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"Collateralizable Wealth, Asset Returns, and Systemic Risk: International Evidence"

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Collateralizable Wealth, Asset Returns, and Systemic Risk: International Evidence

Ricardo M. Sousa [$]

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Abstract

I assess the role of wealth and systemic risk in explaining future asset returns. I show that the residuals of the trend relationship among asset wealth and human wealth predict both stock returns and government bond yields. Using data for a set of industrialized countries, I find that when the wealth-to-income ratio falls, investors demand a higher risk premium for stocks. As for government bond returns: (i) when they are seen as a component of asset wealth, investors react in the same manner; (ii) if, however, investors perceive the increase in government bond returns as signalling a future rise in taxes or a deterioration of public finances, then investors interpret the fall in the wealth-to-income ratio as a fall in future bond premia. Finally, I show that the occurrence of crises episodes (in particular, systemic crises) amplifies the transmission of housing market shocks to financial markets and the banking sector.

Keywords: Wealth; stock returns; government bond yields; systemic crises.
JEL classification: E21, E44, D12.

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1. Introduction

The sudden occurrence of the current crisis, its severity and potentially long-lasting effects, became key elements for understanding the impact of external influences, oil prices, private investment, stock markets or even duration dependence on the likelihood of an expansion and contraction ending (Castro, 2009).

A prompt answer from monetary policy and large fiscal stimulus have also become important ingredients of the attempt to recover economic activity. Notably, these interventions pose major challenges because they represent an valuable test to the long-term (un)sustainability of public accounts.[1] Moreover, they may cause business cycle de-synchronization (Rafiq and Mallick, 2008; Mallick and Mohsin, 2007, 2010) or impinge on the nexus between monetary stability and financial stability (Castro, 2008; Granville and Mallick, 2009; Sousa, 2010a).

The behaviour of asset markets is indeed of major importance for financial institutions, homeowners, monetary authorities and policy makers. In addition, the linkages between the financial markets and the banking system, the housing sector, and the monetary framework have emerged very strongly in the course of the financial turmoil. Not surprisingly, the relationship between macroeconomic variables, wealth, and long-term predictability of stock returns has revived the interest on the topic by academics (Sousa, 2010b).

The current paper addresses the role of wealth in analysing predictability of both stock and government bond returns for a set of industrialized countries. Specifically, I

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[1] In this context, Gabriel and Sangduan (2010a, 2010b) develop a Markov-switching cointegration framework that assesses long-run fiscal sustainability and allows to simultaneously determine the presence of fiscal regimes and analyze the timing of their transition. Ahmed and Rogers (1995) also analyze the issue of sustainability of public finances by looking at the cointegration between government spending and revenue.

assess the forecasting power of the ratio of asset wealth to human wealth for expected future returns.

The rationale behind this linkage lies on the fact that a decrease in asset wealth reduces the value of collateral and increases household exposure to idiosyncratic risk. Consequently, a decrease in that ratio predicts higher stock returns and increases and leads to a higher risk premium. As for government bond returns, first one needs to understand the way government debt is perceived by the agents. If government bonds are seen as a component of asset wealth, then investors demand a higher bond risk premium when they face a fall in the ratio of wealth. If, however, the issuance of government debt is understood to lead to an increase of future taxes or is seen as a symptom of public finance deterioration, then investors will interpret the fall in the housing wealth-to-income ratio as a fall in future government bond returns.

I show that the ratio of housing wealth to income, *rwy*, predicts both stock and government bond returns, which, therefore, highlights the characteristic of housing wealth as providing collateral to the banking system. It also emphasizes the important channel by which shocks originated in the housing market are transmitted to risk premium in asset markets. The empirical findings suggest that the predictive power is particularly important for horizons spanning from 4 to 6 quarters.

Then, I focus on importance of composition of asset wealth in the context of forecasting asset returns in a similar fashion as Sousa (2010b). The author shows that consumption reacts differently by category of asset wealth and that it is more sensitive to changes in financial wealth than to changes in housing wealth. Therefore, I assess the potential role of financial wealth as providing collateral services, namely, by assessing the forecasting power of the ratio of aggregate wealth (that is, the sum of housing and financial wealth) to income, *wy*, for both stock returns and government bond yields.

The predictive power of the *rwy* and *wy* measures for real stock returns is substantial, ranging between 31% (UK), 20% (Belgium), and 11% (Ireland), and 10% (Finland and the US) over the next 4 quarters. As for Japan and Spain, those proxies do not seem to capture well the time-variation in stock returns.

In what concerns government bond returns, the analysis suggests that one can cluster the set of countries in two groups. In the first group (which includes Australia, Finland and Netherlands), both *rwy* and *wy* have an associated coefficient with negative sign in the forecasting regressions. This, therefore, corroborates the idea that government debt is seen as part of the investor's asset wealth. In the second group (which includes Germany and Italy), the forecasting regressions show that both *rwy* and *wy* have an associated coefficient that is positive. Consequently, agents in these countries perceive the rise in government bond returns rather as a deterioration of public finances and as signalling an increase in future taxation.

Finally, I ask about the importance of episodes of crises in amplifying the transmission of shocks in the housing market to the financial system. In particular, I assess whether the occurrence of systemic *versus* non-systemic crises can help improving our understanding about the linkages between housing and financial markets. I show that the predictive power of future asset returns is indeed improved when one takes into account the presence of crises episodes, specially, the systemic ones.

The robustness of the results is analysed in several directions. In fact, I show that: (i) the inclusion of additional control variables does not change the predictive power of *rwy* and *wy*; and (ii) models that include *rwy* and *wy* perform better than the autoregressive and the constant expected returns benchmark models.

The paper is organized as follows. Section 2 reviews the literature on the predictability of asset returns. Section 3 describes the theoretical approach. Section 4 presents the estimation results of the forecasting regressions for stock returns and government bond yields. Section 5 provides the robustness analysis. Section 6 analyses the role of systemic risk in the amplification of the strength between the linkages among housing market developments and financial markets. Finally, in Section 7, I conclude and discuss the implications of the findings.

2. Literature review

The current financial turmoil has revealed the strength of the linkages between the housing market, the banking sector, and the financial system.

In rich countries, private credit is offered not only by deposit money banks (as it happens in the case of developing countries), but also by banks and other financial institutions such as development banks, insurance companies, and private pension funds, private and public corporate bond and public equity markets.

Given that a bank cannot be certain about a borrower's ability and perfect monitoring of the borrower's effort is costly, it is often forced to design contracts in order to achieve the first-best outcome (Ebrahim and Mathur, 2006). However, when collateral is scarce and contract enforcement is weak, the optimal allocation - where low-risk entrepreneurs pay a low interest rate and high-risk individuals pay a high interest rate – and pricing of loans (Greenbaum et al., 1989) is not achievable and credit is rationed or credit risk is affected (Jiménez and Saurina, 2004).

The efficiency of the housing finance system is also of key interest to financial institutions, homeowners, and policy makers, and Cole et al. (2008) highlight the relationship between bank stock returns and economic growth. Liquidity and collateralizable wealth play, therefore, a major role for asset pricing.[2] First, liquidity shocks are positively correlated with shocks to returns. Second, assets have higher expected returns when they are positively correlated with aggregate market liquidity (Pastor and Stambaugh, 2003). Third, assets with high transaction costs or ililiquid assets normally trade at a discount (Amihud and Mendelson, 1986).

In this section, I review the literature on the predictability of stock returns and government bond returns, in particular, by highlighting the works that focus on the linkages between wealth and asset returns.[3]

2.1. Predictability of stock returns

Risk premium is generally considered as reflecting the ability of an asset to insure against consumption fluctuations. The empirical evidence has, however, shown that the covariance of returns across portfolios and contemporaneous consumption growth is not sufficient to justify the differences in expected returns. In fact, the literature on asset pricing has concluded that inefficiencies of financial markets (Fama and French, 1996), the rational response of agents to time-varying investment opportunities that is driven by variation in risk aversion and in the joint distribution of consumption and asset returns (Duffee, 2005).

Different economically motivated variables have been, therefore, developed to capture time-variation in expected returns and document long-term predictability. Lettau and Ludvigson (2001) show that the transitory deviation from the common trend in

[2] Beltratti and Morana (2010) analyze the importance of house prices in explaining macroeconomic fluctuations, while Koetter and Poghosyan (2010) look at its role for bank stability.

[3] In this context, Guo (2006) assesses the issue of time-variation in risk premium for stocks at the cross-sectional dimension, while Kessler and Scherer (2009) focus on international bond markets. Additionally, Priestley (2001) looks at time-variation of persistence in expected returns.

consumption, aggregate wealth and labour income is a strong predictor of stock returns. Lustig and Van Nieuwerburgh (2005) highlight the importance of housing in shifting the conditional distribution of asset prices and consumption growth. Yogo (2006) and Piazzesi et al. (2007) emphasize the role of non-separability of preferences and Fernandez-Corugedo et al. (2007) focus on the relative price of durable goods.

2.2. Predictability of bond returns

In contrast with the literature on the predictability of stock returns, there are just a few studies that try to explain the factors undermining bond risk premia. Fama and Bliss (1987) show that the spread between the *n*-year forward rate and the one-year yield can forecast the *n*-year excess bond returns. Campbell and Shiller (1991) find that excess bond returns can be predicted by the Treasury yield spreads. More recently, Cochrane and Piazzesi (2005) suggest that a single tent-shaped linear combination of forward rates explains up to 44% of the variation in next year's excess returns on bonds with maturities ranging from one to five years. Ludvigson and Ng (2009) find marked countercyclical variation in bond risk premia.

