium level adjusts over four quarters. These results suggest that only relatively long-lived movements in resources levels can be expected to have a noticeable effect on consumption. The size of the coefficient is somewhat smaller than that found in other panel studies (Ludwig and Sløk (2001) find a coefficient of -0.096 and Barrell, Byrne and Dury (2003) find -0.13), likely because our sample includes the years of sharp swings related to the global financial crisis.

Only a few variables are found to consistently have significant effects on short-run consumption dynamics. Among the income variables, only labor income has a significant and positive coefficient across the various specifications. Among the wealth variables, only the coefficient on financial assets is found to be significant and positive effect across the various specifications (including when using net financial assets). The short-run coefficients on the unemployment

rate and the 10-year government bond yield are significant across specifications, but the size of the coefficients is close to zero. Two interest rate indicators, the ECB's mortgage lending rate for new borrowing and the long-term lending rate for new borrowing, were not statistically significant. Other studies have found the coefficient on interest rates to be ambiguous (for example Kerdrain, 2011), suggesting heterogeneity across countries in the interplay of substitution, income and wealth effects from interest rates. The small coefficient for unemployment suggests that precautionary savings may be subdued in the presence of more generous social safety nets.

We conducted several robustness checks of our results to account for possible cross-country institutional differences in access to financing and preferences for home ownership, shown in Table 5. Column 1 repeats our preferred specification. Column 2 includes only countries with household debt to GDP greater than 85 percent of gross disposable income on average during the sample period (therefore excluding France and Italy). Column 3 includes only countries with household debt to GDP greater than 110 percent of disposable income on average during the sample period (which excludes Finland, France, Germany, Italy, and Spain). Column 4 includes only countries with home ownership rates above 60 percent (this excludes Germany and Japan). Column 5 excludes countries that saw housing boom defined as countries with y/y house price increase of 8 percent (corresponds to the 75th percentile of the distribution) for 8 consecutive quarters (which excludes Denmark France, Ireland, Netherlands, Spain, Sweden, and United Kingdom).

We find that the sign and significance of the coefficients is broadly consistent across these different samples, although the size of coefficients does change somewhat. For countries with the highest household debt (column 3), we find that the coefficient on housing assets is higher than that of financial assets. It may be that in this case, housing has a higher elasticity because it is more evenly distributed, or it may be that higher household debt correlates with a greater ability to borrow against the rise in the value of housing collateral. For countries that did not see a housing boom (column 5), the coefficient on housing assets ceases to be significant.

Table 5. Determinants of Private Consumption: Alternative Samples

	1	2	3	4	5
Long-run coefficients					
Labor income	0.569***	0.553***	0.675***	0.623***	0.536***
	(0.103)	(0.100)	(0.093)	(0.101)	(0.086)
PIT and SSC	-0.081*	-0.076*	-0.092***	-0.081**	0.068
	(0.042)	(0.040)	(0.025)	(0.033)	(0.053)
Social benefits	0.331***	0.338***	0.302***	0.394***	0.377***
	(0.048)	(0.047)	(0.048)	(0.041)	(0.031)
Financial assets	0.333***	0.338***	0.234**	0.209***	0.081*
	(0.032)	(0.032)	(0.042)	(0.045)	(0.048)
Housing assets	0.195***	0.196***	0.139***	0.206***	0.082
	(0.035)	(0.035)	(0.027)	(0.031)	(0.050)
Household debt	-0.370***	-0.371***	-0.272***	-0.336***	-0.092**
	(0.025)	(0.024)	(0.028)	(0.025)	(0.044)
Speed of adjustment	-0.071**	-0.085**	-0.129***	-0.069***	-0.112*
(error correction)	(0.030)	(0.034)	(0.045)	(0.022)	(0.061)
Short-run coefficients					
Labor income	0.155**	0.151**	0.228***	0.184***	0.074
	(0.067)	(0.075)	(0.062)	(0.068)	(0.098)
PIT and SSC	0.023	0.035	0.054	0.035	0.120
	(0.081)	(0.094)	(0.102)	(0.071)	(0.101)
Social benefits	0.001	-0.009	-0.023	0.048	-0.121
	(0.056)	(0.064)	(0.080)	(0.035)	(0.111)
Financial assets	0.095**	0.105**	0.128**	0.065*	0.142
	(0.042)	(0.048)	(0.060)	(0.036)	(0.090)
Housing assets	0.174	0.212*	0.213	0.061	0.059
	(0.109)	(0.124)	(0.150)	(0.048)	(0.072)
Household debt	0.091	0.043	-0.026	0.140**	0.074
	(0.086)	(0.083)	(0.092)	(0.070)	(0.199)
Sovereign bond yield (10y)	-0.002***	-0.003***	-0.002**	-0.002**	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Unemployment rate	-0.003***	-0.003**	-0.003***	-0.003***	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)
Observations	549	468	342	519	184
Countries	14	12	9	12	7
St. deviation of residuals	0.018	0.021	0.014	0.014	0.019

