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Scant attention has been paid in the literature concerning 'consumption wealth effects' to asset heterogeneity in terms of foreign and domestic asset holdings. Through extending the approach of Lettau and Ludvigson (2004).and Nitschka (2007), this study uncovers that whilst households tend to view innovations to domestic asset holdings as part of their permanent income, changes in the value of foreign equity holdings are largely characterised as temporary in nature and unrelated to household consumption decisions. This evidence complements existing work concerning 'valuation effects' by highlighting at a disaggregated level an important mechanism by which this phenomenon affects a fundamental macroeconomic aggregate, and also draws implications for trade balance outcomes.

Keywords: Valuation Effects, Household Consumption, Cointegration
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1 Introduction

Recent years have seen a sharp increase in the foreign asset holdings of major industrialised countries and developing nations alike. In the mide 1990s, both developed and developing nations experienced a pronounced increase in their degree of financial integration, measured in terms of gross foreign asset and liability positions (Lane and Milesi - Ferretti (2003, 2006a)). As demonstrated by a broad range of research, this take-off in gross asset and liability positions and the associated potential for capital gains ('valuation effects') on these asset positions has various direct implications for the external sector - for exchange rates (see Lane and Milesi Feretti 2006b), for questions of external sustainability and adjustment (see Gourinchas and Rey 2007a and Gourinchas 2008), and for the global imbalances debate (Gourinchas and Rey 2007b). Moreover, this increase in the absolute size of the external asset position has been accompanied by a concomitant increase in its *heterogeneous* composition along both asset and currency dimensions, opening the door to divergent effects of price and exchange rate movements on the value of each respective asset class (see Tille 2005).

Given that the external implications of foreign asset holdings have been well documented, the question then arises as to whether this increase in size and heterogeneous composition of foreign asset holdings may have domestic macroeconomic effects? To answer this question, this paper focuses - as far as we know, for the first time in the literature - on the potential consumption wealth effects of household holdings of foreign equity and debt assets and analyses whether differential effects occur depending on whether one considers holdings of contingent versus non-contingent claims? Whilst *a priori* one would expect little impact of innovations to a nominal variable to have little real effect, this study finds that holdings of foreign assets *do* affect household consumption. In doing so, we stress several points. Firstly, innovations to the value of foreign asset holdings (valuation effects) affect household consumption outcomes over short and long term horizons, confirming the importance of considering the relationship between consumption and foreign asset dynamics. Indeed, It is found that different wealth effects obtain depending on the type of foreign asset held by households (equity vs bonds) and that the estimated average marginal propensities to consume (MPCs) from household foreign equity and foreign bond wealth (which are implied by the long run equilibrium relationship) are small in magnitude when compared to the MPC from household domestic asset wealth.

Secondly, the estimate of the average MPC from household domestic wealth is smaller than that for estimated in the previous literature concerning overall household wealth e.g. in Lettau and Ludvigson (2004). This is because previous estimates of the marginal propensity to consume from overall asset wealth conflated wealth effects stemming from domestic vs those arising from foreign asset wealth. Since consumers tend to consume more from an additional unit of domestic asset wealth (which is the largest category of asset in the household portfolio) than from each form of foreign asset wealth, this tends to suggest the presence of fixed costs to adjusting consumption.

Thirdly, innovations to foreign equity wealth are in the main characterised by transitory fluctuations, which are unconnected with fluctuations in consumption. In contrast, innovations to the value of foreign bond and domestic wealth holdings tend to be permanent in nature. Finally, the cointegration relationship between household consumption, income and foreign and domestic asset holdings is unstable over time, with the financial integration era providing more stability to the long run relationship with consumption. This implies that future research should concentrate on modelling the potential nonlinear dynamics of the consumption - foreign wealth ratio.

The analysis is structured as follows. Section II reviews the existing literature concerning valuation effects, as well as that concerning the consumption wealth linkage. Section III presents the theoretical and econometric framework of the study, while section IV presents the empirical findings. Section V concludes.

2 Review of the Literature

The present analysis finds itself at the confluence of two well established literatures - that concerning the potential economic impact of valuation gains on foreign assets and liabilities mentioned above, and also that relating to the consumption wealth linkage. In this light, the following literature review examines several aspects. Firstly, since this paper is concerned with a disaggregation of household wealth into foreign and domestic components and also into the consitutuent components of foreign asset wealth, it is of relevance to examine the evidence concerning the type of valuation effect that predominates for each kind of asset. Secondly, a sample of the voluminous studies concerning the consumption - wealth linkage is analysed. Also, the limited existing evidence concerning the link between international asset price movements and consumption is considered, whilst finally the literature concerning some more tangential issues is reviewed. Whilst it is in each case not possible to review the full extent of the large literature, we seek to highlight examples of papers which are representative of each strand of the literature and to examine how this is relevant for the theoretical and empirical analysis presented in this paper.

2.1 Type of Foreign Assets and Valuation Effects

Whilst the main existing works concerning the economic impacts of valuation effects on the external sector have been reviewed above, it is also of relevance to consider the evidence concerning the types of capital gain that predominate for each class of asset, given that the effects of these valuation gains on household consumption are the main interest of this paper. It is well known that U.S holdings of foreign equity assets are predominantly denominated in foreign currencies, whilst the bulk of US debt asset holdings consist of dollar positions. That is, whilst foreign currencies account for 65% of foreign assets, the spread across asset classes is uneven. Nearly all of FDI and foreign equity assets are denominated in foreign currencies, whilst they represent only 17% of remaining assets, reflecting that the bulk of US assets in debt securities and banking consist of dollar denominated positions (see Tille 2005, 2008).

Accordingly, one might expect a large role for capital gains to foreign equity holdings stemming from exchange rate movements. This is actually the case for the US, especially so on the early 2000s, with asset price valuation effects also playing a prominent role (Higgins, Klitgaard and Tille 2006). In terms of foreign bond holdings, the evidence points to a large role for capital gains attributable to price movements. This dichotomy between the different types of capital gains to the different types of foreign assets is therefore important and will play a large role in explaining why household holdings of foreign assets and foreign bonds react differently to a transitory (exchange rate) shock in the empirical analysis of the present study.

2.2 The Consumption Wealth Linkage

Furthermore, the linkage between fluctuations in household wealth and household consumption has also generated much research interest. The classic works of this genre, such as that of Modigliani (1971), primarily concentrated on the consumption impacts of household wealth accumulation. However, recent interest in this branch of the literature surged especially in the policy context of the supposed 'consumption-wealth channel' of monetary policy transmission. According to these studies, it was hypothesised that changes in the overnight cash rate (for example the Fed Funds rate in the US) would affect asset values and hence household wealth. Fluctuations in the value of household assets would therefore in turn have an impact upon household consumption. Hence this transmission chain consists of two links; that between the monetary policy instrument and asset values, and subsequently the link from asset values to household consumption (Zeldes 2002). Whilst for example the work of Ludvigson, Steindel

and Lettau (2002) addressed the former question, it is the latter link between changes in the value of assets and household consumption which is of direct relevance to the present study. Studies that investigated this latter link include Ludvigson and Steindel (1999), who find a positive, yet short-lived, connection between (stock market) wealth changes and consumer spending.

However, it was Lettau and Ludvigson (2004) who, in pioneering their cointegration approach to this question (an empirical approach which is followed and extended by this study and examined in greater detail in Section III), found in relation to US data that the vast majority of quarterly fluctuations in asset values are attributable to *transitory* innovations, which display virtually no association with aggregate consumption. Their results imply that the vast majority of the variability in consumption (driven by permanent shocks) is disassociated with most of the variability in wealth (which is driven by transitory shocks). That is, in their framework, only permanent trend changes in wealth are related to consumer spending, with the implication that the marginal propensities to consume (MPCs) from household wealth which are traditionally calculated by the literature need to be adjusted for the fraction of wealth which is characterised by transitory shocks.