While these findings imply that bond risk premium is time-varying, they are, in general, silent regarding its relationship with macroeconomic magnitudes. Moreover, they tend to find that excess bond returns can be forecasted not by wealth aggregates or macroeconomic variables such as consumption or inflation, but rather by pure financial indicators such as forward spreads and yield spreads.

3. Theoretical framework and empirical approach

3.1. Wealth and risk premium

I assume that there is a continuum of agents who consume nondurable consumption, c_t, and wealth services (for instance, liquidity or collateral services), w_t, and are endowed with stochastic labor income, $y_t(i_t, a_t)$, where i_t represents the idiosyncratic event and a_t denotes the aggregate event.

The household maximizes utility, that is

$$U(c,w) = \sum_{s_t|s_0} \sum_{t=0}^{\infty} \beta^t p(s_t \mid s_0) u(c_t(s_t), w_t(s_t)), \qquad (1)$$

where β is the time discount factor, s_t represents the state of the economy, $p(s_t \mid s_0)$ denotes the probability of state s_t given the initial state s_0, and preferences are specified by

$$u(c_t, w_t) = \left[c_t^{(\varepsilon-1)/\varepsilon} + \psi w_t^{(\varepsilon-1)/\varepsilon}\right]^{(1-\gamma)\varepsilon/(\varepsilon-1)} /(1-\gamma), \qquad (2)$$

where ψ >0 captures the importance of wealth in the utility function, ε is the intratemporal elasticity of substitution between consumption and wealth services, and γ is the coefficient of risk aversion.

The solvency constraints are restrictions on the value of the household's consumption claim net of its labour income claim, that is:

$$\Lambda_{s_t}\left[c_t(s_t) + \rho_t(a_t) w_t(s_t)\right] \geq \Lambda_{s_t}\left[y_t(s_t)\right], \qquad (3)$$

where $\Lambda_{s_t}[d_t(s_t)]$ represents the price of a claim to $d_t(s_t)$, and ρ_t is the rental price of wealth services.

The strength of the solvency constraints is determined by the ratio of asset wealth to human wealth (i.e., the wealth-to-income ratio), *wy*,

$$wy_t(a_t) = \Lambda_{z_t}\left[\rho w^a\right] / \Lambda_{z_t}\left[c^a\right]. \qquad (4)$$

where w^a and c^a correspond, respectively, to aggregate wealth and aggregate consumption.

Equilibrium allocations and prices will depend on the consumption weight θ as follows: 1) if the household *does not switch* to a state with a binding constraint, it is $\theta_t'(\theta, s_t)$; and 2) if it *switches*, then the new weight is the cutoff level $\underline{\theta}_t(y_t, a_t)$.

In order to obtain aggregate consumption, one integrates over the new household weights, that is, $\zeta_t^a(a_t) = \int \theta'_t(\theta, s_t) d\Phi_t(\theta; a_t)$, where $\Phi_t(\bullet; a_t)$ represents the distribution over weights at the start of period *t*. The consumption share of an agent can then be represented as the ratio of his consumption weight to the aggregate consumption weight $c_t(\theta, s_t) = \theta'_t(\theta, s_t) \cdot c_t^a(a_t) / \zeta_t^a(a_t)$ and, similarly, for the wealth share of an agent $w_t(\theta, s_t) = \theta'_t(\theta, s_t) \cdot w_t^a(a_t) / \zeta_t^a(a_t)$,

where $\zeta_t^a(a_t)$ defines a nondecreasing stochastic process.

As the ratio of wealth to income, *wy,* decreases, the cutoff levels for the consumption weights increase, $\underline{\theta}(y_t, a_t) / \zeta_t^a(a_t)$, and, if the consumer moves to a state where the constraint is binding, then the cutoff level for the consumption share equals the household’s labour income share. As a result, when the ratio of wealth to income decreases, the household’s exposure to income shocks increases and a higher risk premium is demanded.

3.2. Wealth and labour income

Log real per capita asset wealth (log *w*), and labour income (log *y*) are nonstationary. As a result, I estimate the following vector error correction model (VECM):

$$\begin{bmatrix} \Delta \log(w_t) \\ \Delta \log(y_t) \end{bmatrix} = \alpha \left[\log(w_t) + \varpi \log(y_t) + \vartheta t + \chi \right] + \sum_{k=1}^{K} D_k \begin{bmatrix} \Delta \log(w_{t-k}) \\ \Delta \log(y_{t-k}) \end{bmatrix} + \varepsilon_t . \quad (5)$$

The K error correction terms allow one to eliminate the effect of regressor endogeneity on the distribution of the least-squares estimators of $[1, \varpi, \vartheta, \chi]$.

The components log (w) and log (y) are stochastically cointegrated and I impose the restriction that the cointegrating vector eliminates the deterministic trends, so that $\log(w_t) + \varpi \log(y_t) + \vartheta t + \chi$ is stationary. Then, the ratio of wealth to income, wy, is measured as the deviation from the cointegration relationship:

$$wy_t = \log(w_t) + \hat{\varpi} \log(y_t) + \hat{\vartheta} t + \hat{\chi} .\text{[4]} \quad (6)$$

Finally, I estimate the ratio of the real estate wealth, rw, to income. As before, one considers the following vector error-correction model

$$\begin{bmatrix} \Delta \log(rw_t) \\ \Delta \log(y_t) \end{bmatrix} = \alpha \left[\log(rw_t) + \varpi \log(y_t) + \vartheta t + \chi \right] + \sum_{k=1}^{K} D_k \begin{bmatrix} \Delta \log(rw_{t-k}) \\ \Delta \log(y_{t-k}) \end{bmatrix} + \varepsilon_t , (7)$$

from which the ratio of collateralizable wealth, rwy, is measured as:

$$rwy_t = \log(rw_t) + \hat{\varpi} \log(y_t) + \hat{\vartheta} t + \hat{\chi} . \quad (8)$$

4. Results

4.1. Data

The data are quarterly, post-1960, and include sixteen countries (Australia, since 1970:1; Austria, since 1978:2; Belgium, since 1980:2; Canada, since 1965:1; Denmark, since 1977:1; Finland, since 1979:1; France, since 1970:2; Germany, since 1965:1;

[4] The ratio of housing wealth to income is also measured by estimating the constant, χ, and the trend, ϑ, in the cointegrating relationship while imposing the restriction $\varpi = -1$. However, the results do not significantly change.

Ireland, since 1975:4; Italy, since 1971:4; Japan, since 1965:1; the Netherlands, since 1975:1; Spain, since 1978:1; Sweden, since 1977:1; the UK, since 1961:2; and the US, since 1965:1). It, therefore, cover the last 30 to 50 years of data.

Labour income is approximated with compensation series of the NIESR Institute. In the case of the US, I follow Lettau and Ludvigson (2001). As for the UK, I follow Sousa (2010b).

Wealth includes financial and housing wealth and data come from National Central Banks, the Eurostat, the Bank for International Settlements (BIS), the United Nation's Bulletin of Housing Statistics for Europe and North America.

Stock returns are computed using the share price index provided by the International Financial Statistics (IFS) of the International Monetary Fund (IMF) and the dividend yield ratio provided by Datastream. The 10-year government bond yield data is also provided by the IFS of the IMF.

The government finance data normally refers to the Central Government, therefore, with the exclusion of the Local and/or the Regional Authorities. It is typically disseminated through the monthly publications of the General Accounting Offices, Ministries of Finance, National Central Banks and National Statistical Institutes of the respective countries. The latest figures are also published in the Special Data Dissemination Standard (SDDS) section of the International Monetary Fund (IMF) website.

Data for population are taken from OECD's Main Economic Indicators and interpolated from annual series.

Finally, all series – with the obvious exceptions of stock returns and government bond yields - were deflated with consumption deflators, expressed in logs of per capita terms and seasonally adjusted.

4.2. The long-run relation

I first use the augmented Dickey-Fuller and the Phillips-Perron tests to determine the existence of unit roots in the series and conclude that all the series are first-order integrated, *I(1)*. Next, I analyze the existence of cointegration among the series, using the Engle-Granger methodology and find evidence that supports that hypothesis.[5] Finally, I estimate the vector error-correction model (VECM) as expressed in (5) and (7).[6]

Table 1.1 shows the estimates (ignoring coefficient estimates on the constant and the trend) for the shared trend among housing wealth and income. It can be seen that, with the exceptions of Canada, France and Spain, the long-run elasticity of housing wealth with respect to labour income is positive, implying that the two aggregate tend to share a positive long-run path. The table also presents the unit root tests to the residuals of the cointegration relationship based in the Engle-Granger methodology and shows that they are stationary (that is, one can reject the null of a unit root).

Table 1.2 reports the estimates (ignoring coefficient estimates on the constant and the trend) for the shared trend among aggregate wealth and income. First, it shows that the coefficient associated to income in the cointegrating vection is statistically significant for all countries, therefore, giving rise to the linkage between aggregate wealth and income is economically meaningful. Second, the point estimates for income are positive (with the exception of Denmark) in accordance with the findings of Table 1.1. This suggests that not only housing wealth but also financial wealth can be used as

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[5] I also use the Johansen-Juselius and the Phillips-Ouliaris methodologies to detect cointegration and the results remain robust.

[6] Gabriel (2003) discusses the joint use of stationarity and unit root tests in the case of cointegration.

collateral. Finally, the cointegration tests suggest that the residuals of the cointegration relationship among aggregate wealth and income are stationary.

Table 1.1 – Cointegration estimations.