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; PIT: Personal income tax; SSC: social security contributions. Variables are in log real terms, except for the unemployment rate, bond yield and the primary gap that are in percent.

Column 1 includes all 14 countries in the sample. Column 2 includes only countries with household debt to GDP greater than 85 percent of gross disposable income (therefore excluding France and Italy). Column 3 includes only countries with household debt to GDP greater than 110 percent of disposable income (which excludes Finland, France, Germany, Italy, and Spain). Column 4 includes only countries with home ownership rates above 60 percent (this excludes Germany and Japan). Column 5 excludes countries with a housing boom (countries with y/y house price increase of 8 percent (corresponds to the 75th percentile of the distribution) for 8 consecutive quarters (which excludes Denmark France, Ireland, Netherlands, Spain, Sweden, and United Kingdom).

VI. IT'S NOT ALL FISCAL

The analysis above can help inform the relative size of the different elements impacting private consumption. Clearly, the econometric analysis provides results based on an average across countries for the entire time period, which is likely to vary for every particular country at a particular point in time. Nonetheless, drawing on the average experience we can provide an overall picture of the different elements and their broad orders of magnitude.

Figure 7 provides the fitted values for the change in private consumption in the years leading up to the global crisis and in the years following. Based on Table 2, column 1, it groups the effects of labor income variables, fiscal variables, wealth variables, other and the residual. The figure shows that on average in the years prior the financial crises, strong labor income growth and rising wealth explain the bulk of the increase in consumption. It also shows that after 2008, falling wealth is the factor that pulls down consumption the most, especially in countries that saw the largest decline in private consumption.

Figure 7. Fitted Values for the Change in Private Consumption
(Cumulative change, in real logs)
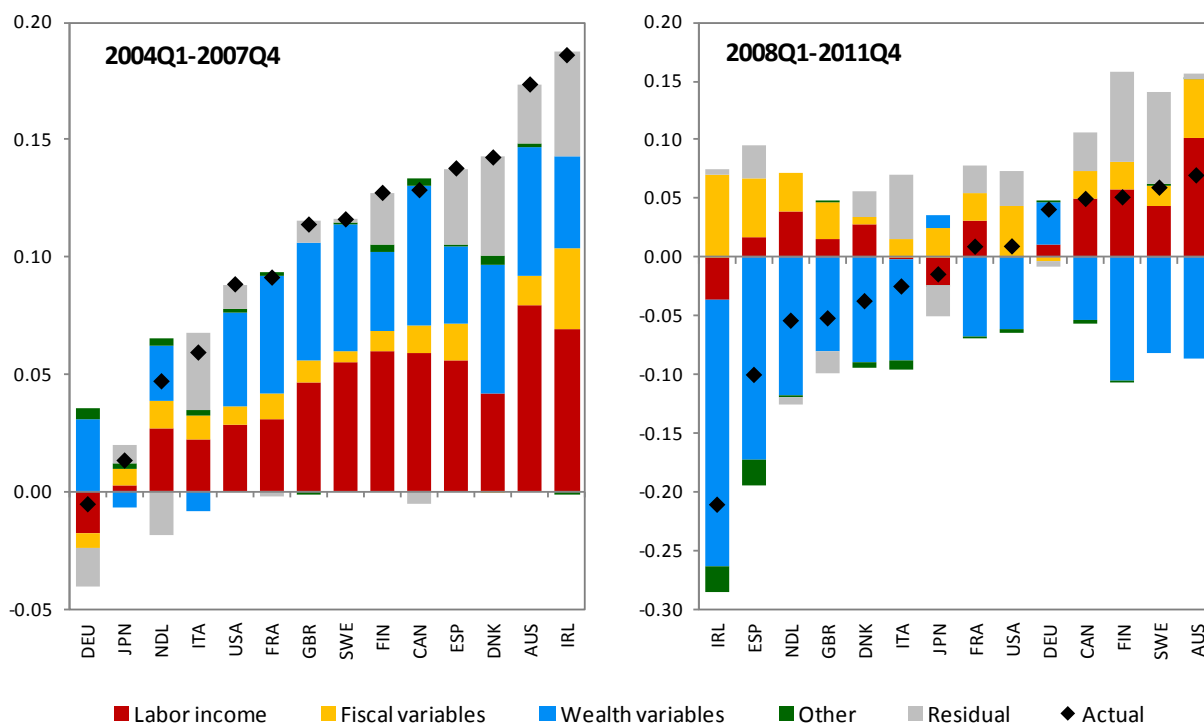
Note: For Canada, right panel corresponds to change between 2008Q4 and 2010Q4.