A further issue which has been considered by the literature and related to the present study is that of asset heterogeneity and the differential impacts on household consumption of innovations to different kinds of assets (note that asset heterogeneity has up until now only been considered in terms of domestic asset holdings. A feature of the present study is to also consider asset heterogeneity in the international dimension). An example of this kind of study is Byrne and Davis (2003), who emphasise the differential impact of different forms of wealth on aggregate consumption. The essence of this paper is to distinguish household assets by their degree of liquidity ('liquid' vs 'nonliquid' wealth) and to estimate long run consumption functions for data of a set of G7 nations (US, UK, Germany, France, Italy, Canada and Japan). They find that there is a broad pattern of larger and more significant coefficients for illiquid rather than liquid assets (except for Italy where both are insignificant), although the results differ slightly according to differing definitions of 'liquidity'. Interestingly, this study also considers several variants of disaggregation, including an examination of the wealth effects of stockmarket wealth versus non stockmarket wealth, finding a significant coefficent on long run equity holdings. The clear implication from this study is however to highlight the value of disaggregating wealth into its subcomponents, with different results obtaining at different levels of aggregation. This approach, involving the disaggregation of household wealth into its foreign and domestic components, is one which is followed in the present analysis.

2.3 International Asset Price Movements, Household Consumption & the External Sector

Despite the plethora of studies concerning the linkage between innovations to asset wealth and household consumption, limited interest has however been shown in the literature in the potential effects of *international* asset price movements on domestic consumption. For example, whilst Holinski and Vermeulen (2009) use a global error - correction model to analyse the effect of transmission of asset price movements between countries and their effects on consumption, this study does not explicitly consider potential differential effects between bond and equity holdings. With specific reference to the foreign asset position, Lane and Milesi Feretti (2006b) explicitly note that the valuation gains from exchange rate depreciation may boost domestic expenditure through an associated positive wealth effect, whilst Fair (2004) notes sizeable macroeconomic impacts through capital gains to foreign assets associated with the depreciation of the US dollar in the early 2000s.

The closest work to the present one is that of Corsetti and Konstantinou (2009), who in analysing the joint dynamics of US net output, consumption and valuation adjusted foreign assets and liabilities highlight the importance of differentiating between the trend and cyclical components of the current account. This study finds that variations US consumption are virtually solely characterised by trend movements and that transitory variations in

gross foreign asset and liability positions are quantitatively large over short and long horizons. Furthermore, they highlight that to the extent that the buildup of external assets and liabilities is persistent in nature (that these holdings can be expected to take some time to return to trend values) adjustment in quantities such as consumption and net output will clearly be of relevance for external adjustment. However, whilst this paper analyses the overall dynamics of gross asset and liability positions, it also does not explicitly tackle the question of the potential impact of *heterogeneous* asset holdings on consumption.

2.4 Tangential Issues

A tangentially related strand of literature (which is however not the direct focus of the current analysis) investigates the effects of *discrete* financial liberalisation events on consumption outcomes. The hypothesis underlying these studies is that financial liberalisation is likely to impact upon consumption behaviour by reducing liquidity constraints on borrowers. Whilst even in this subarea of the literature a large number of studies exist, a good example is that of Barrell and Davis (2004), who employ an error correction consumption function to analyse the significance of credit constraints for consumption (i.e. the size and significance of current income for consumption before and after liberalisation). This paper finds a distinct shift in consumer expenditure patterns after a financial liberalisation event, which involves a more rapid adjustment of consumption to its long run equilibrium value, a shift from long run dependence on income to more influence of wealth, a decline in short run income elasticities and a rise in short run wealth and interest rate elasticities.

3 Theoretical and Econometric Framework

In contrast to previous studies, the present study seeks to address the implications of the buildup of the household asset portfolio over time for the real sector by estimating the long run elasticities of household consumption to innovations in different types of household foreign asset holdings. Thus the present analysis examines whether innovations to foreign asset wealth holdings impact upon domestic household consumption, and also to disentangle the potential differential impacts of each form (equity vs bond) of foreign asset holding on household consumption. In this respect it may be seen as complementary to the analysis of Corsetti and Konstantinou (2009), where here we focus on the adjustment of the household sector to changes in the value of their foreign asset holdings. The major contribution of this paper lies in the extension of the theoretical model of Nitschka (2007) to a quintvariate cointegrating system, and the application of the cointegration approach of Lettau and Ludvigson (2004) to generate estimates of how innovations to different forms of household foreign asset wealth (capital gains or 'valuation effects') affect household consumption. The theoretical and foundations and empirical methodology of this analysis are detailed below.

3.1 Theoretical Model

The theoretical and empirical analysis of this paper extends the theoretical foundation of Nitschka (2007), who in turn extended the well known approach of Lettau and Ludvigson (2004). Following the approach of Campbell and Mankiw (1989) and using a simple wealth accumulation equation, the latter study derived a trivariate relationship between log consumption, log income and log household wealth as an expression for the log consumption – wealth ratio. The former extended this relationship to a quadvariate setting, involving a decomposition which isolated the foreign equity component of household wealth. However, empirical evidence, such as the 2007 wave of the US Survey of Consumer Finances, indicates that households which hold foreign stocks also hold foreign bonds.

Therefore it seems appropriate to jointly model the effects of both forms of foreign asset wealth on consumption[1]. More formally, the quintvariate relationship analysed here (all variables are in logs) is given by:

$$\begin{aligned} & c_t - \xi fe_t - \gamma fb_t - \phi daw_t + (1-v)y_t \qquad (1) \\ = \quad & E_t \left\{ \sum_{i=1}^{\infty} \rho_w^i \left[\left(\xi r_t^{fe} - \gamma r_t^{fb} - \phi r_t^{daw} + (1-v)\Delta y_{t+i} \right) - \Delta c_{t+i} \right] + (1-v) z_{t+i} \right\} \end{aligned}$$

The above equation (1) states that log consumption (c_t), log foreign equity holdings (fe_t), log foreign bond holdings (fb_t), log domestic wealth holdings (daw_t), and log labour income (y_t) cointegrate provided that they are I (1) variables[2]. According to this specification, time variation in the consumption to foreign wealth ratio (that is, a temporary deviation from common trends) thus mirrors expected returns to a foreign asset (bond or equity, represented respectively by vr_{t+i}^{fb} and vr_{t+i}^{fe}), expected future income growth (Δy_{t+i}), expected future consumption growth (Δc_{t+i}), or returns on domestic asset wealth $\left(r_t^{daw}\right)$, or some combination of these[3].Note that the variables representing the different forms of household asset holdings can be understood as the time varying shares of household wealth that are invested in each asset. For the empirical analysis it is ideal to include the notion of a time varying parameter, since (as has been well documented elsewhere) the share of foreign and domestic asset holdings in the balance sheet is not static and has evolved over time.

3.2 Empirical Implementation

The empirical implication of Equation (1) is that all variables in the system cointegrate provided that they are integrated of order one. The purpose of estimating these equations as a quintvariate cointegrating relation is essentially that estimates of the 'consumption wealth effect' of asset wealth are traditionally formed from the estimates of the coefficients in a cointegrating regression of consumption on income and the different forms of asset wealth. These coefficient estimates may be regarded as the long run elasticities of consumption with respect to the respective regressors(Lettau and Ludvigson 2004).