	$\hat{\varpi}$	ADF t-statistic	Critical values	
		Lags: 1	5%	10%
Australia	1.89*** (2.57)	-2.28	-1.94	-1.62
Austria	27.75*** (4.62)	-4.78	-1.94	-1.62
Belgium	4.73*** (8.37)	-4.85	-1.94	-1.62
Canada	-10.20*** (-2.93)	-3.09	-1.94	-1.62
Denmark	12.38*** (3.42)	-2.22	-1.94	-1.62
Finland	1.80*** (3.81)	-3.18	-1.94	-1.62
France	-4.01*** (-2.95)	-2.89	-1.94	-1.62
Germany	0.54*** (2.87)	-3.38	-1.94	-1.62
Ireland	4.09*** (5.58)	-2.77	-1.94	-1.62
Italy	1.25*** (3.00)	-3.32	-1.94	-1.62
Japan	2.18*** (5.79)	-2.74	-1.94	-1.62
Netherlands	4.17*** (8.31)	-3.64	-1.94	-1.62
Spain	-20.49* (-1.40)	-1.95	-1.94	-1.62
Sweden	4.63*** (3.47)	-2.00	-1.94	-1.62
UK	2.59*** (3.73)	-2.10	-1.94	-1.62
US	4.48*** (9.31)	-2.30	-1.94	-1.62

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 1.2 – Cointegration estimations.

	$\hat{\varpi}$	ADF t-statistic	Critical values	
		Lags: 1	5%	10%
Australia	1.73*** (3.72)	-2.04	-1.94	-1.62
Austria	7.52** (4.03)	4.53	-1.94	-1.62
Belgium	1.06** (2.05)	-3.16	-1.94	-1.62
Canada	2.89*** (4.11)	-3.12	-1.94	-1.62
Denmark	-6.35* (1.87)	-2.88	-1.94	-1.62
Finland	2.17*** (12.53)	-2.73	-1.94	-1.62
France	1.04*** (3.05)	-2.68	-1.94	-1.62
Germany	0.63*** (2.76)	-3.78	-1.94	-1.62
Ireland	1.99*** (4.72)	-2.51	-1.94	-1.62
Italy	1.10*** (3.73)	-3.55	-1.94	-1.62
Japan	1.94*** (4.56)	-2.38	-1.94	-1.62
Netherlands	1.08** (1.92)	-3.43	-1.94	-1.62
Spain	4.60*** (4.71)	-2.64	-1.94	-1.62
Sweden	1.19* (1.56)	-2.17	-1.94	-1.62
UK	0.79* (1.36)	-2.31	-1.94	-1.62
US	0.53* (1.45)	-2.06	-1.94	-1.62

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

4.3. Forecasting stock returns

Section 3 shows that transitory deviations from the long-run relationship among wealth and income, wy_t, mainly reflect agents' expectations of future changes in asset returns. Moreover, when I allow for real estate wealth to provide collateral services, I assess whether the deviations of real estate wealth from its trend relationship with income, *rwy*, help forecasting expected future returns.

I look at real stock returns (denoted by SR_t) for which quarterly data are available and should provide a good proxy for the non-human component of asset wealth.

Table 2.1 summarizes the forecasting power of rwy_t for different horizons. It reports estimates from OLS regressions of the H-period real stock return, $SR_{t+1} + \ldots + SR_{t+H}$, on the lag of rwy_t. Therefore, I estimate the following model:

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta rwy_{t-1} + \varepsilon_t \,. \qquad (9)$$

It shows that rwy_t is statistically significant for a large number of countries and the point estimate of the coefficient is large in magnitude. Moreover, its sign is: (i) negative and statistically significant for Australia, Germany, Finland, Italy and the UK; and (ii) positive and statistically significant for Belgium, Denmark, Sweden and the US. These results suggest that for the first set of countries, investors expect a fall in future stock returns when they observe a rise in the ratio of housing wealth to income. As for the second set of countries, investors forecast an increase in future stock returns when they observe a rise in the ratio of housing wealth to income.

It can also be seen that the trend deviations explain an important fraction of the variation in future real returns (as described by the adjusted R^2), in particular, at horizons spanning from 4 to 8 quarters. In fact, at the 4 quarter horizon, rwy_t explains 17% (Belgium), 10% (Australia and Sweden), 8% (Finland and the UK), 6% (US) and 5% (Japan) of the real stock return. In contrast, its forecasting power is poor for countries such as Austria, Canada, France, Ireland, Japan, Netherlands and Spain.

Table 2.2 reports the forecasting power of wy_t for different horizons, and follows the estimation of the model:

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta wy_{t-1} + \varepsilon_t \qquad (10)$$

In accordance with the findings for rwy_t, it shows that wy_t is statistically significant for almost all countries (with the exceptions of Japan and Spain), the point estimate of the coefficient is large in magnitude. Moreover, its sign is negative. These results suggest that investors expect an increase in future stock returns when they face a fall in the aggregate wealth – income ratio.

Table 2.1 – Real stock returns, estimated effect of *rwy*.

	Forecast Horizon *H*				
	1	2	3	4	8
Australia	-0.20***	-0.40***	-0.53***	-0.64***	-0.99***
	(-2.61)	(-3.23)	(-3.58)	(-3.70)	(-3.83)
	[0.05]	[0.13]	[0.16]	[0.10]	[0.12]
Austria	0.00	0.00	0.00	0.00	-0.02*
	(0.59)	(0.43)	(0.46)	(0.20)	(-1.92)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]
Belgium	0.17***	0.34***	0.49***	0.62***	0.93***
	(2.92)	(3.80)	(4.28)	(4.41)	(4.71)
	[0.08]	[0.12]	[0.15]	[0.17]	[0.16]
Canada	-0.00	-0.00	0.00	0.01	0.04
	(-0.34)	(-0.13)	(0.13)	(0.36)	(1.37)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.02]
Denmark	0.03***	0.05***	0.08***	0.11***	0.23***
	(2.33)	(2.76)	(2.85)	(3.18)	(3.96)
	[0.03]	[0.04]	[0.04]	[0.05]	[0.11]
Finland	-0.11**	-0.25***	-0.39***	-0.52***	-1.06***
	(-2.07)	(-2.88)	(-3.12)	(-3.24)	(-3.53)
	[0.02]	[0.05]	[0.06]	[0.08]	[0.13]
France	-0.01	-0.03	-0.03	-0.01	0.10
	(-0.43)	(-0.61)	(-0.51)	(-0.22)	(1.06)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]
Germany	-0.27**	-0.56***	-0.87***	-1.18***	-2.10***
	(-2.38)	(-3.27)	(-4.03)	(-4.75)	(-7.39)
	[0.04]	[0.06]	[0.08]	[0.11]	[0.16]
Ireland	0.04	0.10	0.15	0.18	0.02
	(0.87)	(1.31)	(1.53)	(1.50)	(0.10)
	[0.00]	[0.01]	[0.01]	[0.01]	[0.00]
Italy	-0.25**	-0.41**	-0.47*	-0.43	0.23
	(2.14)	(-2.07)	(1.92)	(-1.63)	(0.87)
	[0.06]	[0.05]	[0.04]	[0.02]	[0.00]
Japan	0.08	0.13	0.17	0.19	0.07
	(1.20)	(1.18)	(1.22)	(1.11)	(0.31)
	[0.02]	[0.02]	[0.02]	[0.02]	[0.00]
Netherlands	0.02	0.00	-0.03	-0.06	-0.28
	(0.23)	(0.04)	(-0.18)	(-0.30)	(-0.95)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]
Spain	-0.01	-0.01	-0.01	-0.02	-0.01
	(-1.38)	(-1.24)	(-1.08)	(-0.98)	(-0.39)
	[0.02]	[0.02]	[0.01]	[0.01]	[0.00]
Sweden	0.16***	0.29***	0.38***	0.47***	0.86***
	(2.80)	(3.27)	(3.44)	(3.65)	(5.25)
	[0.07]	[0.09]	[0.09]	[0.10]	[0.18]
UK	-0.20*	-0.34*	-0.46*	-0.54*	-0.59**
	(-1.75)	(-1.71)	(-1.78)	(-1.82)	(-2.13)
	[0.06]	[0.06]	[0.08]	[0.08]	[0.05]
US	0.16*	0.33**	0.45**	0.62***	1.42***
	(1.81)	(2.16)	(2.32)	(2.71)	(4.89)
	[0.03]	[0.04]	[0.05]	[0.06]	[0.16]

Notes: Newey-West corrected t-statistics appear in parenthesis. Adjusted R-square is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 2.2 – Real stock returns, estimated effect of *wy*.

