Wealth, Labour Income, Stock Returns and Government Bond Yields, and Financial Stress in the Euro Area

Ricardo M. Sousa[$]

December 2010

Abstract

I show that when the ratio of asset wealth to human wealth falls, investors become more exposed to idiosyncratic shocks and demand higher stock and government bond risk premia. I find that the residuals from the cointegrating vector among asset wealth and labour income, *wy*, predict both future stock and bond returns in the Euro Area. Consequently, it can be used to track time-variation in risk premium. The results are robust to the inclusion of control variables and vis-a-vis other benchmark models.
Finally, I show that, conditioning the predictive ability of *wy* on the financial stress conditions allows one to track better future time-variation in risk premium. Moreover, when financial stress increases, investors perceive a larger risk for both stocks and government bonds.

Keywords: wealth, income, stock returns, government bond yields.
JEL classification: E21, E44, D12.

[$] Financial Markets Group (FMG), London School of Economics, Houghton Street, London WC2 2AE, United Kingdom. Department of Economics and Economic Policies Research Unit (NIPE), University of Minho, Campus of Gualtar, 4710-057 - Braga, Portugal. E-mails: rjsousa@alumni.lse.ac.uk; rjsousa@eeg.uminho.pt. Telephone: +351253601936. Fax: +351253676375.

1. Introduction

The 2008-2009 financial turmoil has revealed the strength of the linkages between the financial system, the housing sector, the banking sector and the credit market, and demanded a prompt answer from monetary policy. In addition, the sudden emergence of the current crisis, together with its severity and potentially long-lasting effects, led to large fiscal stimulus in an attempt to recover economic activity. As a result, factors such as external influences, oil prices, private investment, stock markets or even duration dependence on the likelihood of an expansion and contraction ending, became key elements for understanding the current developments (Castro, 2010a).

For the Euro Area as a whole, these interventions pose major challenges both because of the need of fiscal coordination and because they represent an valuable test to the long-term (un)sustainability of public accounts and can impact on the future conduction of monetary policy.

Moreover, homogeneity in response to exogenous shocks is crucial in a one-size-fits-all framework, as the lack of similarity may cause business cycle de-synchronization. For instance, based on the quarterly data from the US, the UK, Canada, and Italy, Mallick and Moshin (2010) find that inflation, negatively affects both consumption and investment, *but* has a positive influence on the current account both in the short and long term. Similarly, Granville and Mallick (2009) investigate the nexus between monetary stability and financial stability in the EMU. The authors show that the interest rate instrument used for inflation targeting (monetary stability) is conducive to financial stability (proxied by the term structure of interest rates, share prices, exchange rates, property price inflation and the deposit–loan ratio of the banking sector). Rafiq and Mallick (2008) examine the effects of monetary policy shocks on output in the three largest euro area economies – Germany, France and Italy (EMU3) – and show that there is a lack of homogeneity in the responses.

The behaviour of asset markets is indeed of major importance for financial institutions, homeowners, monetary authorities and policy makers. Sousa (2010a) finds that, for the Euro Area as whole, while housing wealth effects from a monetary policy contraction are very persistent, financial wealth effects are of short duration. Additionally, the monetary authority pays a special attention to developments in monetary aggregates, but the monetary policy rule also suggests that it adopts a vigilant posture regarding financial markets. Similarly, Castro (2010b) finds that the European Central Bank follows a nonlinear Taylor rule and targets financial conditions, therefore, making the Eurozone eventually less vulnerable to the recent credit crunch.

In fact, the linkages between the financial markets and the housing sector, the banking system and the monetary framework have revealed their strength in the current crisis, corroborating the research on the linkages between macroeconomic variables, wealth, and long-term predictability of stock returns (Sousa, 2010b).

Moreover, 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. Consequently, a wide range of asset categories is nowadays considered as a way of allowing the provision of funds for consumption (and, therefore, utility), but also collateral services in many relationships between borrowers and lenders. Liquidity and, more importantly, wealth play, therefore, a major role for asset pricing (Michaelides, 2003).

In contrast, only a few studies addressed the determinants of bond risk premium. Fama and Bliss (1987) show that excess bond returns are forecasted by the spread between the forward rate and the one-year yield, while Campbell and Shiller (1991) emphasize the role of the Treasury yield spreads. Cochrane and Piazzesi (2005) find that a linear combination of forward rates explains future bond risk premium and Ludvigson and Ng (2009) highlight its countercyclical pattern.