The above cointegrating regression can be estimated using several empirical methodologies which are common in the literature concerning measuring the wealth effects on consumption of innovations to asset holdings. For example, the Dynamic Ordinary Least Squares (DOLS) approach of Stock and Watson (1993), or the Full Information Maximum Likelihood approach of Johansen (1991), Johansen and Juselius (1990) both produce (superconsistent) estimators of the elasticity of consumption with respect to income, the different foreign asset types, and domestic wealth holdings[4]. In practice, both methodologies will yield estimates of the cointegrating coefficients of a very similar magnitude, which then imply calculations of the marginal propensity to consume (MPC) from the respective forms of asset wealth.

However, Lettau and Ludvigson (2004) highlight that only a fraction of the innovations to wealth are associated with consumption changes. This is because wealth and consumption are characterised to differing extents by permanent and transitory innovations. The extent to which an innovation to wealth translates into a change in

[1] The formal derivation of the model is to be found in the Appendix.

[2] Note that the terms ξ, γ and ϕ denote the share of asset wealth in total wealth multiplied by the respective shares of each form of asset wealth in the household portfolio.

[3] In order to keep the spotlight on the issue of foreign asset heterogeneity, we therefore focus on the marginal effects on consumption of different foreign asset classes compared with that of overall domestic wealth. A further interesting extension to the model would be to break down domestic asset wealth into its bond and equity components, which we for now leave to future research.

[4] Whereas the latter produces estimates of the cointegrating coefficients by maximising the likelihood function of the *pth* order VAR representation of the cointegrated system (subject to the constraint of the number of cointegrating vectors present), the former methodology generates the coefficient estimates through regressing consumption on (leads and lags of) the regressors.

consumption is assessed by estimating innovations to wealth and consumption are characterised by permanent and transitory shocks. To achieve this, we rewrite the cointegrating relationship in its error correction form, a la Engle and Granger (1987):

$$\Gamma(L)\Delta y_t = \lambda\acute{\beta} y_{t-1} + \varepsilon_t \tag{3}$$

where $\Delta y_t = [\Delta c_t, \Delta fb_t, \Delta daw_t, \Delta y_t, \Delta fe_t]$ is the vector of first differences, y_{t-1} is the vector of lagged levels, $\lambda = [\lambda_c, \lambda_{fb}, \lambda_{daw}, \lambda_y, \lambda_{fe}]$ is the vector of adjustment coefficients , $\Gamma(L)$ denotes a 5 x 5 identity matrix in the lag operator and $\widehat{\beta} = \left[1, -\beta_y, -\beta_{daw}, -\beta_{fb}, -\beta_{fe}\right]$ is the estimated vector of cointegration coefficients (with the coefficient on consumption normalised to unity).

This VECM specification offers several advantages in the current context. Firstly, one can generate estimates of the short term dynamics of consumption with respect to each variable in the system, including the different types of asset holdings. Secondly, the error correction representation (3) implies that there are one or more variables which restore the system to equilibrium when it deviates from the common trend. Through analysing the significance of the adjustment coefficients (which are the coefficients on the lagged cointegrating residual, or the equilibrium error, and represent the strength of attraction between the cointegrated variables), it is possible to assess which variable(s) contribute towards the restoration of the long run equilibrium relationship characterising the model[5]. That is, if a particular variable ζ_j is responsible for the adjustment that occurs to restore the system to its long run equilibrium after a distorting shock, then the corresponding adjustment coefficient, λ_j, will be significant (the magnitude of the adjustment coefficient indicates the speed of this adjustment process and is given by the quantity $\frac{1}{\lambda}$).

Futhermore, an assessment of the short run dynamics of a cointegrated system allows one to reconcile the short run and long run behaviour of the variables.in the system (Lettau and Ludvigson 2004) If for example wealth growth is much more volatile over short horizons than either consumption or labor income, then it must be that wealth is mean reverting and adjusts over long horizons to match the smoothness of consumption and labor income. This in turn would signal the existence of a significant transitory component in wealth that is unrelated to consumption and labor income.

Finally, the shocks affecting the system of variables can be analysed according to their degree of persistence, an approach which is intuitive in two respects. Firstly, in terms of the strong theoretical foundations underpinning the long run equilibrium relationship involving consumption - the permanent income hypothesis (Friedman 1957), whereby transitory and short term fluctuations in wealth have little effect on consumption behaviour - it seems natural to employ the permanent - transitory decomposition of foreign asset wealth variables in this study in order to assess whether / which form of foreign asset is related to permanent income. Secondly, Lettau and Ludvigson (2004) note that conventional estimates of the wealth effect on consumption are commonly based in parameters of the shared trend in consumption, labor income, and wealth. However, if most changes in wealth are not trend movements but are instead transitory movements unrelated to consumption, then usual estimated of the marginal propensity to consume will significantly exaggerate the true correlation between consumption and wealth. Moreover, a number of studies have employed this approach of using the permanent component of total innovations to interpret the long and short run dynamics of cointegrated systems. These studies include for example Stock and Watson (1988), King et al (1991), Warne (1993), Gonzalo and Granger (1995), Proietti (1997). With specific reference to the consumption wealth decomposition, see for example Chen (2006) and Lettau and Ludvigson (2004).

[5] As is well known, this is because the Granger Representation Theorem outlines that in a cointegrated system, at least one of the adjustment coefficients must be significantly different from zero, to indicate the variable that is responsible to restoring the system to equilibrium after a deviation from common trend.

Moreover, from the econometric perspective, this approach is particularly suited to the analysis of cointegrating relationships because in this type of system, variables move together at low frequencies and our ability to identify the sources of shocks is more limited than in the absence of cointegration (Gonzalo and Ng 2001). Cointegration is thus used to decompose the vector y_t into innovations that are distinguished by their degree of persistence, restricting the matrix of long run multipliers of shocks in the system (which identifies the permanent components, while the transitory component is identified as the residual). The dynamic impacts of the transitory innovation are then assessed by assuming the latter to be orthogonal to the permanent innovations This decomposition gives a variable a large weight in the permanent innovations and a small weight in the transitory innovations when its corresponding λ is small, implying that the variable participates little in the error correction required to restore the system to its common trend. On the contrary, it gives a variable a small weight in the permanent innovations and a large weight in the transitory innovations when its corresponding λ is large, implying that the variable plays an important role in the error correction system (Lettau and Ludvigson 2004). Here, since y_t has five elements and a single cointegrating vector, there are four permanent shocks (common trends) and one transitory shock[6].

However, an important assumption underlying the above methodology is that the long run equilibrium relationship between the variables in question (which underpins the VECM described by Equation (3)) is *stable* over time, implying a constant speed of adjustment towards the long run equilibrium in each period. The existence of instability in the cointegration relationship is tested formally below by the implementation of the Hansen (1992) tests, which extend traditional parameter instability tests to the case of integrated regressors. A finding of instability in the long run equilibrium relationship may imply the presence of nonlinearity in the consumption - foreign wealth ratio and hence different adjustment dynamics in the 'pre - financial integration' (pre 1990s) and 'post - integration' (post 1990s) eras.

4 Empirical Analysis

4.1 The Data

Preceding the empirical analysis, one should briefly examine the data series used. Firstly it should be noted that this study confines itself to the analysis of US data, for several reasons. Firstly, the use of US data enables comparability of results with the major works of the previous literature (such as the seminal study of Lettau and Ludvigson (2004), upon which this paper draws), which has concerned itself with the consumption wealth linkage in the USA. Secondly, a relatively long timespan of data (1952:1 to 2007:1) is available for the USA for all variables (this timespan is also chosen to end in 2007:1 to avoid any unstable dynamics induced by the most recent crisis period). Secondly, such data are readily available - for example, data on US household consumption and income per capita are as in Lettau and Ludvigson (2004)[7].