	Forecast Horizon *H*				
	1	2	3	4	8
Australia	-0.22***	-0.45***	-0.62***	-0.77***	-1.28***
	(2.65)	(-3.40)	(-3.80)	(-3.92)	(-4.81)
	[0.05]	[0.09]	[0.11]	[0.12]	[0.18]
Austria	-0.01	-0.02	-0.03	-0.05*	-0.15***
	(-0.79)	(-1.28)	(-1.55)	(-1.86)	(-3.90)
	[0.00]	[0.01]	[0.01]	[0.01]	[0.06]
Belgium	-0.21**	-0.43***	-0.65***	-0.89***	-1.85***
	(-2.49)	(-3.79)	(5.31)	(-6.65)	(-10.42)
	[0.07]	[0.11]	[0.16]	[0.20]	[0.37]
Canada	-0.04	-0.08	-0.12	-0.15*	-0.27**
	(-0.92)	(-1.28)	(-1.47)	(-1.67)	(-1.98)
	[0.01]	[0.01]	[0.02]	[0.02]	[0.04]
Denmark	-0.03***	-0.05***	-0.08***	-0.11***	-0.24***
	(-3.39)	(-4.39)	(-4.56)	(-5.09)	(-6.23)
	[0.04]	[0.06]	[0.07]	[0.09]	[0.19]
Finland	-0.21	-0.48*	-0.82***	-1.17***	-2.25***
	(-1.37)	(-1.95)	(-2.56)	(-3.07)	(-5.20)
	[0.02]	[0.04]	[0.07]	[0.10]	[0.15]
France	-0.26***	-0.51***	-0.79***	-1.08***	-2.11***
	(-2.59)	(-3.05)	(-3.67)	(-4.35)	(-7.07)
	[0.06]	[0.09]	[0.13]	[0.17]	[0.30]
Germany	-0.23**	-0.47***	-0.78***	-1.11***	-2.10***
	(-2.15)	(-2.99)	(-3.88)	(-4.82)	(-9.11)
	[0.03]	[0.05]	[0.09]	[0.12]	[0.20]
Ireland	-0.36***	-0.64***	-0.93	-1.24***	-2.22***
	(-2.53)	(-2.96)	(-3.38)	(-3.74)	(-5.17)
	[0.05]	[0.06]	[0.08]	[0.11]	[0.16]
Italy	-0.43***	-0.72***	-0.87***	-0.88**	-0.17
	(-2.55)	(-2.55)	(-2.50)	(-2.32)	(-0.41)
	[0.09]	[0.09]	[0.07]	[0.05]	[0.00]
Japan	0.03	0.04	0.05	0.03	-0.24
	(0.37)	(0.30)	(0.32)	(0.16)	(-1.19)
	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]
Netherlands	-0.12**	-0.28***	-0.48***	-0.65***	-1.31***
	(-2.00)	(-3.15)	(-4.25)	(-4.93)	(-7.03)
	[0.03]	[0.07]	[0.12]	[0.14]	[0.24]
Spain	0.03	0.02	0.01	0.02	-0.10
	(0.35)	(0.20)	(0.09)	(0.13)	(-0.47)
	[0.00]	[0.00]	[0.00	[0.00]	[0.00]
Sweden	-0.34***	-0.68***	-0.94***	-1.15***	-2.05***
	(-2.94)	(-3.84)	(-4.16)	(-4.39)	(-5.59)
	[0.09]	[0.14]	[0.17]	[0.18]	[0.29]
UK	-0.28***	-0.54***	-0.79***	-0.98***	-1.49***
	(-3.70)	(-4.10)	(-4.51)	(-4.73)	(-5.43)
	[0.13]	[0.19]	[0.27]	[0.31]	[0.22]
US	-0.16***	-0.30***	-0.43***	-0.55***	-1.06***
	(-3.63)	(-3.91)	(-4.13)	(-4.45)	(-5.35)
	[0.05]	[0.10]	[0.09]	[0.10]	[0.17]

Notes: Newey-West corrected t-statistics appear in parenthesis. Adjusted R-square is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

The trend deviation, wy_t, explains 31% (UK), 20% (Belgium), 18% (Sweden), 17% (France), 14% (Netherlands), 12% (Australia and Germany), 11% (Ireland), and

10% (Finland and the US) of stock returns over the next 4 quarters. Its forecasting power is poor for Japan and Spain.

Noticeably, it is important to emphasize that, in general, wy_t performs better than rwy_t, also in accordance with the findings of Sousa (2010b), reflecting the ability of wy_t to track the changes in the composition of asset wealth. Portfolios with different compositions of assets are subject to different taxation, transaction costs or degrees of liquidity: for example, agents who hold portfolios where the exposure to housing wealth is larger bear an additional risk associated with the (il)liquidity of these assets and the high transaction costs involved in trading them up or down. Wealth composition is, therefore, an important source of risk that wy_t - but not rwy_t - is able to explain. Moreover, it highlights that financial wealth – and not only housing wealth - can provide important collateral services to investors.

4.4. Forecasting government bond returns

I now look at the power of rwy_t (Table 3.1) and wy_t (Table 3.2) in predicting bond returns (proxied by the government bond yields and denoted by BR_t) for which quarterly data are available. As mentioned before, one needs to keep in mind that, in contrast with stocks, an increase in government debt (in particular, in the government bond return) may not be seen as a rise in wealth, but may be perceived as a mere signal of a future increase in taxes. As a result: (i) when agents see government debt as a component of wealth, one should expect a negative point coefficient for rwy_t and/or wy_t in the forecasting regressions for government bond yields; and (ii) when investors interpret the rise in government debt as a signal of future tax rises, deviations in the long-term trend among housing wealth and income (rwy_t) or in the long-term trend among aggregate wealth and income (wy_t) should be positively related to future government bond returns.

Table 3.1 summarizes the forecasting power of rwy_t for different horizons. It reports estimates from OLS regressions of the H-period real government bond return, $BR_{t+1} + \ldots + BR_{t+H}$, on the lag of rwy_t, as described by the model:

$$\sum_{h=1}^{H} BR_{t+h} = \alpha + \beta rwy_{t-1} + \varepsilon_t . \qquad (11)$$

It shows that rwy_t is statistically significant for almost all countries (with the exception of Austria) and the point estimate of the coefficient is large in magnitude. It can also be seen that the trend deviations explain an important fraction of the variation in future bond yields (as described by the adjusted R^2), in particular, at horizons spanning from 4 to 8 quarters. In fact, at the 4 quarter horizon, rwy_t explains In fact, at the 4 quarter horizon, wy_t explains 49% (Spain), 29% (US), 28% (Belgium), 13% (Finland), 12% (Ireland), and 11% (Germany and Netherlands) of the bond returns.

Interestingly the results suggest that the sign of the coefficient of rwy_t is negative for Australia, Finland, Netherlands and Spain and positive for Belgium, Canada, France, Germany, Ireland, Italy, Japan, Sweden, the UK and the US. This piece of evidence corroborates the idea that government debt is seen as part of investor's wealth for the first set of countries: in the outcome of a fall in the ratio of housing wealth to income, agents allow consumption to rise because they expect yields to increase in the future. As for the second set of countries, agents perceive the rise in government bond returns as a deterioration of the public finances and an increase in future taxation. As a result, they reduce consumption when they observe a rise in the ratio of housing wealth to income.

In practice, these results largely reflect higher sustainability of public finances in the first set of countries. In the case of the second set of countries, they characterize well the relatively frequent swings in public deficits and government debt and the concerns about the long-term sustainability of public finances.

Table 3.2 summarizes the results from forecasting regressions of wy_t for different horizons, where I estimate the following model:

$$\sum_{h=1}^{H} BR_{t+h} = \alpha + \beta wy_{t-1} + \varepsilon_t . \qquad (12)$$

It shows that wy_t is statistically significant for virtually all countries. The point estimate of the coefficient is large in magnitude and wy_t explains an important fraction of the variation in future real government bond yields: at the 4 quarter horizon, wy_t explains 39% (Australia), 38% (Netherlands), 33% (Belgium), 28% (Finland, Sweden and US), 20% (Denmark), 13% (Germany), 12% (Japan), and 10% (Spain) of government bond returns. As for Austria and Ireland, the forecasting power of wy_t is virtually nil.

The results also suggest that the sign of the coefficient of wy_t is positive for Austria, Denmark, Germany, Italy, Japan and Spain, therefore, indicates that agents reduce consumption when they expect a rise of government bond returns. In this case, a rise in government bond yields is perceived as a signal of deterioration of public finances, so agents believe in the Ricardian equivalence. As for Australia, Belgium, Canada, Finland, France, Netherlands, Sweden, UK and US, the sign of the coefficient of wy_t is negative and supports the idea that government debt is considered a component of wealth in this set of countries.

Table 3.1 – Real bond returns, estimated effect of *rwy*.