While these findings stress the importance of financial indicators, the development of economically motivated variables that track expectations about future government bond yields has not been considered yet.

The current paper assesses the power of the ratio of asset wealth to human wealth for forecasting asset returns in the Euro Area as a whole. Specifically, I show the deviations from the equilibrium relationship among wealth and labour income (labelled by *wy*) predict both stock returns and government bond yields.

In the case of stocks, I show that the predictive power of *wy* is particularly important for horizons spanning from four to eight quarters, when it explains between 14% and 18% of future real stock returns or between 13% and 16% of future excess stock returns. This highlights the importance of wealth composition in asset pricing models (Sousa, 2010b), as well as providing collateral services to the banking system.

As for government bond yields, the empirical proxy predicts 30% of real bond returns at horizons of twenty quarters. The effects are sizeable: a one standard-deviation fall in *wy* leads to a rise of 16.84 basis points in the expected real government bond yield at an annual rate.

What explains such findings? The economic rationale behind this link lies on the fact that a fall in wealth increases household exposure to labour income risk and, as a result, leads to an increase in risk premium. Consequently, a decrease in the ratio of asset wealth to human wealth (the wealth-to-income ratio) predicts higher stock returns and government bond yields.

Finally, given the potentially large implications of financial stress for the real economy and with the current crisis in mind, I assess the transmission of financial stress to stock and government bond markets. In particular, I ask the following questions: How strong is the link between financial stress and financial markets? How do financial stress conditions affect the behavior of stock returns and government bond yields?

I show that accounting for the level of financial stress allows one to track better future time-variation in risk premium. Moreover, when financial stress increases, investors demand higher stock returns and government bond yields. Therefore, the current work opens new avenues for understanding the dynamics of the linkages wealth, stock markets and government bonds' developments, and financial stress conditions.

The rest of the paper is organized as follows. Section 2 describes the theoretical framework while Section 3 provides the empirical approach. Section 4 presents the results, while Section 5 proceeds with the robustness analysis. Section 6 concludes.

2. Wealth-to-Income Ratio and Risk Premium: An Illustration

Consider a continuum of households who consume c_t and wealth services (for instance, liquidity or collateral services), w_t, and maximize utility as follows,

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

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. Preferences are specified by

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

where $\psi > 0$ 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.

Each household has an endowment of stochastic labour income, $y_t(i_t, a_t)$, where i_t is the idiosyncratic event and a_t is the aggregate event, and faces the solvency constraint

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

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

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

$$wy_t(a_t) = \frac{\Lambda_{z_t}\left[\rho w^a\right]}{\Lambda_{z_t}\left[c^a\right]}, \quad (4)$$

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

Allocations and prices will depend on household's consumption weight, θ, as follows: *(i)* if it *does not switch* to a state which is binding, it is $\tilde{\theta}_t(\theta, s_t)$; and *(ii)* if it *does switch*, the new weight is $\underline{\theta}_t(y_t, a_t)$.

Aggregate consumption is obtained by integrating over household weights, namely, $\zeta_t^a(a_t) = \int \tilde{\theta}_t(\theta, s_t) d\Phi_t(\theta; a_t)$, where $\Phi_t(\bullet; a_t)$ represents the distribution over weights at the start of period *t*. The consumption share of an agent can be represented as the ratio of his consumption weight to the aggregate consumption weight, $c_t(\theta, s_t) = \theta'_t(\theta, s_t) \cdot c_t^a(a_t) / \zeta_t^a(a_t)$, while the individual's wealth share corresponds to the ratio of his consumption weight to the aggregate consumption weight, $w_t(\theta, s_t) = \theta'_t(\theta, s_t) \cdot w_t^a(a_t) / \zeta_t^a(a_t)$.

As the wealth-to-income ratio, *wy*, decreases, the cutoff levels for consumption weights increase, $\dfrac{\theta(y_t, a_t)}{\zeta_t^a(a_t)}$, and equal the household's income share if the consumer moves to a state where the constraint is binding. Consequently, household's exposure to income shocks increases and a higher risk premium on stocks and government bond yields is requested.

3. Cointegration Among Wealth and Labour Income

First, the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests are used to determine the existence of unit roots and show that all series are first-order integrated.