Furthermore, the construction of the dataset used in this study necessitates the use of a Flow of Funds database to capture indirect asset holdings through mutual funds and valuation gains on household foreign bond and equity assets (since the Flow of Funds values assets at their market value). Whilst there are several examples of such databases (such as those of Japan, Australia and Switzerand), the US Flow of Funds matrix is the premier example of this kind of database, offering for example a breakdown of asset holdings by sector and including importantly for the following analysis information concerning indirect household foreign equity holdings through mutual funds.

[6] Note that in order to analyse the effects of the single transitory shock, it is not necessary to separately identify the four permanent shocks. Therefore we examine the effect of of the transitory shock against the joint effect of the permanent shocks combined together. See the Appendix for more information concerning the empirical methodology.

[7] Note that all data are real per capita values, obtained by deflating with the CPI of total personal consumption expenditure in chain-weighted (1996 = 100) seasonally adjusted U.S. dollars published by the Bureau of Economic Analysis in NIPA table 1.1.4 and with population figures from NIPA table 2.1 published by the Bureau of Economic Analysis.

The main drawback of the database in terms of household foreign asset holdings is that instead of being able to isolate foreign bond holdings in a separate category on the household balance sheet, it only contains information concerning household 'corporate and foreign bond holdings'. See the Appendix for more information concerning the construction of the dataset and also how the issue of isolating household holdings of foreign bond assets from the 'corporate and foreign bond' category is dealt with in this study.

Figure 1 displays the data for household consumption and household labor income (left hand pane), along with that for hosuehold foreign equity, foreign bond, and domestic asset holdings (right hand pane). In terms of stylised facts to emerge from a visual analysis of the data, as expected both income and consumption variables exhibit an upward trend over time. However, the main variables of interest for this study are household bond holdings and household foreign equity holdings. Whilst the former are much larger than the latter, both series experience an upward tilt in the early 1990s commensurate with the deepening of financial integration of the US in this period and consistent with the pattern displayed by other series of foreign asset holdings, such as that of Gourinchas and Rey (2007b)[8].

The question naturally arises as to how the data series for foreign asset holdings used in the present analysis compare with those in the previous literature? Whilst this is a less significant in terms of the series for foreign equity holdings (since these are directly verifiable from the Flow of Funds, as detailed in the Appendix), it is of direct relevance for the series of household foreign bond holdings (which is not directly observable from the Flow of Funds and was constructed as per the Appendix). As a robustness check for the data series, the data series of Gourinchas and Rey (2007b) was normalised such that it reflects the proportion of foreign debt assets held by the household sector and analysed the correlation between the two series. The correlation coefficient of 0.98 (with a p-value of 0.00) reflects a high degree of association between the two datasets.

4.2 Empirical Results

4.2.1 Cointegration Analysis - Short Run and Long Run Wealth Dynamics

Long Run Dynamics The key result of the long run cointegration analysis is as follows. Once explicit consideration of foreign and domestic wealth holdings in a cointegrating relationship is made, there exists a degree of heterogeneity in the estimated elasticities of consumption with respect to the different forms of asset wealth That is, consumption is more than twice as sensitive to innovations in domestic wealth than it is to fluctuations in the value of foreign bond holdings, and more than one and a half times as sensitive to fluctuations in foreign equity holdings.

This result is shown in the maximum likelihood estimates of the single cointegrating vector (with the coefficient on consumption normalised to unity and t - statistics in parentheses)[9] :

$$\begin{aligned} \widehat{\beta} &= [1, -\beta_y, -\beta_{daw}, -\beta_{fe}, -\beta_{fb}] \\ &= \begin{bmatrix} 1 & -0.75(-12.61) & -0.05(-1.97) & -0.03(-3.89) & -0.02(-2.27) \end{bmatrix} \end{aligned} \tag{1}$$

These estimates of the cointegration coefficients (the β in Equation 3) signify the long run elasticities of consumption with respect to income, foreign assets and all other asset holdings. Note of course that prior to estimating this cointegrating vector, we found, by employing several different standard methods such as the tests of Dickey

[8] Note that the data of Gourinchas and Rey (2007b) are scaled by GDP, whereas the data used by the current study are not.
[9] Similar estimates to these were obtained using the Dynamic OLS estimation method of Stock and Watson (1993).

and Fuller (1979), Phillips and Perron (1988), that the variables in the system are integrated of order one. This was further confirmed by the stationarity test of Kwiatkowski, Phillips, Schmidt and Shin (1992)[10] Following this, the cointegrating properties of the system are established using the conventional test of Johansen (1988), indicating that one cointegrating vector exists in the cointegrating system (see results in the Appendix).

What might account for the variation in the measured consumption elasticities between domestic and foreign assets? Noting from the theoretical derivation of the model presented in the Appendix that the respective coefficients on the different forms of household asset wealth share in common the term v, which denotes the share of asset wealth in total wealth, differences in the measured elasticities will therefore arise from factors affecting the other term in the product, namely the time varying share of each asset (domestic, foreign equity and foreign bond) in total household asset wealth. The data reflect that whilst in recent years the proportion of especially foreign equity assets has risen substantially, the household balance sheet remains tilted toward domestic assets (see Figure 2). Whilst the estimated long run coefficients do not exactly reflect the relative size of domestic to household domestic to foreign asset holdings, the ordinal ranking of the estimated parameters of the long run relationship (domestic asset wealth, followed by foreign equity and then foreign bond wealth) corresponds to the ranking of assets by size in the household portfolio.

In the literature concerning the consumption wealth linkage, it is common practice to express the impact of household wealth on consumption in terms of the 'marginal propensity to consume' (MPC). As is common in the literature, the marginal propensity to consume (MPC) from the different forms of asset wealth are calculated as the respective cointegrating coefficient, β, multiplied by the sample average ratio of asset wealth to consumption. By these standard calculations, the average MPC from foreign equity wealth over the whole sample period is calculated to be 0.2% (intuitively speaking, a one dollar increase in household foreign equity holdings leads to an 0.2 cent increase in household consumption). This compares to an average MPC from household domestic asset holdings of 1 cent in the dollar, an estimate which while lower than those of the previous literature, is again not directly comparable given the different definitions of asset wealth used in this study. Furthermore, the corresponding marginal propensity to consume from foreign bond holdings is negligible - not only is the absolute elasticity of consumption with respect to foreign bond holdings small, but since foreign bond holdings form a small component of the household balance sheet, the implied marginal propensity to consume is also tiny[11]. Why do consumers tend to consume more from marginal domestic rather than foreign asset wealth? This non - linear phenomenon, whereby consumers appear to care more about marginal increases in their domestic rather than foreign wealth and tend to increase their consumption by alot for small increases in wealth, may be explained by the presence of fixed costs to changing consumption habits. A rich literature has emphasised the role of such adjustment costs in affecting consumption decisions (see amongst others Marshall and Parekh (1999) and Stokey (2009))[12].

Short Run Dynamics Given the above estimates of the long run dynamics, we analyse the short run dynamics of the model by estimating the VECM (1) for the consumption - foreign asset wealth ratio, Eqn (3). The Table 1 below presents the results of this estimation and is read as follows. The five columns under the heading 'Equation' represent the five equations of the vector error correction system.and present the respective estimated coefficient values (with t-values in parentheses) for the regression of the variables in the top line on the regressors listed in the left hand most column (under the heading 'Dependent Variable'). Thus for example the first column represents the regression of Δc_t on Δc_{t-1}, Δfb_{t-1}, Δdaw_{t-1}, Δy_{t-1} and Δfe_{t-1}. The bottom two lines of the table list the

[10] Results available upon request.