	Forecast Horizon *H*				
	1	2	3	4	8
Australia	-0.05**	-0.11**	-0.16*	-0.21**	-0.38***
	(-1.96)	(-1.95)	(-1.94)	(-1.96)	(-1.87)
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]
Austria	-0.00	-0.00	-0.00	-0.00	0.00
	(-0.30)	(-1.62)	(-1.24)	(-1.26)	(0.07)
	[0.00]	[0.01]	[0.01]	[0.01]	[0.00]
Belgium	0.11***	0.22***	0.32***	0.43***	0.80***
	(6.62)	(6.92)	(6.92)	(6.92)	(6.65)
	[0.25]	[0.28]	[0.28]	[0.28]	[0.27]
Canada	0.01***	0.02***	0.02***	0.04***	0.09***
	(3.12)	(3.46)	(3.81)	(4.22)	(6.02)
	[0.05]	[0.06]	[0.07]	[0.08]	[0.14]
Denmark	-0.01	-0.03	-0.05	-0.07*	-0.18**
	(-1.12)	(-1.29)	(-1.50)	(-1.72)	(-2.32)
	[0.01]	[0.01]	[0.02]	[0.02]	[0.03]
Finland	-0.10***	-0.21***	-0.32***	-0.43***	-0.91***
	(-4.37)	(-5.25)	(-5.73)	(-5.95)	(-6.68)
	[0.09]	[0.11]	[0.12]	[0.13]	[0.15]
France	0.01**	0.03**	0.04**	0.05**	0.10**
	(2.35)	(2.36)	(2.36)	(2.31)	(2.26)
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]
Germany	0.05***	0.12***	0.20***	0.30***	0.81***
	(2.70)	(4.07)	(4.90)	(5.78)	(9.42)
	[0.03]	[0.06]	[0.08]	[0.11]	[0.26]
Ireland	0.08***	0.17***	0.25***	0.34***	0.79***
	(4.63)	(4.59)	(4.57)	(4.61)	(5.30)
	[0.11]	[0.11]	[0.12]	[0.12]	[0.17]
Italy	0.05**	0.08*	0.10	0.11	0.04
	(2.01)	(1.79)	(1.50)	(1.18)	(0.22)
	[0.02]	[0.02]	[0.01]	[0.01]	[0.00]
Japan	0.05	0.10	0.14**	0.17***	0.32***
	(0.96)	(1.38)	(2.15)	(3.41)	(3.25)
	[0.02]	[0.03]	[0.06]	[0.09]	[0.09]
Netherlands	-0.06***	-0.13***	-0.20***	-0.25***	-0.46***
	(-3.04)	(-3.94)	(-4.07)	(-3.90)	(-3.59)
	[0.08]	[0.11]	[0.11]	[0.11]	[0.10]
Spain	-0.02***	-0.03***	-0.05***	-0.06***	-0.12***
	(-7.69)	(7.61)	(-7.98)	(-8.58)	(-10.57)
	[0.44]	[0.46]	[0.47]	[0.49]	[0.49]
Sweden	0.04*	0.05	0.08*	0.10**	0.13
	(1.82)	(1.62)	(1.84)	(2.20)	(1.35)
	[0.03]	[0.03]	[0.03]	[0.04]	[0.02]
UK	0.01	0.03	0.06	0.10	0.31***
	(0.54)	(0.77)	(1.14)	(1.46)	(2.59)
	[0.00]	[0.00]	[0.01]	[0.01]	[0.03]
US	0.21***	0.42***	0.63***	0.81***	1.41***
	(7.44)	(7.56)	(7.60)	(7.38)	(6.28)
	[0.30]	[0.31]	[0.30]	[0.29]	[0.25]

Notes: Newey-West corrected t-statistics appear in parenthesis. Adjusted R-square is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 3.2 – Real bond returns, estimated effect of *wy*.

	Forecast Horizon *H*				
	1	2	3	4	8
Australia	-0.18***	-0.36***	-0.55***	-0.74***	-1.54***
	(-8.17)	(-8.56)	(-8.89)	(-9.28)	(-10.80)
	[0.34]	[0.36]	[0.37]	[0.39]	[0.44]
Austria	0.00	0.00	0.00	0.01	0.03**
	(0.45)	(0.28)	(0.62)	(0.95)	(1.97)
	[0.00]	[0.00]	[0.00]	[0.01]	[0.03]
Belgium	-0.16***	-0.31***	-0.45***	-0.60***	-1.16***
	(-6.58)	(-6.78)	(-6.66)	(-6.64)	(-6.74)
	[0.32]	[0.34]	[0.33]	[0.33]	[0.34]
Canada	-0.04***	-0.07***	-0.11***	-0.15***	-0.40***
	(-3.70)	(-3.60)	(-3.63)	(-3.72)	(-5.14)
	[0.07]	[0.06]	[0.06]	[0.07]	[0.13]
Denmark	0.04***	0.08***	0.13***	0.18***	0.41***
	(4.92)	(6.11)	(6.69)	(7.23)	(8.27)
	[0.13]	[0.16]	[0.18]	[0.20]	[0.27]
Finland	-0.29***	-0.56***	-0.84***	-1.09***	-2.04***
	(-6.09)	(-7.21)	(-7.46)	(-7.35)	(-6.98)
	[0.24]	[0.27]	[0.28]	[0.28]	[0.27]
France	-0.04***	-0.08***	-0.10***	-0.13***	-0.19***
	(2.66)	(-2.56)	(-2.42)	(-2.26)	(-1.90)
	[0.02]	[0.02]	[0.02]	[0.01]	[0.01]
Germany	0.05***	0.12***	0.20***	0.29***	0.75***
	(2.94)	(4.23)	(5.18)	(5.97)	(9.25)
	[0.04]	[0.07]	[0.10]	[0.13]	[0.27]
Ireland	-0.04	-0.08	-0.12	-0.16	-0.23
	(-0.79)	(-0.77)	(-0.79)	(-0.82)	(-0.59)
	[0.01]	[0.01]	[0.01]	[0.01]	[0.00]
Italy	0.06**	0.11*	0.14	0.15	0.02
	(1.96)	(1.78)	(1.46)	(1.14)	(0.06)
	[0.02]	[0.02]	[0.01]	[0.01]	[0.00]
Japan	0.05	0.07	0.14**	0.21***	0.44***
	(0.79)	(0.99)	(2.01)	(3.71)	(4.24)
	[0.01]	[0.02]	[0.06]	[0.12]	[0.14]
Netherlands	-0.09***	-0.18***	-0.27***	-0.35***	-0.63***
	(-7.27)	(-8.32)	(-8.87)	(-9.03)	(-7.93)
	[0.36]	[0.39]	[0.39]	[0.38]	[0.32]
Spain	0.06**	0.13**	0.20***	0.27***	0.56***
	(2.28)	(2.46)	(2.61)	(2.71)	(2.67)
	[0.07]	[0.08]	[0.09]	[0.10]	[0.11]
Sweden	-0.14***	-0.28***	-0.39***	-0.49***	-0.96***
	(-2.82)	(-4.71)	(-5.01)	(-6.01)	(-6.28)
	[0.08]	[0.20]	[0.22]	[0.28]	[0.27]
UK	-0.04*	-0.08**	-0.11**	-0.14**	-0.26**
	(-1.93)	(-2.15)	(-2.19)	(-2.17)	(-2.20)
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]
US	-0.13***	-0.26***	-0.38***	-0.52***	-1.15***
	(-8.59)	(-8.60)	(-8.59)	(-8.84)	(-11.61)
	[0.27]	[0.27]	[0.27]	[0.28]	[0.36]

Notes: Newey-West corrected t-statistics appear in parenthesis. Adjusted R-square is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

5. Robustness analysis

5.1. Additional control variables

In this Sub-section, I assess the robustness of the forecasting power of *rwy* and *wy* in the regressions of real stock returns and government bond yields.

In what concerns stock returns, Campbell and Shiller (1988) and Jiang and Lee (2009) analyse the predictive power of the ratios of price to dividends or price to earnings for stock returns.

As for government bond yields, Gale and Orszag (2003) argue that budget deficits may raise nominal interest rates, while Engen and Hubbard (2004) do not find a significant effect. Brandt and Wang (2003) and Lee (2010) argue that risk premia are driven by shocks to inflation, as well as by shocks to aggregate consumption.

Table 4.1 reports the estimates from one-quarter ahead forecasting regressions that include the dividend yield ratio ($DivYld_t$) as an additional variable. It displays only information for countries for which data on the dividend yield ratio is available.

The results show that both the point coefficient estimates of *rwy* and *wy* and their statistical significance do not change with respect to the findings of Tables 2.1 and 2.2 where only *rwy* and *wy* were included as explanatory variables. Moreover, the dividend yield ratio ($DivYld_t$) seems to provide some relevant information about future asset returns: it is statistically significant in a large number of regressions.

By its turn, Table 4.2 reports the estimates from one-quarter ahead forecasting regressions that include additional variables shown to contain predictive power for long-term interest rates, in particular, the inflation rate (*Inflation*) and the deficit-to-GDP ratio (*Deficit*).

The results show that both the point coefficient estimates of *rwy* and *wy* and their statistical significance do not change with respect to the findings of Tables 3.1 and

3.2 where only *rwy* and *wy* were included as explanatory variables. In addition, both the lag of the inflation rate and the lag of the deficit-to-GDP ratio bring some relevant information in forecasting bond returns. This, therefore, suggests that investors use government bonds to hedge against the risk of inflation. In addition, it reveals that an increase in the deficit-to-GDP ratio is associated with a rise in future government bond yields.

Table 4.1 – Real stock returns: additional control variables.

	rwy_{t-1}	$DivYld_{t-1}$	Adj. R-square	wy_{t-1}	$DivYld_{t-1}$	Adj. R-square
Australia	-0.19**	5.55**	[0.08]	-0.18	2.55	[0.06]
	(2.34)	(2.22)		(-1.37)	(0.56)	
Austria	0.00		[0.00]	-0.01		[0.00]
	(0.59)			(-0.79)		
Belgium	0.12*	-0.43	[0.04]	-0.46***	-6.91**	[0.11]
	(1.85)	(-0.17)		(-3.47)	(-2.18)	
Canada	-0.00	3.13	[0.01]	-0.04	3.45	[0.02]
	(-0.24)	(1.20)		(-1.02)	(1.30)	
Denmark	0.03***		[0.03]	-0.03***		[0.04]
	(2.33)			(-3.39)		
Finland	-0.22***	-1.65	[0.05]	-0.22	1.01	[0.02]
	(-2.61)	(-0.66)		(-1.34)	(0.34)	
France	-0.01	1.28	[0.01]	-0.27***	1.96	[0.07]
	(-0.33)	(0.70)		(-2.75)	(1.12)	
Germany	-0.68***	11.33***	[0.11]	-0.74***	12.23***	[0.11]
	(-2.98)	(2.75)		(-3.58)	(2.67)	
Ireland	0.04		[0.00]	-0.36***		[0.05]
	(0.87)			(-2.53)		
Italy	-0.23**	20.48***	[0.14]	-0.27*	16.71**	[0.10]
	(-2.02)	(3.20)		(-1.83)	(2.48)	
Japan	0.01	9.94**	[0.04]	-0.04	10.88*	[0.03]
	(0.12)	(2.00)		(-0.52)	(1.94)	
Netherlands	0.73**	6.24	[0.15]	2.03***	74.67***	[0.19]
	(2.44)	(0.66)		(3.47)	(2.98)	
Spain	-0.01		[0.02]	0.03		[0.00]
	(-1.38)			(0.35)		
Sweden	0.13**	12.48***	[0.12]	-0.25**	10.44**	[0.13]
	(2.46)	(2.73)		(-2.15)	(2.40)	
UK	-0.00	3.60***	[0.03]	-0.12	1.85	[0.05]
	(-0.01)	(-0.01)		(-1.51)	(1.03)	
US	0.16*	-0.07	[0.03]	-0.15***	0.74	[0.05]
	(1.68)	(-0.04)		(-3.35)	(0.43)	