Second, the methodologies of Engle and Granger (1987), Johansen and Juselius (1990), and Phillips and Ouliaris (1990) support the existence of cointegration.

Third, I estimate the following vector error-correction model (VECM):

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

where the cointegrating vector eliminates the deterministic trends so that $\log(w_t) + \varpi\log(y_t) + \vartheta t + \chi$ is stationary.

Finally, the wealth-to-income ratio, *wy*, is measured as the deviation from the cointegration relationship:

$$wy_t = \log(w_t) + \hat{\varpi}\log(y_t) + \hat{\vartheta} t + \hat{\chi}, \quad (6)$$

thereby the cointegrating vector eliminates the deterministic trends. The ratio is also computed by estimating the constant, χ, and the trend, ϑ, in the cointegrating relationship while imposing the restriction $\varpi = -1$. The estimates for *wy* are, respectively: *(i)* $wy_t = \log(w_t) - 0.57\log(y_t) - 0.01t - 3.20$; and *(ii)* $wy_t = 1.75\log(w_t) - \log(y_t) - 0.01t - 5.58$.

4. Results

4.1. Data

This Section provides a summary description of the data employed in the empirical analysis.

In the estimations, I use quarterly, seasonally adjusted data for the Euro Area. The sample period 1980:1-2007:4 for which data are available, and all variables - with the obvious exceptions of stock returns and government bond yields - are expressed in logs of real per capita terms by using the GDP deflator.

The main data source is the European Central Bank (ECB) and Euro Area aggregates are calculated as weighted average of euro-11 before 1999 and, thereafter, as break-corrected series covering the real-time composition of the Euro Area. The weights are computed using GDP at irrevocable fixed conversion rates.

Income refers to disposable income, and aggregate wealth is the sum of housing wealth and financial wealth. Given that original data on wealth correspond to the end-of-period values, I lag once the data, so that the observation of wealth in *t* corresponds to the value at the beginning of the period *t + 1*.

Stock returns are computed using data for share price index and the dividend yield ratio provided by the International Financial Statistics (IFS) of the International

Monetary Fund (IMF) and the Datastream. The 10-year government bond yield data is also provided by the IFS of the IMF.

Excess returns are defined as the difference between asset returns and the short-term interest rates. For short-term interest rates from January 1999 onwards, the euro area 3-month Euribor is used. Before 1999, the euro area nominal interest rates are estimated as weighted averages of national three-month interest rates.

Finally, the Financial Stress Index for the Euro Area as a whole is computed using country-level Financial Stress Indexes provided by the IMF.

4.2. Forecasting Stock Returns

Section 2 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.

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

Table 1 summarizes the forecasting power of wy_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 wy_t. Therefore, I estimate the following model:

$$\sum_{h=1}^{H} SR_{t+h} = \alpha + \beta wy_{t-1} + \varepsilon_t \,. \tag{7}$$

It shows that wy_t is statistically significant, the point estimate of the coefficient is negative and large in magnitude, especially, at horizons of eight quarters (-2.80 when $\hat{\varpi}$ is freely estimated and -1.60 when $\hat{\varpi}$ is restricted to -1). In fact, it can be seen that the trend deviations explain an important fraction (18%) of the variation in future real returns (as described by the adjusted R^2).

[PLACE TABLE 1 HERE.]

Table 2 provides a summary of the power of wy_t in predicting excess stock returns at different horizons. Therefore, it reports estimates from OLS regressions of the H-period real stock return, $ER_{t+1} + \ldots + ER_{t+H}$, on the lag of wy_t, as follows:

$$\sum_{h=1}^{H} ER_{t+h} = \alpha + \beta wy_{t-1} + \varepsilon_t . \quad (8)$$

Similarly to the findings in Table 1, Table 2 confirms that the sign of the coefficient associated to wy_t is statistically significant and negative. The forecasting power of wy_t is particularly strong at horizons of four to eight quarters, where it explains between 13% and 16% of the variation in future excess returns.

[PLACE TABLE 2 HERE.]

Summing up, these results suggest that investors demand a higher risk premium when they face a fall in the wealth to income ratio. Moreover, they are in accordance with the work of Sousa (2010b), who argues that one can improve stock return predictability by combining wealth with macroeconomic data and shows that wealth composition is a major driver of risk premium.