[11] As has already been noted, the calculations of the MPCs above are based on the assumption that all changes in wealth are trend movements, as opposed to transitory innovations, an issue which is assessed in more detail below.

[12] Stokey (2009) focuses on role of fixed costs in the context of the consumption of housing services. In this framework, fixed costs tend to distort the consumption mix from housing towards nondurables and affect household portfolio adjustments as the ratio of total wealth to housing changes Marshall and Parekh (1999) focus on the role of consumption adjustment costs in explaining the empirical failure of the consumption based capital asset pricing model.

adjustment coefficient (λ) and the R^2 of the regression respectively. Significant coefficient results are indicated with a * and highlighted in bold.

Table I- Results of Estimating the VECM (1) For Consumption - Foreign Asset Wealth Ratio

Dependent Variable	**Equation**				
	Δc_t	Δfb_t	Δfe_t	Δdaw_t	Δy_t
Δc_{t-1}	**0.20(2.86)***	0.89(0.54)	-0.61(-0.40)	0.21(0.66)	**0.42(2.88)***
Δfb_{t-1}	0.001(0.36)	0.04(0.53)	-0.02(-0.39)	0.00(0.02)	-0.01(-1.19)
Δdaw_{t-1}	0.02(1.46)	0.14(0.36)	0.03(0.08)	0.12(1.63)	0.04(1.09)
Δy_{t-1}	**0.09(2.40)***	-1.23(-1.40)	0.29(0.35)	-0.18(-1.11)	-0.05(-0.59)
Δfe_{t-1}	**0.01(2.82)***	-0.05(-0.76)	**0.13(2.12)***	-0.002(-0.15)	**0.02(2.76)***
λ	0.03(0.24)	0.22(1.62)	**-0.73(-5.83)***	-0.19(-1.44)	-0.20(-1.55)
R^2	0.19	0.03	0.17	0.07	0.14

Lag Length of 1 selected using the AIC. T-values in (). * indicates significant at 5% level. ** indicates significant at 5% level.

The key results to emerge from the above table are as follows. Firstly, from the first column, the change in consumption is predicted by the first lag of its own change (this response is ,exactly the same as in Lettau and Ludvigson (2004)) as well as by the first lag of the change in labor income (the response is a third higher than in previous studies). Of more interest for the present hypothesis is that the other significant predictor of the change in consumption in the short term is the previous periods change in foreign equity holdings. According to the above results, consumption in the short term increases by 0.01% to a 1% increase in the value of foreign equity holdings in the previous quarter, around a fourth of the Lettau and Ludvigson (2004) result for total asset wealth (0.043%).

Secondly, the change in foreign bond wealth (second column) and the change in domestic asset wealth (fourth column) are not predicted in the short run by any of the regressors of the model. In contrast this outcome, the change in foreign equity wealth is determined by its change in the previous period (third column). More importantly for this analysis, the value of foreign equity holdings also bear special significance in this cointegrated system, in that it is these holdings which are responsible for error correction in the system (moving thes system back to equilibrium after a deviation in common trends). This is highlighted by the significance at the 5% level, the only significant adjustment coefficient is that on on foreign equity holdings. Thus growth in foreign equity holdings is predictable over long horizons and adapts to match the smoothness of the other variables involved in the cointegrating system (consumption, income and foreign bond holdings). The magnitude of the adjustment coefficient implies that the value of foreign equity holdings acts rapidly (inside 1.37 quarters) to restore the system to its equilibrium, indicating a high degree of long run attraction between the value of foreign equity holdings and the common trends.

Finally, as regards the short term determinants of the change in labor income, not only does the previous periods' change in consumption affect this period's change in income, but an innovation to foreign equity holdings has a positive effect on the change in after tax labor income (a 1% increase in the value of foreign equity holdings leads to an increase in after tax labor income of 0.09%. This income response is the same as the Lettau and Ludvigson (2004) income response for overall asset wealth). Initially, the respect in which a change in foreign equity holdings affects after tax labor income may seem unclear, however given that this variable is calculated net of various taxes and items such as personal interest income and dividends (see Appendix for full description), it is clear that an innovation to foreign equity holdings increases dividends received by households, lowering total taxes and increasing labor income.

The major implication of these results is that whilst there is some short term predictability in the growth of household consumption, income, and the value of foreign equity holdings (as shown by the dependence of these

variables on lagged growth rates), it is growth in the latter variable which exhibits error correction behaviour and predictability over the long run Thus the value of foreign equity holdings is mean reverting and adapts over long horizons to match the smoothness of the other variables in the cointegrated system. Interestingly, the change in domestic wealth is not a significant short term predictor of any of the endogenous variables in the system

4.2.2 The Permanent - Transitory Decomposition

To summarise the results thus far, the real effects of innovations to foreign asset wealth are quantitatively small in comparison to that of domestically held assets, a finding which can be rationalised by the presence of frictions to consuming from marginal increases in foreign wealth. However, these estimates of the elasticity of consumption with respect to foreign and domestic assets assumes that all changes in wealth are trend movements, whereas it is well known that only permanent changes in wealth have feedback effects on consumption, whilst transitory innovations to wealth do not. Therefore, in order to distinguish the shocks by their degree of persistence and to further gauge the impact of innovations to foreign and domestic asset wealth on consumption, the permanent - transitory shock decomposition is undertaken a la Gonzalo and Ng (2001), see Appendix for details.

Initially, variance decomposition analysis examines how the total variance in the forecast error of consumption, income, domestic wealth, foreign bond and foreign equity holdings are associated with the each kind of shock to the system[13] . Whilst the key interest in this analysis is not necessarily to give a 'structural' interpretation to each shock in the traditional sense of identifying the impact of shocks to each variable in the system (since there are no identification assumptions as such which are made in the analysis, the interest is rather to gauge the persistence of the reaction of each variable following the respective permanent and transitory shocks in order to assess the true extent to which innovations to each variable are associated with consumption), since the transitory shock has an impact upon both forms of foreign wealth holdings and a negligible impact upon the domestic variables in the system, the latter has a natural interpretation as an exchange rate shock. Secondly, impulse response analysis highlightsthe impact on each variable of a one standard deviation transitory shock.

The key result of the variance decomposition analysis is given in Figure 3. This graph indicates the point estimates of the proportion of the forecast error variance accounted for by a one standard deviation innovation in the transitory shock to the system for the respective variables (as indicated above, the remaining proportion is accounted for by the 4 permanent shocks combined). It is noticeable that the transitory shock is the predominant explanatory factor of the forecast error variance of foreign equity holdings, especially so at shorter horizons. Interestingly, these results for for the characterisation of fluctuations in foreign equity holdings, of a significant short term impact and a tapering off of the effect in the later periods, exhibit the same magnitude and pattern as those of Corsetti and Konstantinou (2009) mentioned above. Intuitively, consumers tend not to view innovations to the value of foreign equity holdings, caused partly through price movements but also due to the vagaries of uncertain exchange rates, as part of their permanent income (since although exchange rates exhibit long run mean reverting behaviour, they may be a source of short term uncertainty). In contrast to this, the permanent shocks predominate for both domestic household wealth and foreign bond holdings, which suggests that in the long run consumers tend to view the returns to both foreign bond wealth and asset wealth held domestically within the United States and denominated in US dollars as part of their permanent income (it also is intuitive that the returns to non - contingent claims should form part of the permanent income of a representative household). Household consumption and household after tax labor income are completely associated with the permanent innovations to the system.