As further illustration, figures 8 and 9 provide the fitted values of the quarter on quarter change in consumption, with a breakdown of the individual factors for a selection of countries.

In the case of Ireland (Figure 8), rising housing assets boosted consumption in the mid-2000s, but part of this was offset by rising household debt. By 2007, consumption growth rates began

to fall as housing assets and housing prices declined. High household debt was also a drag on growth during this period and continued to have a negative impact. The decline in financial assets help explain the sharp fall in consumption in 2008 and early 2009, and their recovery helped offset some of the other negative factors on consumption. Since the mid-2000s, rising social benefits supported consumption. This continued even as the global crisis unfolded, including because in 2009 the government increased welfare and pension rates by 3 percent. The effect of social benefits began to narrow in 2011 in the context of the fiscal adjustment program. The impact of personal income taxes and social security contributions was relatively minor.

In the case of Spain (Figure 8), consumption in the mid-2000s was supported by rising labor income and housing assets, though weighed down somewhat by higher household debt. The stimulus package introduced in 2009 supported consumption to some extent, but this was not enough to offset the continued declines in housing assets, household debt, and mounting unemployment.

In the case of the United Kingdom (Figure 9), housing wealth is also shown to have had a sizeable effect on consumption before and during the global crisis. A rebound in housing and financial assets in late 2009 was short-lived, followed by a reversal in 2011, matched by a similar pattern in consumption. Financial assets continued to recover in 2012, supporting consumption growth. Stimulus measures in 2009 provided some support to consumption, but the effect of tax cuts appears to have been relatively small. Household debt had a dampening effect on consumption until 2011, when household debt began declining slightly.

In the case of the United States (Figure 9), as with the other countries, housing and financial assets supported consumption in the mid-2000s. Both started to weaken in already in late 2007. Among the examples discussed, the U.S. shows the largest impact of fiscal stimulus measures in 2009 and 2010. Measures on both the tax and spending side were the main elements supporting positive consumption growth starting in 2010.