4.3. Forecasting Government Bond Returns

Table 3 reports estimates from OLS regressions of the H-period real government bond yield, $BR_{t+1} + \ldots + BR_{t+H}$, on the lag of wy_t, that is, from the following model:

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

The coefficient associated to *wy* is negative and large in magnitude, in particular, at the horizon of 20 quarters (-5.07 when $\hat{\varpi}$ is freely estimated and -2.90 when $\hat{\varpi}$ is restricted to -1), when it explains 30% of the variation in future real government returns. This implies that a one standard-deviation fall in the wealth-to-income ratio leads to a rise of 16.84 basis points in the expected annual real government bond yield.

[PLACE TABLE 3 HERE.]

5. Robustness Analysis

5.1 Additional Control Variables

The robustness of the forecasting power of *wy* is assessed by adding other control variables to the estimations. Specifically, Shiller (1984), Campbell and Shiller (1988), and Fama and French (1988) find that the price-to-dividend ratio and the price-to-earnings ratio have predictive power for stock returns.

Tables 4 and 5 report the estimates from eight-quarter-ahead forecasting regressions – for which the predictability power of *wy* is found to be largest - that include the dividend yield ratio ($DivYld_t$) or the lag of stock returns as additional variables.

The results show that both the point coefficient estimates of *wy* and its statistical significance do not change with respect to the findings of Tables 1 and 2 where only *wy* was included as explanatory variable. Moreover, the dividend yield ratio ($DivYld_t$) seems to provide some relevant information about future asset returns as it is also statistically significant.

[PLACE TABLE 4 HERE.]

[PLACE TABLE 5 HERE.]

As for government bond yields, I consider the lag of government bond yield and the inflation rate (*Inflation*) as possible predictors. In fact, Davis and Kutan (2003) find that inflation predicts stock returns and volatility.

Table 6 summarizes the estimates from 20-quarters-ahead forecasting regressions (for which the predictability power of *wy* is found to be largest). The results show that the statistical significance of *wy* remains unchanged. There is also evidence suggesting that: *(i)* yields exhibit persistence; and *(ii)* investors use government bonds as a way of hedging against inflation risk.

[PLACE TABLE 6 HERE.]

5.2 Nested Forecast Comparisons

I now make nested forecast comparisons in which I compare the mean-squared forecasting error from a series of eight-quarter-ahead out-of-sample forecasts obtained from a prediction equation that includes *wy* as the sole forecasting variable, to a variety of forecasting equations that include only the lagged asset return (the *autoregressive benchmark*) or a constant (the *constant expected returns benchmark*).

Tables 7 and 8 summarize, respectively, the nested forecast comparisons for the equations of the real and excess stock returns using *wy*. It can be seen that models that include *wy* have a lower mean-squared forecasting error. This is particularly important when the benchmark model is the *autoregressive*. Similarly, the *wy* model is superior to the *constant expected returns benchmark*, which, therefore, supports the existence of time-variation in expectations about future returns.

[PLACE TABLE 7 HERE.]

[PLACE TABLE 8 HERE.]

Table 9 compares the mean-squared forecasting error from a series of twenty-quarter-ahead out-of-sample forecasts obtained from an equation that includes *wy* as the sole forecasting variable, to equations that include only a constant (the *constant expected returns benchmark*) or the lagged yield (the *autoregressive benchmark*). The *wy* model clearly outperforms the benchmark models, corroborating the idea of time-variation in expectations about future returns.

[PLACE TABLE 9 HERE.]

6. How Important is Financial Stress?

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.

The financial turmoil that began in the summer of 2007 has quickly mutated into a full-blown crisis. In fact, its intensification after the collapse of Lehman Brothers in September 2008 has raised the specter of another Great Depression. While encompassing broad securities markets and impacting the banking systems of several advanced economies, a key concern is what policymakers can do both to reduce its economic consequences and prevent such episodes to occur in the future. Similarly, a crucial question is how macroeconomic activity will be affected going forward, and, in particular, how financial markets will react to the turmoil.

The impact of financial cycles on the real economy has been analyzed under three lenses. First, by looking at the role of the financial accelerator due to the effects of changes in the value of collateral on the willingness of the financial system to provide credit to the economy (Bernanke and Gertler, 1995, and Bernanke et al., 1999, Kiyotaki and Moore, 1997). Second, by examining the role of bank capital for aggregate credit (Kashyap and Stein, 1995). In this case, banks are more reluctant to lend when their capital is eroded, which, in turn, leads to sharper economic downturns. Third, by assessing whether the role of the financial accelerator varies with the type of financial system (Rajan and Zingales, 2003). For instance, the general trend towards systems that rely less on relationship-based lending and more on arm's-length based financing may have increased the ability of economies to absorb financial stress.