The impulse responses of each variable to the transitory shock in the system.confirm this characterisation (Figure 4) It is evident that the transitory shock has negligible impacts upon household consumption, labor income

[13] Note that the standard errors for the variance decompositions are the same as for the impulse response functions for each shock and are listed in the Appendix. These are small in magnitude compared to the size of the respective impulses.

and domestic wealth (solid lines), whilst it is clear that the value of foreign equity holdings (dashed line) reacts in a highly positive and persistent manner to the one standard deviation transitory innovation. Furthermore, the value of foreign bonds responds to a much lesser extent to the transitory shock, but in a negative fashion (dotted line). Moreover, the effect of the transitory shock on asset values is quite persistent, with the shock continuing to affect asset values for over 5 years in the case of foreign equity, and four years in the case of foreign bond wealth. The intuition is as follows. Interpreting the transitory innovation as an exchange rate shock , it leads to an increase in the market value of foreign equity holdings - given that the evidence shows that these are denominated predominantly in foreign currencies (whereas foreign bond holdings are denominated in US dollars), a depreciation boosts the US dollar value of foreign equity holdings, whilst the market value of foreign bond holdings initially falls to a lesser extent. These initial reactions persists for sometime, more so for the market value of foreign equity holdings. Thus the majority of fluctuations in the value of foreign equity holdings due to exchange rate valuation effects are transitory in nature (i.e. disassociated from consumption outcomes), whereas this is true to some limited extent for foreign bond holdings. Intuitively, domestic wealth holdings, consumption and income are unaffected by the transitory (exchange rate) shock.

This in turn implies that the above calculated average MPC from foreign equity wealth is actually quite deceptive, in that it only applies to a fraction of the variation in wealth. Adjusting the calculation of the average MPC from foreign equity wealth for transitory shocks, one finds that that a one dollar innovation - a 'valuation effect' - to foreign equity wealth leads to a 0.1 cent increase in household consumption, which is small in relation to estimates of the MPC from asset wealth found elsewhere in the literature[14]. In the case of foreign bond wealth, it has already been seen that the MPC is negligible. Yet even taking into account that the majority of fluctuations in foreign bond wealth are permanent, the MPC will remain extremely small. Since domestic wealth holdings are entirely characterised by permanent shocks, there is no need to adjust the estimated MPC as calculated previously. Thus, in contrast to the findings of the previous literature, which found that fluctuations in *overall* household wealth holdings are transitory in nature. the above analysis reveals the value of disaggregating household wealth into its domestic and foreign components. By doing so, it is found that domestic wealth holdings in fact form part of a common trend with household consumption, labor income and foreign bond holdings. That is, since innovations to domestic wealth holdings are permanent in nature and households regard fluctuations to domestic asset wealth as part of their permanent income, a (permanent) 1 dollar increase in domestically held asset wealth leads to a (permanent) 1 cent increase in household consumption.

Thus it has been seen that innovations to the value of foreign asset holdings, i.e. valuation effects, *do* affect household consumption, albeit that via the usual calculations the marginal propensities to consume from foreign wealth holdings are quantitatively small when compared to those from domestic asset wealth. Furthermore, it has been seen that innovations to foreign equity wealth are predominantly transitory in nature, in contrast to those to domestic and foreign bond holdings which are characterised in the main by permanent innovations. Thus the implication of this result is that, to the extent that valuation effects on household foreign asset holdings impact upon household consumption and hence domestic absorption, this has the potential to affect trade balance outcomes. That is, whilst an exchange rate depreciation is *ceteris paribus* associated with improving export competitiveness and an improving trade balance, to the extent that the resulting spike in the value of foreign equity holdings increases household consumption and hence domestic absorption, the trade balance response of an exchange rate depreciation in the presence of significant household foreign equity holdings may be more muted than would otherwise be the case. However, since this effect depends of course on the extent to which the increase in household consumption resulting from valuation effects on foreign asset holdings is split between tradable and nontradable goods (with

[14] Following Chen (2006), the adjusted average MPC is calculated using the following formula: $q.0 + (1-q)MPC^p$, *where* $q = \frac{\sqrt{sT}}{(\sqrt{sT}+\sqrt{sP})}$ and $\sqrt{sP}$ and $\sqrt{sT}$ are the average shares in the total variance of the forecast errors of the permanent and transitory shocks respectively. Using the previous estimates, q for foreign equity holdings is calculated to be 0.5.

a stronger trade balance effect obtaining if consumption is skewed towards the former), it is difficult to directly quantify this effect without a more in depth model parameterisation.

4.2.3 Stability

Apart from the assumption that all innovations to wealth represent trend movements, an additional caveat, analysed further below, to the cointegration analysis is the assumption of parameter stability over the entire sample period. This assumption is not only inherent the linear adjustment process inherent in the VECM specification of Equation (3), but implicit in the calcuation of the average MPC from each type of asset wealth. However, over such a long sample period, and especially in the context of increasing foreign asset holdings described above, this may not be the case. Whilst the hypothesis of parameter instability is investigated more formally below using structural break tests, an initial indication can be drawn from estimating the cointegrating relationship given by (2) over several subsamples. Note that it is never really proper econometric practice to disregard information about a common trend relationship, and estimating the cointegrating relationship over subsamples should therefore provide only a *rough* indicator of parameter instability (Lettau and Ludvigson 2004).

Below we undertake this exercise for what one might call a 'pre financial globalisation' period (1952:1 to 1989:4) and a 'post financial globalisation' era (1990:1 to 2007:1). This reveals that the estimated cointegrating coefficients are quite volatile:

Table 2 - Stability of the Cointegrating Coefficents

Period	β_c	β_y	β_{daw}	β_{fb}	β_{fe}
'Pre Integration' (1952:1 to 1989:4)	1	0.63 (15.20)*	0.02(4.64)*	-0.001(-0.31)	0.02(0.30)
'Post Integration' (1990:1 to 2007:1)	1	0.68(5.90)*	0.05(1.85)**	0.004(0.73)	0.05(12.86)*

Lag Length of 1 selected using the AIC. T-values in (). * indicates significant at 5% level. ** indicates significant at 5% level.

Whilst more formal statistical evidence of instability is provided below, the above table already gives a flavour of the unstable nature of the consumption to foreign wealth ratio. Comparing across sample periods, the only significant driver of household consumption spending in the pre - integration period is domestic wealth. Furthermore, it is remarkable that the elasticity of consumption with respect to both foreign equity holdings and domestic asset holdings *increases* (and switches from insignificant to significant) from the 'pre' to 'post' integration era. Consistent with earlier findings, an $MPC > 0$ is found for the largest asset categories, with the MPC from foreign equity wealth increasing in the financial integration era. This latter finding is unsurprising and captures the very essence of risk sharing, a la for example Bracke and Schmitz (2008), where the returns to cross border asset holdings help to smooth consumption and provide insurance against country specific shocks.