Figure 8. Ireland and Spain, Fitted Values for Private Consumption
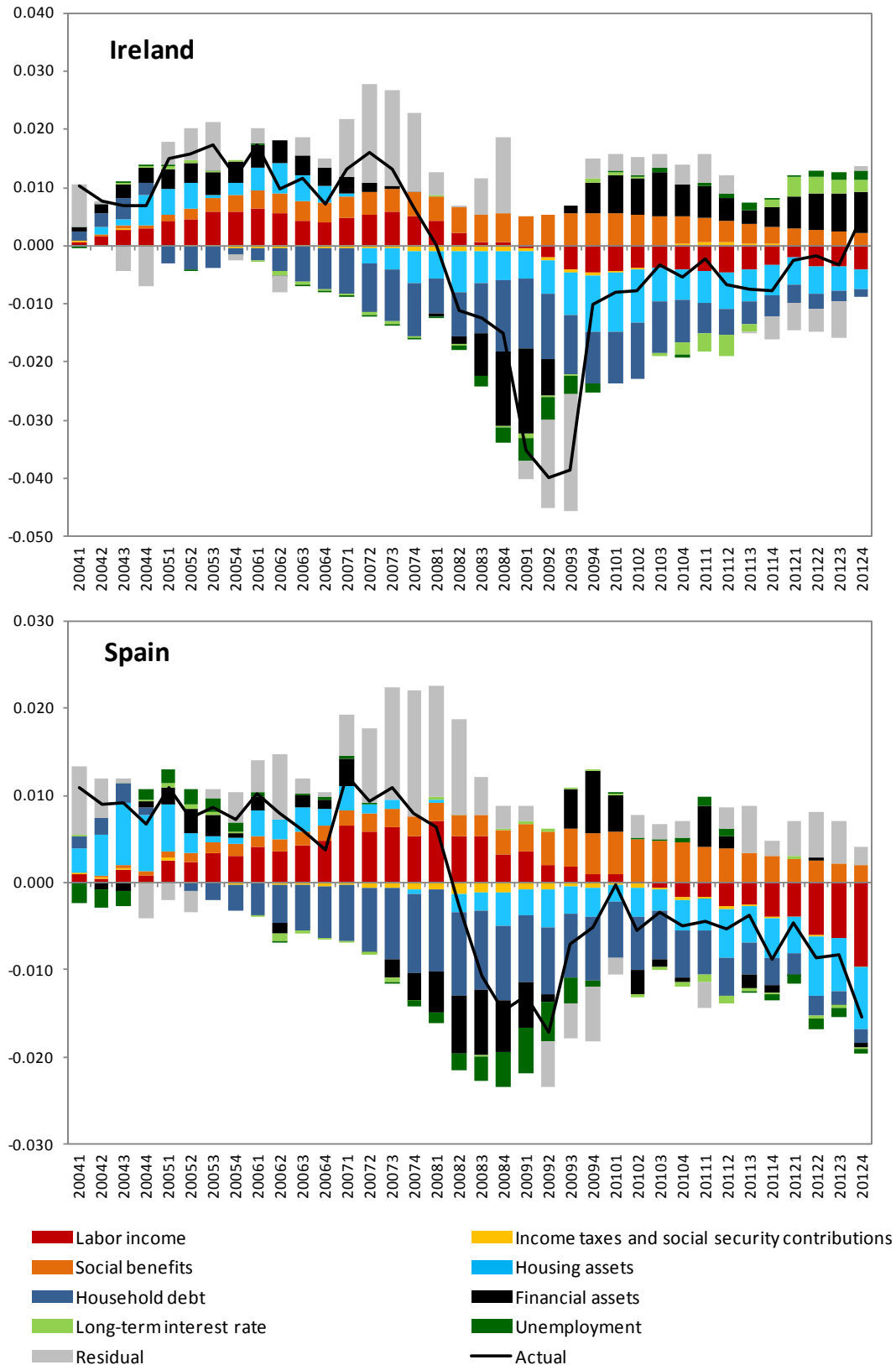*(Quarter on quarter change, in real logs)*

Legend:
- Labor income
- Social benefits
- Household debt
- Long-term interest rate
- Residual
- Income taxes and social security contributions
- Housing assets
- Financial assets
- Unemployment
- Actual