Against the background of the current financial turmoil, we address the following questions: how important is financial stress? Does an increase of financial stress conditions push risk premium upwards? How does it impact on stock returns and government bond yields?

In order to assess the importance of financial stress, I estimate the following models:

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

$$\sum_{h=1}^{H} ER_{t+h} = \alpha + \beta wy_{t-1} + \mu wy_{t-1} * FinancialStress_{t-1} + \varepsilon_t , \qquad (11)$$

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

where *FinancialStress* is an Index measuring the Financial Stress conditions of the Euro Area as a whole, and *H* refers to the number of quarters-ahead of the forecasting exercise.

Tables 10, 11 and 12 report the estimates from the forecasting regressions for real stock returns, excess stock returns and government bond yields, as expressed by equations (10), (11) and (12), respectively. The results show that the coefficient estimates of *wy* do not change relative to the previous findings. Moreover, they remain negative and statistically significant, indicating that a fall in the asset wealth to human wealth ratio predicts a rise in risk premium. Moreover, the coefficient associated to the interaction between *wy* and the Financial Stress Index is statistically significant: (i) in the forecasting regressions for real stock returns and excess stock returns over horizons from one to twelve quarters; and (i) statistically significant in the forecasting regressions for government bond yields over horizons from four to twenty quarters. This is also in line with the previous findings which suggest that the predictive ability of *wy* for stock returns is largest at short to medium horizons, while it predicts better government bond yields at longer periods. In addition, it has an opposite sign of the one associated with *wy*, implying that investors demand a higher risk premium for both stocks and government bonds during episodes of larger financial stress. Finally, the adjusted R-square statistics are also improved: the regressions are able to explain 29%-30% of the variation of real and excess stock returns over the next four quarters, and 37% of the variation of government bond yields over the next twenty quarters. Summing up, conditioning the effect of *wy* on the financial stress conditions allows one to track better future risk premium.

[PLACE TABLE 10 HERE]

[PLACE TABLE 11 HERE]

[PLACE TABLE 12 HERE]

7. Conclusion

The 2008-2009 financial crisis has demonstrated that the financial system, the housing sector, and the banking sector are strongly connected not only in domestic terms, but also when considering inter-country dimensions. These linkages, in turn, can generate important wealth dynamics.

This paper analyses the forecasting properties of the trend deviations from the cointegrating relationship among asset wealth and labour income (labelled *wy*) for expected future stock returns and government bond yields in the Euro Area as a whole.

These results follow from the fact that the wealth-to-income ratio captures time-variation in expected returns. In particular, when the ratio of asset wealth to human wealth falls (increases), forward-looking investors become more (less) exposed to idiosyncratic shocks and, therefore, demand a higher (lower) risk premium for stocks. As for bond yields, if government bonds are understood as another wealth component, then investors behave in the same way as for stocks. However, if the increase in government bond yields is perceived as a symptom of the deterioration of the fiscal stance, investors will interpret the fall in the wealth-to-income ratio as a fall in future bond risk premium.

I show that *wy* strongly predicts stock returns, in particular, at the eight-quarter-ahead horizon when it explains 16% of real returns and 18% of excess returns. In the case of government bond yields, the empirical proxy predicts 30% of real returns at horizons of twenty quarters. In addition, in both the forecasting regressions for stock returns and government bond yields, the coefficient associated with *wy* is negative, therefore, highlighting the investors behave in a *non-Ricardian* way.

Finally, I show that, conditioning the predictive ability of *wy* on the financial stress conditions, allows one to track better future time-variation in risk premium. In particular, investors demand a higher risk premium for both stocks and government bonds when financial stress increases. Therefore, the current work opens new and challenging avenues for understanding the dynamics of the relationship between the housing sector, stock market and government bond developments, and the banking system.

References

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

Bernanke, B., and M. Gertler (1995). Inside the black box: The credit channel of monetary policy transmission. Journal of Economic Perspectives, 9, 27-48.

Bernanke, B., Gertler, M., and S. Gilchrist (1999). The financial accelerator in a quantitative business cycle framework. Handbook of Macroeconomics, 1C, 1341-1393.