However, as indicated one shouldn't take the results of the above table too literally on statistical grounds. A more formal, econometrically superior way of taking account of parameter instability is to employ the Hansen (1992) tests of structural breaks in cointegrating regressions. This series of tests encompasses three different tests of the null hypothesis of parameter stability. Firstly, the $SupF$ statistic is more suited to analysing whether there was a swift break in regime a la Quandt (1960). Furthemore, the $MeanF$ and L_c test statistics model the parameters in the cointegrating regressions as martingale processes and capture the notion of slowly evolving parameter instability, with the L_c test being appropriate if the likelihood of parameter variation is constant over the sample period (see Hansen (1992) for more details regarding the tests). The results of these tests, expressed in $p - value$ form, are shown in the below table:

Table 3 - Hansen (1992) Tests For Stability Of Cointegrating Regressions

Sample Period	**Type of Test**		
	$SupF$	$MeanF$	L_c
1952:1 - 2007:1	0.20	0.02	0.05
1952:1 - 1989:4	0.02	0.01	0.04
1990:1 - 2007:1	0.04	0.05	0.01

P-values of the F-Test of parameter stability

One can note first that the since the sample period ends in with the first quarter of 2007, it excludes any unstable dynamics associated with the most recent crisis period. In this light, the above table indicates some evidence that overall unstable dynamics over the whole sample period stem from the 'pre - financial globalisation' era. That is, over the whole sample period it is only in the case of a discrete structural break ($SupF$ statistic) that one decisively fails to reject the null of parameter stability. The other two test statistics either yield evidence of instability in the long run equilibrium relationship ($MeanF$) or are a borderline case (L_c).

However in interpretating the above tables we prefer to focus attention on the $MeanF$ statistic, since this allows for the possibility that the parameters of the cointegrating relationship vary with a differing probability in each period. As noted by Rudd and Whelan (2002), this instability in the cointegration relationship could on one hand obtain due to expected returns on human or asset wealth (or the growth rate of consumption) not being stationary, as a result of structural changes in the economy including but not limited to shocks to trend productivity growth or demographic shifts. Here, in the case of the consumption - foreign wealth ratio, one might also expect the buildup of foreign assets over time, as well as time - varying shifts in the returns to different forms of assets, to affect the stability of the relationship with consumption. Thus, Equation (1) for the consumption - foreign wealth ratio may still be correct, but it does not necessarily obtain that a stationary linear combination of the modelled variables will hold in each period.

To further investigate this latter possiblity, the stability of the cointegration relationship is, as above, assessed over the 'pre - financial globalisation' and 'post - globalisation' periods (i.e. before and after 1990). This approach yields the intuitive result that financial integration has yielded more stable consumption dynamics, since, it appears that the bulk of the instability in the consumption - foreign wealth relationship stems from the 'pre - integration' period. That is, whilst some test statistics reject the null hypothesis of parameter stability, the preferred $MeanF$ statistic fails to reject at the 5% level. For the pre - liberalisation sample, we reject the null hypothesis of parameter stability at conventional levels of significance).

The further implication of the stability analysis is that the consumption wealth ratio, decomposed into a relationship between consumption, income, domestic and foreign asset wealth, may well exhibit non linear adjustment dynamics. That is, the linear VECM specification assumes that the equilibrium adjustment mechanism is symmetric, with adjustment towards long run equilibrium occuring at an equal rate in each time period. In terms of the hypothesis examined and the stylised facts concerning the growth in foreign asset holdings over time highlighted above, it would seem reasonable to postulate a form of regime switching model, whereby the adjustment process towards equilibrium depends upon the state of the world (e.g. pre and post financial globalisation), with some kind of gradual transition between regimes.

5 Conclusion

Returning to the motivations of this paper, increasing financial integration has broadened the scope of household investment opportunities. Evidence shows that household investment portfolios increasingly consist of foreign stocks and to some extent bonds, held both directly and indirectly through for example mutual funds, and potential exists for capital gains to these assets to influence household consumption decisions. Whilst many authors (such as those mentioned above) have stressed the point that as the process of financial globalisation continues, capital gains and losses that affect asset market valuation are arguably playing an increasing role in agents' intertemporal and portfolio decisions, little formal evidence exists concerning the the potential response of household consumption to heterogeneous asset holdings (that is, heterogeneous in terms of domestic versus foreign asset holdings). This is surprising, given that microeconomic survey evidence indicates that both direct and indirect holdings of foreign stock and bond holdings - to which capital gains potentially can accrue - form an increasingly nontrivial component of household wealth (see US Survey of Consumer Finances 2007 and Bucks et. al 2009 - this is especially the case for direct and indirect holdings of foreign equity).

In this light, whereas the previous literature concentrated on the important external implications of innovations to the foreign asset position, for example in terms of the global imbalances and external sustainability debates, this paper - to our knowledge for the first time - has explicitly addressed the possibility that valuation effects to foreign asset holdings may affect household consumption. By exploiting a dataset on household foreign asset holdings, it has been demonstrated in terms of the consumption-wealth linkage that it is useful to differentiate between holdings of domestic, foreign equity and foreign bond wealth. Moreover, differential impacts of innovations to the value of asset holdings on household consumption obtain depending upon whether one considers holdings of contingent or non - contingent claims, or whether one considers purely domestically held assets. This tends to indicate the presence of adjustment costs in consumption, which affect the tendency to use innovations to different forms of asset wealth for consumption purposes.

Furthermore, the permanent - transitory decomposition shows that consumers do not regard the majority of capital gains to the value of foreign equity holdings as part of their permanent income, which is unsurprising, given that these assets are non - contingent claims and are subject to exchange rate fluctuations. This stands in contrast to capital gains to foreign bond wealth, which according to the evidence shown tend to be regarded as shifts in permanent income by consumers. This evidence complements the findings of Corsetti and Konstaninou (2009) concerning the importance of considering the dynamics of consumption, net output and foreign asset holdings in current account adjustment and highlighted potential trade balance implications.

Additionally, whilst it is found that a higher MPC from foreign equity wealth than foreign bond wealth obtains, since the former present a greater proportion of the household balance sheet than the latter, evidence of instability in the consumption - foreign wealth rati was also found, indicating a need in future research to consider nonlinear adjustment dynamics. The use of such nonlinear approaches has recently gained popularity in the analysis of the consumption to wealth ratio (for example, Gabriel, Alexandre and Bacao (2008) analyse the consumption wealth ratio as a Markov switching process, which behaves differently according to the phase of the business cycle) and constitutes a fruitful avenue for future research in the present context.

Thus, to answer the question posed in the title of this paper, foreign asset holdings *do* affect household consumption. This evidence complements existing work concerning foreign asset holdings and external adjustment by highlighting at a disaggregated level an important mechanism by which innovations to different forms of household foreign asset holdings affect a fundamental macroeconomic aggregate. However, despite these developments, a potential caveat to the preceding analysis is that the long run equilibrium relationship examined in this paper is unstable over time. Given the evolving nature of the household balance sheet, as represented by increasing holdings of foreign asset wealth, as well as time varying returns to foreign assets, an additional fruitful avenue for future research would be an assessment of the possible nonlinear cointegration dynamics of the consumption - foreign

wealth ratio. Secondly, future research could also further extend the current model by disaggregating domestic wealth holdings into its constituent components and compare the respective wealth effects of individual components of domestic wealth to those of the individual components of foreign asset wealth. Finally, future research could develop and parameterise a model which could quantify the extent to which the increase in household consumption associated with valuation effects on foreign asset holdings translate into trade balance effects.

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7 Appendix

7.1 Appendix 1: Derivation of the Theoretical Model

In this study, the four variable framework of Nitschka (2007), who in his paper fine-tuned the theoretical methodology of Lettau and Ludvigson (2004), is extended to the five variable case in order to further disaggregate wealth holdings into their domesitc, foreign equity and foreign bond holdings components.