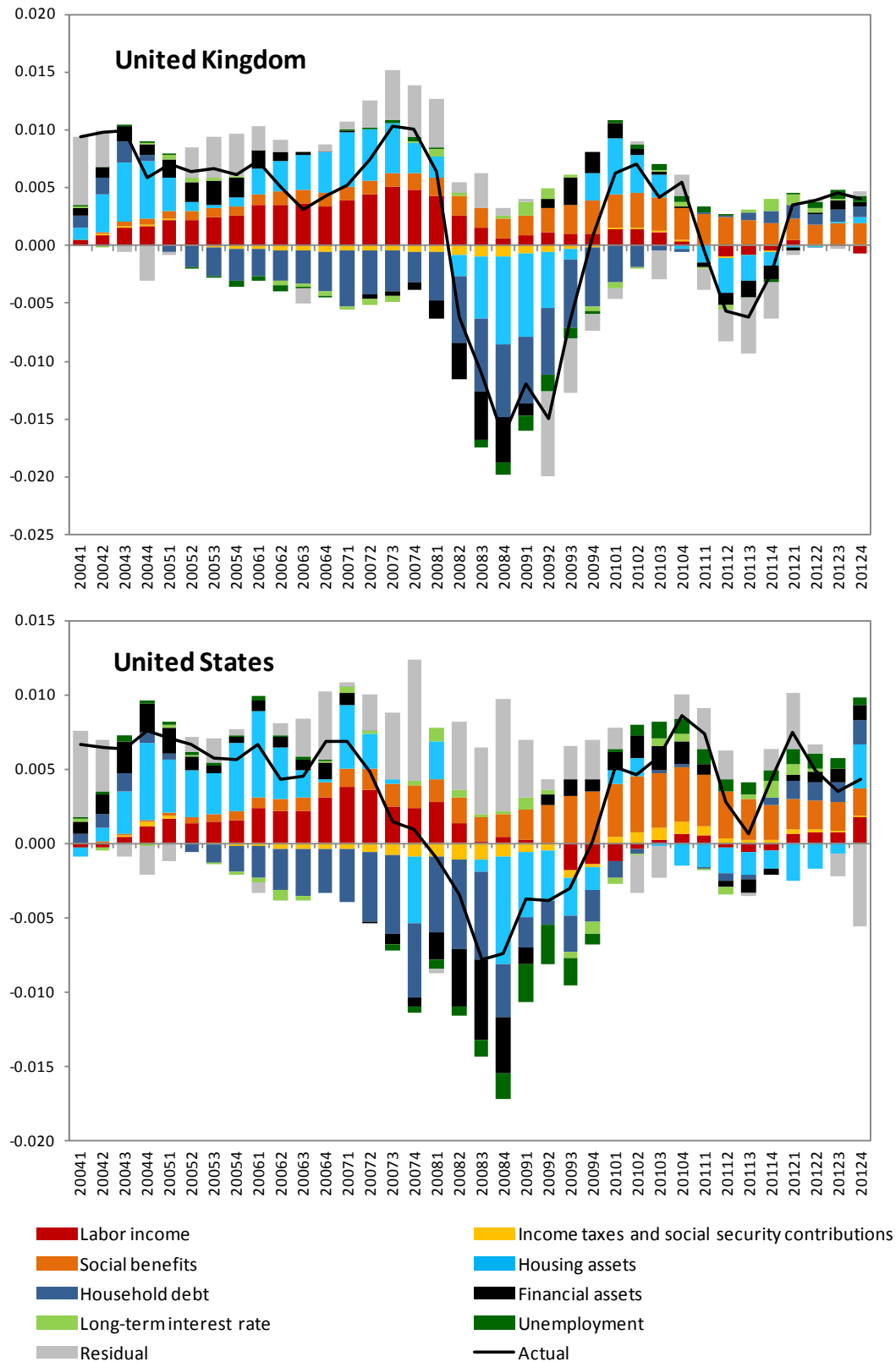**Figure 9. United Kingdom and United States, Fitted Values for Private Consumption**
(Quarter on quarter change, in real logs)

Legend:
- Labor income
- Income taxes and social security contributions
- Social benefits
- Housing assets
- Household debt
- Financial assets
- Long-term interest rate
- Unemployment
- Residual
- Actual

VII. CONCLUSIONS

We attempt to disentangle income and wealth effects on consumption by disaggregating both the different types of income and wealth. We estimate a consumption function for a panel dataset of 14 advanced economies spanning 2003Q1 to 2012Q4, using an error correction specification. We find a significant long-term relation between consumption and the different components of income and wealth. Labor income remains the main driver of consumption. Personal income taxes and social security contributions are found to have a negative impact on consumption, while social benefits are found to have a larger positive impact. Financial assets and housing assets are found to have a positive coefficient, while household debt is found to have a negative coefficient. Furthermore, the results suggest that the contribution to consumption from an increase in financial or housing assets would be more than offset if financed fully through in increase in household debt.

This analysis emphasizes that there were several elements at play in driving private consumption. In many cases, consumption trends were already deteriorating before the global crisis. Our findings show that wealth effects were sizeable, suggesting that the effect of fiscal policy on economic activity may be overestimated if such factors are overlooked.

There are several directions for further research. In particular, it would be interesting to analyze the effect of income and wealth effects on other components of GDP, for example on investment. It would also be interesting to explore where fiscal resources would have the most "bang-for the buck" in supporting consumption and economic activity, whether through higher transfers and lower taxes or through debt relief to households. These topics, which go well beyond the scope of this paper, are left for future analysis.

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