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 4.2 – Real bond returns: additional control variables.

	rwy rwy_{t-1}	$Inflation_{t-1}$	$Deficit_{t-1}$	Adj. R-square	wy_{t-1}	$Inflation_{t-1}$	$Deficit_{t-1}$	Adj. R-square
Australia	-0.05	0.00	0.01	[0.03]	-0.21***	-0.00	-0.07	[0.41]
	(-1.59)	(1.10)	(0.26)		(-9.89)	(-2.94)	(-1.54)	
Austria	-0.00	0.00		[0.01]	0.00	0.00		[0.01]
	(-0.35)	(0.85)			(0.36)	(0.75)		
Belgium	0.04**	-0.00	-0.11***	[0.49]	-0.12***	-0.00	-0.11***	[0.62]
	(2.49)	(-0.28)	(-4.93)		(-6.04)	(-1.05)	(-7.44)	
Canada	-0.00	0.00**	0.04	[0.07]	-0.01	0.00*	0.22	[0.06]
	(-0.51)	(2.08)	(0.05)		(-0.24)	(1.76)	(0.38)	
Denmark	-0.01	0.01***		[0.16]	0.03***	0.01***		[0.24]
	(-1.15)	(5.41)			(3.34)	(4.05)		
Finland	-0.05*	-0.00***	0.35***	[0.20]	-0.28***	-0.00	0.04	[0.25]
	(-1.84)	(-3.87)	(4.22)		(-4.67)	(-0.78)	(0.42)	
France	0.02***	0.01***	0.02	[0.30	-0.08***	0.01***	-0.01	[0.30]
	(4.01)	(4.89)	(0.43)		(-5.36)	(4.88)	(-0.18)	
Germany	0.05**	0.00**	0.19**	[0.08]	0.05***	0.00**	0.16*	[0.09]
	(2.47)	(1.98)	(2.02)		(2.72)	(1.99)	(1.77)	
Ireland	0.05**			[0.02]	-0.04			[0.01]
	(2.01)				(-0.79)			
Italy	0.06***	0.01***	0.33***	[0.77]	0.09***	0.02***	0.33***	[0.78]
	(3.88)	(9.55)	(10.02)		(4.33)	(10.08)	(10.17)	
Japan	0.04	0.01***	3.53**	[0.31]	0.02	0.01***	3.48*	[0.31]
	(0.47)	(4.67)	(2.06)		(0.19)	(4.74)	(1.97)	
Netherlands	-0.05***	0.00	0.22***	[0.28]	-0.08***	0.00*	0.10**	[0.40]
	(-2.59)	(1.33)	(5.83)		(-5.04)	(1.85)	(2.02)	
Spain	-0.01***	0.01**	0.29***	[0.58]	0.06**	0.02**	0.39**	[0.34]
	(-6.42)	(2.19)	(3.11)		(0.2.31)	(2.48)	(2.42)	
Sweden	0.04	0.00	0.04	[0.03]	-0.14**	0.00	-0.01	[0.08]
	(1.51)	(0.62)	(0.30)		(-2.46)	(0.18)	(-0.12)	
UK	-0.01	0.00***	0.03	[0.13]	-0.03	0.00***	0.01	[0.15]
	(-0.51)	(3.48)	(0.46)		(-1.57)	(3.53)	(0.17)	
US	0.17***	0.02***	0.28	[0.52]	-0.08***	0.01***	0.57***	[0.26]
	(5.97)	(7.49)	(1.35)		(-3.44)	(3.72)	(2.66)	

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

5.2. Nested forecast comparisons

As a final robustness check, I make nested forecast comparisons, in which I compare the mean-squared forecasting error from a series of one-quarter-ahead out-of-sample forecasts obtained from a prediction equation that includes either *rwy* or *wy* as the sole forecasting variables, to a variety of forecasting equations that do not include either *rwy* or *wy*. As a result, the unrestricted model *nests* the benchmark model.

I consider two benchmark models: the *autoregressive benchmark* and the *constant expected returns benchmark*. In the *autoregressive benchmark*, I compare the mean-squared forecasting error from a regression that includes just the lagged asset return as a predictive variable to the mean-squared error from regressions that include, in addition, *rwy* or *wy*. In the *constant expected returns benchmark*, I compare the mean-squared forecasting error from a regression that includes a constant (as the only explanatory variable) to the mean-squared error from regressions that include, in addition, *rwy* or *wy*.

Table 5.1 summarizes the nested forecast comparisons for the equations of the real stock returns and the government bond yields using *rwy*. It shows that, in general, including *rwy* in the forecasting regressions improves over the benchmark models. This is particularly important when the benchmark model is the *constant expected returns benchmark*, and, therefore, supports the existence of time-variation in expected returns.

Table 5.1 – One-quarter ahead forecasts of returns.
rwy model vs. constant/AR models

	Real stock returns		Real bond returns	
	$MSE_{rwy}/MSE_{constant}$	MSE_{rwy}/MSE_{AR}	$MSE_{rwy}/MSE_{constant}$	MSE_{rwy}/MSE_{AR}
Australia	0.978	0.980	0.988	1.004
Austria	1.003	1.004	1.003	1.004
Belgium	0.964	0.990	0.870	1.005
Canada	1.003	1.004	0.979	1.000
Denmark	0.990	0.995	1.000	1.005
Finland	0.992	0.994	0.957	0.997
France	1.003	1.003	0.988	1.004
Germany	0.986	0.988	0.990	0.994
Ireland	1.002	1.002	0.945	1.004
Italy	0.976	0.992	0.994	1.003
Japan	0.996	0.996	0.995	1.000
Netherlands	1.005	1.004	0.962	1.005
Spain	0.996	0.997	0.753	1.005
Sweden	0.969	1.002	0.992	1.005
UK	0.975	0.969	1.003	1.003
US	0.991	0.997	0.842	0.997

Notes: MSE – mean-squared forecasting error.

Table 5.2 provides the nested forecast comparisons for the equations of real stock returns and the real government bond returns using *wy*. It can be seen that models that include *wy* generally have a lower mean-squared forecasting error. Moreover, the ratios are smaller that the ones presented in Table 5.1, which constitutes evidence that *wy* is able to better predict both stock returns and government bond yields than *rwy*.

Table 5.2 – One-quarter ahead forecasts of returns.
wy model vs. constant/AR models

	Real stock returns		Real bond returns	
	$MSE_{wy}/MSE_{constant}$	MSE_{wy}/MSE_{AR}	$MSE_{wy}/MSE_{constant}$	MSE_{wy}/MSE_{AR}
Australia	0.978	0.980	0.815	1.003
Austria	1.003	1.003	1.002	1.004
Belgium	0.971	0.950	0.828	1.002
Canada	1.000	1.000	0.970	1.004
Denmark	0.984	0.990	0.938	0.994
Finland	0.995	0.993	0.874	1.002
France	0.975	0.977	0.993	0.984
Germany	0.989	0.991	0.984	0.998
Ireland	0.980	0.980	1.003	0.992
Italy	0.961	0.979	0.995	1.006
Japan	1.003	1.003	0.997	1.001
Netherlands	0.989	0.981	0.807	1.005
Spain	1.007	1.008	0.972	0.999
Sweden	0.960	0.930	0.964	0.974
UK	0.939	0.930	0.988	0.997
US	0.976	0.980	0.857	1.002

Notes: MSE – mean-squared forecasting error.

6. Does systemic risk matter?

Financial crises can be contagious and damaging, and prompt quick policy responses, as they typically lead economies into recessions and sharp current account imbalances. Among the many causes of financial crises, one can refer: (i) credit booms; (ii) currency and maturity mismatches; (iii) large capital inflows; and (iv) unsustainable macroeconomic policies (large current account deficits and rising public debt).

In order to deal with financial crises, governments have employed a broad range of policies, which reallocate wealth toward banks and debtors and away from taxpayers.

Honohan and Laeven (2005) and Laeven and Valencia (2008) identify financial crises episodes, and systemic crisis includes currency, debt and banking crises. A systemic currency crisis corresponds to a nominal depreciation of the currency of at least 30% and, simultaneously, at least a 10% increase in the rate of depreciation compared to the year before. A systemic debt crisis describes a situation where there are sovereign defaults to private lending and debt rescheduling programs. In a systemic banking crisis, there is a large number of defaults on corporate and financial sectors, non-performing loans increase sharply and, asset prices (equity and real estate prices) eventually depress, and real interest rates increase dramatically.

6.1. Systemic crises

In order to assess the importance of systemic crises, I estimate the following models:

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta rwy_{t-1} + \mu rwy_{t-1} * SystemicCrisis + \varepsilon_t, \qquad (13)$$

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta wy_{t-1} + \mu wy_{t-1} * SystemicCrisis + \varepsilon_t, \qquad (13')$$

where *SystemicCrisis* is a dummy variable that takes the value of 1 in the presence of an episode of systemic crisis and 0 otherwise, and *H* refers to the number of ahead periods in the forecasting exercise. Given that the effects of systemic crises may not be immediate, I consider *H=4*, therefore, allowing for a time lag from the date of occurrence of the crisis and the emergence of its effects.