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

Castro, V. (2010a). The duration of economic expansions and recessions: More than duration dependence. Journal of Macroeconomics, 32(1), 347-65.

Castro, V. (2010b). Can central banks' monetary policy be described by a linear (augmented) Taylor rule or by a nonlinear rule? Journal of Financial Stability. forthcoming.

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

Davis, N., and A. M. Kutan (2003). Inflation and output as predictors of stock returns and volatility: International evidence. Applied Financial Economics, 13, 693-700.

Engle, R., and C. Granger (1987). Co-integration and error-correction: representation, estimation and testing. Econometrica, 55, 251-276.

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

Fama, E. F., and K. R. French (1988). Permanent and temporary components of stock prices. Journal of Political Economy, 96, 246-273.

Granville, B., and S. K. Mallick (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.

Johansen, S., and K. Juselius (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. Oxford Bulletin of Economics and Statistics, 52, 169-210.

Kashyap, A., and J. Stein (1995). The impact of monetary policy on bank balance sheets. Carnegie-Rochester Conference Series on Public Policy, 42, 151-195.

Kiyotaki, N., and J. Moore (1997). Credit cycles. Journal of Political Economy, 105, 211-248.

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

Michaelides, A. (2003). International portfolio choice, liquidity constraints and the home equity bias puzzle. Journal of Economic Dynamics and Control, 28, 555-594.

Mallick, S. K., and M. Moshin (2010). On the real effects of inflation in open economies: Theory and empirics. Empirical Economics, 39(3), 643-673.

Newey, W., and K. West (1987). A simple positive semi-definite, heterokedasticity, and autocorrelation consistent covariance matrix. Econometrica, 55(3), 703-708.

Phillips, P. C. B., and S. Ouliaris (1990). Asymptotic properties of residual based tests for cointegration. Econometrica, 58, 165-193.

Rajan, R., and L. Zingales (2003). Banks and markets: The changing character of European finance. CEPR Discussion Paper No. 3865.

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

Shiller, R. J. (1984). Stock prices and social dynamics. Brookings Papers on Economic Activity, 84, 457-510.

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, 88-105.

Sousa, R. M., 2010b, Consumption, (dis)aggregate wealth, and asset returns. Journal of Empirical Finance, 17(4), 606-622.

List of Tables

Table 1 – Forecasting real stock returns.

Forecast Horizon *H*							
1	2	3	4	8	12	16	20
-0.41**	-0.83***	-1.22***	-1.63***	-2.80***	-2.72***	-1.77**	-0.11
(-2.26)	(-2.68)	(-3.00)	(-3.28)	(-3.92)	(-3.84)	(-2.11)	(-0.12)
[0.06]	[0.09]	[0.12]	[0.14]	[0.18]	[0.11]	[0.04]	[0.00]

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 2 – Forecasting excess stock returns.

Forecast Horizon *H*							
1	2	3	4	8	12	16	20
-0.40**	-0.81***	-1.18***	-1.56***	-2.56***	-2.26***	-1.03	1.02
(-2.22)	(-2.61)	(-2.91)	(-3.16)	(-3.67)	(-3.29)	(-1.26)	(1.20)
[0.06]	[0.09]	[0.11]	[0.13]	[0.16]	[0.08]	[0.01]	[0.01]

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 3 – Forecasting real government bond yields.

Forecast Horizon *H*							
1	2	3	4	8	12	16	20
-0.22***	-0.43***	-0.63***	-0.83***	-1.66***	-2.61***	-3.75***	-5.07***
(-4.99)	(-5.00)	(-5.02)	(-5.07)	(-5.33)	(-5.70)	(-6.39)	(-7.35)
[0.17]	[0.17]	[0.17]	[0.17]	[0.18]	[0.20]	[0.24]	[0.30]

Notes: Newey-West corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 4 – Forecasting real stock returns: additional control variables.

wy_{t-1}	$DivYld_{t-1}$	SR_{t-1}	Adj. R-square
-2.92***		-0.31	[0.19]
(-4.22)		(-0.87)	
-2.20***	0.15***		[0.33]
(-3.88)	(4.34)		
-2.13***	0.16***	0.15	[0.33]
(-3.97)	(4.43)	(0.44)	

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 5 - Forecasting excess stock returns: additional control variables.