Table 6.1 reports the estimates from 4 quarters-ahead forecasting regressions. The results show that both the point coefficient estimates of *rwy* and *wy* and their statistical significance do not change with respect to the previous findings. Moreover, the coefficient associated with the interaction between *rwy* or *wy* and the dummy variable for the systemic crisis is, in general, statistically significant. In addition, it has a sign that is consistent with the one associated with *rwy* or *wy*, implying that the occurrence of a systemic crisis leads investors to demand a higher risk premium for stocks in the future.

By its turn, Table 6.2 reports the estimates from 4 quarters-ahead forecasting regressions, following the models:

$$\sum_{h=1}^{H} BR_{t+h} = \alpha + \beta rwy_{t-1} + \mu rwy_{t-1} * SystemicCrisis + \varepsilon_t, \qquad (14)$$

$$\sum_{h=1}^{H} BR_{t+h} = \alpha + \beta wy_{t-1} + \mu wy_{t-1} * SystemicCrisis + \varepsilon_t. \qquad (14')$$

The results suggest again that both the point coefficient estimates of *rwy* and *wy* and their statistical significance do not change with respect to the previous findings. Moreover, the coefficient associated with the interaction between *rwy* or *wy* and the dummy variable for the systemic crisis is, in general, statistically significant. In contrast with the case of stocks, it has an opposite sign with the one associated with *rwy* or *wy*, implying that the occurrence of a systemic crisis leads investors to demand a higher risk premium for government bonds as they interpret that situation as an increase of sovereign default.

Table 6.1 – Real stock returns and systemic crises.

	rwy_{t-1}	rwy_{t-1} * *SystemicCrisis*	Adj. R-square	wy_{t-1}	wy_{t-1} * *SystemicCrisis*	Adj. R-square
Australia	-0.84***	0.972**	[0.13]	-0.83***	0.83	[0.13]
	(-4.15)	(2.05)		(-4.02)	(1.05)	
Austria			No episodes of systemic crisis			
Belgium			No episodes of systemic crisis			
Canada	0.01	-0.07	[0.00]	-0.13	-0.42*	[0.02]
	(0.43)	(-0.76)		(-1.47)	(-1.79)	
Denmark	0.17***	-0.13	[0.07]	-0.11***		[0.09]
	(2.60)	(-1.56)		(-4.90)		
Finland			No episodes of systemic crisis			
France	-0.01	-4.45***	[0.01]	-1.07**	-1.17*	[0.17]
	(-0.19)	(-7.47)		(-4.22)	(-1.84)	
Germany	-1.22***	0.38	[0.11]	-1.11***	-0.03	[0.12]
	(-4.45)	(0.92)		(-4.52)	(-0.06)	
Ireland			No episodes of systemic crisis			
Italy	-0.46	0.10	[0.02]	-1.12**	0.67	[0.06]
	(-1.42)	(0.20)		(-2.29)	(0.96)	
Japan			No episodes of systemic crisis			
Netherlands			No episodes of systemic crisis			
Spain			No episodes of systemic crisis			
Sweden			No episodes of systemic crisis			
UK	-1.10***	1.13**	[0.16]	-1.26***	0.69*	[0.35]
	(-2.66)	(2.18)		(-4.60)	(1.93)	
US	-0.70***	-0.96**	[0.07]	-0.53***	-0.73	[0.11]
	(2.81)	(-2.09)		(-4.23)	(-1.56)	

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 6.2 – Real bond returns and systemic crises.

	rwy_{t-1}	rwy_{t-1} * *SystemicCrisis*	Adj. R-square	wy_{t-1}	wy_{t-1} * *SystemicCrisis*	Adj. R-square
Australia	-0.40***	0.97***	[0.11]	-0.81***	1.36***	[0.45]
	(-3.71)	(4.40)		(-10.43)	(3.71)	
Austria			No episodes of systemic crisis			
Belgium			No episodes of systemic crisis			
Canada	0.04***	-0.38***	[0.26]	-0.13***	-0.48***	[0.09]
	(5.55)	(-12.99)		(-3.20)	(-2.60)	
Denmark	-0.24***	0.34***	[0.09]	0.19***	-0.12**	[0.20]
	(-2.97)	(3.34)		(7.23)	(-2.05)	
Finland			No episodes of systemic crisis			
France	0.05**	0.88*	[0.03]	-0.14***	1.09***	[0.03]
	(2.28)	(1.88)		(-2.51)	(6.31)	
Germany	0.28***	0.21*	[0.12]	0.30***	-0.07	[0.13]
	(4.99)	(1.84)		(-5.53)	(-0.43)	
Ireland			No episodes of systemic crisis			
Italy	0.01	0.31	[0.02]	-0.03	0.51	[0.02]
	(0.05)	(1.02)		(-0.10)	(1.11)	
Japan			No episodes of systemic crisis			
Netherlands			No episodes of systemic crisis			
Spain			No episodes of systemic crisis			
Sweden			No episodes of systemic crisis			
UK	0.36***	-0.53***	[0.10]	-0.01	-0.34***	[0.07]
	(3.86)	(-3.93)		(-0.08)	(-2.49)	
US	0.89***	-1.05***	[0.32]	-0.51***	-0.06	[0.28]
	(7.81)	(-4.83)		(-8.34)	(-0.22)	

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

6.2. Non-systemic crises

Finally, I analyse the impact of non-systemic systemic crises, and estimate the following models:

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta rwy_{t-1} + \mu rwy_{t-1} * NonSystemicCrisis + \varepsilon_t, \tag{15}$$

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta wy_{t-1} + \mu wy_{t-1} * NonSystemicCrisis + \varepsilon_t, \tag{15'}$$

where *NonSystemicCrisis* is a dummy variable that takes the value of 1 in the presence of an episode of non-systemic crisis and 0 otherwise, and H refers to the number of ahead periods in the forecasting exercise. Similarly to the case of systemic crisis, I allow for a lag in the transmission of the effects of non-systemic crises to financial markets and consider $H=4$.

Table 7.1 reports the estimates from 4 quarters-ahead forecasting regressions. The results are somewhat weaker than previously. Nevertheless, the coefficient associated with the interaction between *rwy* or *wy* and the dummy variable for the systemic crisis is statistically significant and has a sign that is consistent with the one associated with *rwy* or *wy* in the case of Finland. This implies that, in the outcome of a systemic crisis, investors to demand a higher risk premium.

Table 7.1 – Real stock returns and non-systemic crises.

	rwy_{t-1}	rwy_{t-1} * *NonSystemicCrisis*	Adj. R-square	wy_{t-1}	wy_{t-1} * *NonSystemicCrisis*	Adj. R-square
Australia			No episodes of non-systemic crisis			
Austria			No episodes of non-systemic crisis			
Belgium			No episodes of non-systemic crisis			
Canada			No episodes of non-systemic crisis			
Denmark			No episodes of non-systemic crisis			
Finland	-0.42***	-1.74***	[0.12]	-1.31**	0.28	[0.10]
	(-2.68)	(-3.04)		(-2.23)	(0.33)	
France			No episodes of non-systemic crisis			
Germany			No episodes of non-systemic crisis			
Ireland			No episodes of non-systemic crisis			
Italy			No episodes of non-systemic crisis			
Japan	0.00	0.69**	[0.04]	-0.22	0.85**	[0.04]
	(0.02)	(2.13)		(-0.87)	(2.21)	
Netherlands			No episodes of non-systemic crisis			
Spain			No episodes of non-systemic crisis			
Sweden	0.57***	-0.47	[0.12]	-1.20***	0.36	[0.18]
	(3.69)	(-1.40)		(-4.34)	(0.81)	
UK			No episodes of non-systemic crisis			
US			No episodes of non-systemic crisis			

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 7.2 shows the estimates from 4 quarters-ahead forecasting regressions, following the models:

$$\sum_{h=1}^{H} BR_{t+h} = \alpha + \beta rwy_{t-1} + \mu rwy_{t-1} * NonSystemicCrisis + \varepsilon_t, \qquad (16)$$

$$\sum_{h=1}^{H} BR_{t+h} = \alpha + \beta wy_{t-1} + \mu wy_{t-1} * NonSystemicCrisis + \varepsilon_t. \qquad (16')$$

The results suggest again that both the point coefficient estimates of *rwy* and *wy* and their statistical significance do not change with respect to the previous findings. In contrast with the case of stocks, the coefficient associated to *NonSystemicCrisis* has the opposite sign of the one associated with *rwy* or *wy*, implying that the occurrence of a systemic crisis leads investors to demand a higher risk premium for government bonds as they interpret that situation as an increase of sovereign default.