wy_{t-1}	$DivYld_{t-1}$	SR_{t-1}	Adj. R-square
-2.66***		-0.30	[0.16]
(-3.95)		(-0.80)	
-2.04***	0.13***		[0.26]
(-3.46)	(3.72)		
-1.99***	0.13***	0.12	[0.26]
(-3.54)	(3.82)	(0.32)	

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 6 – Forecasting real government bond yields: additional control variables.

wy_{t-1}	$Inflation_{t-1}$	BR_{t-1}	Adj. R-square
-1.71***		14.41***	[0.83]
(-3.86)		(24.42)	
-3.73***	0.47***		[0.60]
(-5.31)	(9.66)		
-1.66***	-0.04	15.05***	[0.83]
(-3.96)	(-0.75)	(16.31)	

Notes: Newey-West corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 7 – Eight-quarter-ahead forecasts of real stock returns. *wy* model vs. constant/AR models

$MSE_{wy}/MSE_{constant}$	MSE_{wy}/MSE_{AR}
0.909	0.868

Notes: MSE – mean-squared forecasting error. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 8 – Eight-quarter-ahead forecasts of excess stock returns. *wy* model vs. constant/AR models

$MSE_{wy}/MSE_{constant}$	MSE_{wy}/MSE_{AR}
0.923	0.884

Notes: MSE – mean-squared forecasting error. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 9 – Twenty-quarter-ahead forecasts of real government bond yields.

$MSE_{wy}/MSE_{constant}$	MSE_{wy}/MSE_{AR}
0.844	0.859

Notes: MSE – mean-squared forecasting error. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 10 – Forecasting real stock returns: impact of financial stress conditions.

	Forecast Horizon *H*							
	1	2	3	4	8	12	16	20
wy_{t-1}	-0.64***	-1.26***	-1.84***	-2.41***	-3.70***	-3.58***	-2.36***	-0.43
	(-4.12)	(-4.71)	(-5.24)	(-5.66)	(-4.55)	(-4.12)	(-2.63)	(-0.47)
$wy_{t-1} * FinancialStress_{t-1}$	0.32***	0.59***	0.85***	1.06***	1.24***	1.19**	0.81	0.44
	(3.40)	(3.66)	(3.94)	(4.03)	(3.06)	(2.45)	(1.20)	(0.67)
Adj. R-square	[0.16]	[0.21]	[0.26]	[0.30]	[0.28]	[0.17]	[0.06]	[0.01]

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 11 – Forecasting excess stock returns: impact of financial stress conditions.

	Forecast Horizon *H*							
	1	2	3	4	8	12	16	20
wy_{t-1}	-0.64***	-1.23***	-1.80***	-2.33***	-3.47***	-3.13***	-1.65*	0.66
	(-4.10)	(-4.65)	(-5.17)	(-5.51)	(-4.28)	(-3.63)	(-1.86)	(0.74)
$wy_{t-1} * FinancialStress_{t-1}$	0.32***	0.59***	0.85***	1.06***	1.23***	1.20**	0.85	0.49
	(3.41)	(3.65)	(3.92)	(4.00)	(3.00)	(2.41)	(1.24)	(0.75)
Adj. R-square	[0.16]	[0.20]	[0.26]	[0.29]	[0.25]	[0.14]	[0.04]	[0.02]

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.

Table 12 – Forecasting real government bond yields: impact of financial stress conditions.

	Forecast Horizon *H*							
	1	2	3	4	8	12	16	20
wy_{t-1}	-0.20***	-0.38***	-0.55***	-0.71***	-1.38***	-2.20***	-3.27***	-4.48***
	(-4.32)	(-4.16)	(-4.02)	(-3.92)	(-4.02)	(-4.37)	(-5.11)	(-5.86)
$wy_{t-1} * FinancialStress_{t-1}$	-0.03	-0.08	-0.13	-0.19*	-0.44**	-0.64**	-0.75**	-0.81*
	(-1.11)	(-1.29)	(-1.50)	(-1.71)	(-2.02)	(-2.07)	(-1.98)	(-1.84)
Adj. R-square	[0.19]	[0.19]	[0.19]	[0.19]	[0.21]	[0.24]	[0.27]	[0.37]

Notes: Newey-West (1987) corrected *t*-statistics appear in parenthesis. Adjusted R^2 is reported in square brackets. *, **, *** - statistically significant at the 10, 5, and 1% level respectively.