Table 7.2 – Real bond returns and non-systemic crises.

	rwy_{t-1}	rwy_{t-1} * *NonSystemicCrisis*	Adj. R-square	wy_{t-1}	wy_{t-1} * *NonSystemicCrisis*	Adj. R-square
Australia			No episodes of non-systemic crisis			
Austria			No episodes of non-systemic crisis			
Belgium			No episodes of non-systemic crisis			
Canada			No episodes of non-systemic crisis			
Denmark			No episodes of non-systemic crisis			
Finland	-0.32***	-1.84***	[0.24]	-1.15***	0.12	[0.28]
	(-4.58)	(-6.36)		(-4.17)	(0.40)	
France			No episodes of non-systemic crisis			
Germany			No episodes of non-systemic crisis			
Ireland			No episodes of non-systemic crisis			
Italy			No episodes of non-systemic crisis			
Japan	-0.13***	1.13***	[0.58]	-0.15**	1.21***	[0.60]
	(-2.58)	(12.20)		(-2.46)	(10.90)	
Netherlands			No episodes of non-systemic crisis			
Spain			No episodes of non-systemic crisis			
Sweden	0.12**	-0.09	[0.04]	-0.51***	0.15	[0.28]
	(2.06)	(-1.03)		(-6.21)	(1.10)	
UK			No episodes of non-systemic crisis			
US			No episodes of non-systemic crisis			

Notes: Newey-West corrected t-statistics appear in parenthesis. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

7. Conclusion

The current financial crisis has highlighted the strong connections between the financial system, the housing sector, and the banking sector not only in domestic terms, but also when considering inter-country dimensions. In fact, as Mallick and Mohsin (2007, 2010) note, monetary policy can be crucial, in particular, if it targets financial conditions (Castro, 2008; Sousa, 2010b). Those linkages, in turn, can be responsible for important wealth dynamics (Mathur and De, 1989; Mathur and Waheed, 1991).

This paper explores the predictive power of the trend deviations among asset wealth and human wealth (summarized by the variables *rwy* and *wy*) for expected future asset returns.

The above-mentioned common trends summarize agent's expectations of stock returns and government bond yields. In particular, when the wealth-to-income ratio falls (increases), forward-looking investors will demand a higher (lower) risk premium given that they will be exposed to larger (smaller) idiosyncratic shocks.

As for bond returns, if government bonds are seen as a component of asset wealth, then investors behave in the same manner when they observe a fall in the wealth-to-income ratio. If, however, the increase in government bond returns is perceived as a symptom of public finance deterioration (and, consequently, as a rise in future taxes), then investors will interpret the fall in the wealth-to-income ratio as a fall in future bond risk premium.

Using data for sixteen industrialized countries, I show that the predictive power of *rwy* and *wy* for real stock returns is particularly strong at horizons from 4 to 8 quarters.

In what concerns bond returns, the analysis suggests that one can cluster the set of countries in two groups: (i) in the case of Australia, Finland and Netherlands, there is evidence suggesting that investors behave in a non-Ricardian way; and (ii) in the case of Germany and Italy, investors seem to be forward-looking and act in a Ricardian manner.

Finally, I show that systemic crises amplify housing market shocks and their transmission to the financial system.

The present work opens new avenues of investigation. In this context, Gabriel et al. (2008) emphasize the importance of the formulation of a nonlinear relationship, and suggest that short-term deviations in the consumption-wealth ratio may forecast both asset returns and consumption growth. As a result, a nonlinear adjustment may contribute to a better explanation of the fluctuations in the wealth-to-income ratio and to improve the predictability of asset returns. I leave that line of research for the future.

References

Ahmed, S., Rogers, J., 1995. Government budget deficits and trade deficits. Are present value constraints satisfied in long-term data? Journal of Monetary Economics 36, 351-374.

Amihud, Y., Mendelson, H., 1986. Asset pricing and the bid-ask spread. Journal of Financial Economics 17, 223-249.

Beltratti, A., Morana, C., 2010. International house prices and macroeconomic fluctuations. Journal of Banking & Finance 34(3), 533-545.

Brandt, M.W., Wang, K.Q., 2003. Time-varying risk aversion and unexpected inflation. Journal of Monetary Economics 50, 1457-1498.

Campbell, J.Y., Shiller, R.J., 1988. The dividend-price ratio and expectations of future dividends and discount factors. Review of Financial Studies 1, 195-228.

Campbell, J.Y., Shiller, R.J., 1991. Yield spreads and interest rates: a bird's eye view. Review of Economic Studies 58, 495-514.

Castro, V., 2008. Are central banks following a linear or nonlinear (augmented) Taylor rule? Warwick University, Economic Research Paper No. 872.

Castro, V., 2009. The duration of economic expansions and recessions: More than duration dependence. Journal of Macroeconomics 32(1), 347-65.

Cochrane, J.H., Piazzesi, M., 2005. Bond risk premia. American Economic Review 95(1), 138-160.

Cole, R.A., Moshirian, F., Wu, Q., 2008. Bank stock returns and economic growth. Journal of Banking & Finance 32(6), 995-1007.

Duffee, G., 2005. Time variation in the covariance between stock returns and consumption growth. Journal of Finance 60(4), 1673-1712.

Ebrahim, M.S., Mathur, I., 2006. Pricing home mortgages and bank collateral: a rational expectations approach. Journal of Economic Dynamics and Control 31, 1217-1244.

Engen, E.M., Hubbard, R.G., 2004. Federal government debt and interest rates. NBER Working Paper No. 10681.

Fama, E.F., Bliss, R.H., 1987. The information in long-maturity forward rates. American Economic Review 77(4), 680-692.

Fama, E.F., French, K., 1996. Multifactor explanations of asset pricing anomalies. Journal of Financial Economics 51(1), 55-84.

Fernandez-Corugedo, E., Price, S., Blake, A., 2007. The dynamics of consumers' expenditure: the UK consumption ECM redux. Economic Modelling 24, 453-469.

Gabriel, V., 2003, Cointegration and the joint confirmation hypothesis. Economics Letters 78, 17-25.

Gabriel, V., Alexandre, F., Bação, P., 2008. The consumption-wealth ratio under asymmetric adjustment. Studies in Nonlinear Dynamics & Econometrics 12, issue 4, article 3.

Gabriel, V., Sangduan, P., 2010a. Assessing fiscal sustainability subject to policy changes: a Markov Switching cointegration approach. Empirical Economics, forthcoming.

Gabriel, V., Sangduan, P., 2010b. An efficient test of fiscal sustainability. Applied Economics Letters, forthcoming.

Gale, W.G., Orszag, P.R., 2003. Economic effects of sustained budget deficits. National Tax Journal, 56, 463-485.

Granville, B., Mallick, S.K., 2009. Monetary and financial stability in the Euro Area: pro-cyclicality versus trade-off. Journal of International Financial Markets, Institutions and Money 19, 662-674.

Greenbaum, S.I., Kanatas, G., Venezia, I., 1989. Equilibrium loan pricing under the bank-client relationship. Journal of Banking & Finance 13(2), 221-235.

Guo, H., 2006. Time-varying risk premia and the cross section of stock returns. Journal of Banking & Finance 30(7), 2087-2107.

Honohan, P., Laeven, L., 2005. Systemic financial distress: containment and resolution. Cambridge University Press: Cambridge.

Jiang, X., Lee, B.S., 2009. Stock returns, dividend yield, and book-to-market ratio. Journal of Banking & Finance 31(2), 455-475.

Jiménez, G., Saurina, J., 2004. Collateral, type of lender and relationship banking as determinants of credit risk. Journal of Banking & Finance 28(9), 2191–2212.

Kessler, S., Scherer, B., 2009. Varying risk premia in international bond markets. Journal of Banking & Finance, 33(8), 1361-1375.

Koetter, M., Poghosyan, T., 2010. Real estate prices and bank stability. Journal of Banking & Finance 34(6), 1129-1138.

Laeven, L., Valencia, F., 2008. Systemic banking crises: a new database. IMF Working Paper No. 224.

Lee, B.S., 2010. Stock returns and inflation revisited: An evaluation of the inflation illusion hypothesis. Journal of Banking & Finance 34(6), 1257-1273.

Lettau, M., Ludvigson, S., 2001. Consumption, aggregate wealth, and expected stock returns. Journal of Finance 41(3), 815-849.

Ludvigson, S., Ng, S., 2009. Macro factors in bond risk premia. Review of Financial Studies 22(12), 5027-5067.

Lustig, H., van Nieuwerburgh, S., 2005. Housing collateral, consumption insurance, and risk premia: an empirical perspective. Journal of Finance 60, 1167-1219.

Mallick, S.K., Mohsin, M., 2010. On the real effects of inflation in open economies: Theory and empirics. Empirical Economics, forthcoming.

Mallick, S.K., Mohsin, M., 2007. On the effects of inflation shocks in a small open economy. Australian Economic Review 40(3), 253-266.

Mathur, I., De, S., 1989. A review of the theories of and evidence on returns related to mergers and takeovers. Managerial Finance 15(4), 1-11.

Mathur, I., Waheed, A., 1991. Overseas expansion and shareholders' wealth. Journal of Applied Business Research 7(4), 48-55.

Pastor, L., Stambaugh, R.F., 2003. Liquidity risk and expected stock returns. Journal of Political Economy 3, 642-685.

Piazzesi, M., Schneider, M., Tuzel, S., 2007. Housing, consumption and asset pricing. Journal of Financial Economics 83, 531-569.

Priestley, R., 2001. Time-varying persistence in expected returns. Journal of Banking & Finance 25(7), 1271-1286.

Rafiq, M.S., Mallick, S.K., 2008. The effect of monetary policy on output in EMU3: A sign restriction approach. Journal of Macroeconomics 30, 1756-1791.

Sousa, R.M., 2010a. Housing wealth, financial wealth, money demand and policy rule: Evidence from the Euro Area. The North American Journal of Economics and Finance 21(1), 88-105.

Sousa, R.M., 2010b. Consumption, (dis)aggregate wealth, and asset returns. Journal of Empirical Finance, forthcoming.

Yogo, M., 2006. A consumption-based explanation of expected stock returns. Journal of Finance 61(2), 539-580.

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