Firstly, the methodology by which Lettau and Ludvigson (2004) reach their key theoretical equation for the consumption to wealth ratio builds on the work of Campbell and Mankiw (1989) and Lettau and Ludvigson (2001). Lettau and Ludvigson (2004) consider a simple wealth accumulation equation for aggregate wealth, written as:

$$W_{t+1} = (1 + R_{w,t+1})(W_t - C_t) \tag{A.1}$$

where W_t is beginning of period aggregate wealth (the sum of human capital, H_t, and asset wealth, A_t); $R_{w,t+1}$ is the net return on aggregate wealth. After defining

$$r = \log(1 + R) \tag{A.2}$$

Lettau and Ludvigson (2004) follow the approach of Campbell and Mankiw (1989), in deriving an expression for the log consumption – wealth ratio by taking a first order Taylor expansion of (A1), solving the resulting difference equation for log wealth forward, imposing a transversality condition and taking expectations. The resulting equation in log linear form (where lower case variables denote logs) is:

$$c_t - w_t = E_t \sum_{i=1}^{\infty} \rho_w^i (r_{w,t+i} - \Delta c_{t+i}) \tag{A.3}$$

This equation says that the consumption wealth ratio embodies rational forecasts of returns and consumption growth. In order to empirically test this equation, Lettau and Ludvigson (2004) decompose wealth into human and non – human capital components to yield:

$$c_t - va_t - (1 - v) h_t = E_t \sum_{i=1}^{\infty} \rho_w^i \left(vr_{t+i}^a + (1 - v) r_{t+i}^h - \Delta c_{t+i} \right) \tag{A.4}$$

where v is the average share of asset wealth in aggregate wealth. Furthermore, log aggregate wealth is given by:

$$w_t \approx va_t + (1 - v) h_t \tag{A.5}$$

, where v is the proportion of asset wealth in total aggregate wealth.

In the empirical analysis of this paper, I expand the four variable framework of Nitschka (2007) - who decomposed household wealth (a_t) into its further constituent componentsof foreign equity wealth and the 'rest of domestic asset wealth (domestic stocks, real estate etc.)'. However, it is crucial to acknowledge the empirical reality that households own both foreign stocks *and* bonds. Thus, taking the identity for household asset wealth and decomposing it into its consitutent parts yields:

$$A_t = FE_t + FB_t + DAW_t \tag{A.6}$$

, where FE_t represents houshold holdings of foreign equity, FB_t represents household foreign bond holdings, DAW_t represents the value of domestic asset wealth, such as real estate, domestically held stocks, etc. Taking a log – linear approximation of asset wealth around the ratios of foreign equity and foreign bond to domestic asset wealth ratios yields:

$$a_t \approx \lambda_t fe_t + \gamma_t fb_t + (1 - \lambda_t - \gamma_t)\, daw_t \tag{A.7}$$

where λ_t is the time – varying share of foreign equity wealth in household's asset wealth, γ_t is the time – varying share of foreign bond wealth in household's asset wealth, and $(1 - \lambda_t - \gamma_t)$ the share of domestic asset in household wealth. It is important to note that this share is time varying, such that we can take into consideration that the proportion of household wealth that is held as differing forms of assets (bond, equity and domestic) will intuitively vary over time.

Then (A.5) is combined with (A.7) such that:

$$\begin{aligned} w_t &\approx v\,(\lambda_t fe_t + \gamma_t fb_t + (1 - \lambda_t - \gamma_t)\, daw_t) + (1 - v)\, h_t \\ &\approx \underbrace{v\lambda_t}_{\xi} fe_t + \underbrace{v\gamma_t}_{\kappa} fb_t + \underbrace{v\,(1 - \lambda_t - \gamma_t)}_{\phi} daw_t + (1 - v)\, h_t \\ &\approx \xi fe_t + \kappa fb_t + \phi daw_t + \underbrace{(1 - \xi - \kappa - \phi)}_{(1-v)} h_t \end{aligned} \tag{A.8}$$

Taking a log-linear approximation of the gross return on asset wealth with respect to foreign equity, foreign bond and domestic asset wealth holdings is done in the same manner as the decomposition of the asset wealth components above. If we define

$$r_t^w = v r_t^a + (1 - v)\, r_t^h \tag{A.9}$$

it can be shown that by similar techniques as above that

$$\begin{aligned} r_t^w &= v(\lambda_t r_t^{fe} + \gamma_t r_t^{fb} + (1 - \lambda_t - \gamma_t)\, r_t^{daw}) + (1 - v)\, r_t^h \\ &= \xi r_t^{fe} + \kappa r_t^{fb} + \phi r_t^{daw} + \underbrace{(1 - \xi - \kappa - \phi)}_{(1-v)} r_t^h \end{aligned} \tag{A.10}$$

By substituting (A.10) and (A.8) into (A.3) and simplifying we yield:

$$\begin{aligned} & c_t - \xi fe_t - \kappa fb_t - \phi daw_t - (1-v)h_t \\ = \quad & E_t \left\{ \sum_{i=1}^{\infty} \rho_w^i \left[\left(\xi r_t^{fe} + \kappa fb_t r_t^{fb} + \phi r_t^{daw}) + (1-v)\, r_t^h \right) - \Delta c_{t+i} \right] \right\} \end{aligned} \tag{A.11}$$

However, equation (A.11) cannot be employed for empirical purposes (as one part of aggregate wealth - human capital - is unobservable). Thus it is further necessary to take a log – linear approximation of human wealth,h_t, a la Lettau and Ludvigson (2001, 2004), and substitute this into (A.11) to yield:

$$\begin{aligned} & c_t - \xi fe_t - \delta fb_t - \chi daw_t + (1-v)y_t \\ = \quad & E_t \left\{ \sum_{i=1}^{\infty} \rho_w^i \left[\left(\xi r_t^{fe} - \gamma r_t^{fb} - \phi r_t^{daw} + (1-v)\Delta y_{t+i} \right) - \Delta c_{t+i} \right] + (1-v) z_{t+i} \right\} \end{aligned} \tag{A.12}$$

The above equation (A.12) states that log consumption (c_t), log foreign equity holdings (fe_t), log foreign bond holdings (fb_t), log domestic wealth holdings (daw_t), and log labour income (y_t) cointegrate provided that they are I (1) variables. Therefore time variation in the consumption – wealth ratio (temporary deviation from common trends) mirrors either returns on foreign asset (equity or bonds) holdings, returns on domestic wealth holdings, changes in labour income or consumption growth, or some combination of these.

7.2 Appendix 2: Data Description

Data for the empirical analysis above was obtained from the following sources. Note that all data are real per capita values, obtained by deflating with the CPI of total personal consumption expenditure in chain-weighted (1996 = 100) seasonally adjusted U.S. dollars published by the Bureau of Economic Analysis in NIPA table 1.1.4 and with population figures from NIPA table 2.1 published by the Bureau of Economic Analysis.

Data on US household consumption and income per capita are as in Lettau and Ludvigson (2004) and were obtained from Sydney Ludvigson's website. US household consumption is defined as total household consumption expenditure. Labor income is defined as wages and salaries + transfer payments + other labor income - personal contributions for social insurance - taxes. Taxes are defined as:

$$\frac{wages\ and\ salaries}{(\ wages\ and\ salaries + proprietors'\ incomewithIVA\ and\ Ccadj + rental\ income + personal\ dividends + personal\ interest\ income)}$$

Data on US household per capita foreign equtiy holdings are constructed as in the Appendix of Nitschka (2007), as follows. U.S. households' stock market wealth comprises directly held equity shares at market value and indirectly held equity shares through households' bank personal trusts and estates holdings, life insurance companies´ holdings, private pension fund holdings, state and local government as well as federal government fund holdings and households´ mutual fund holdings as published in the supplemental table B.100e of the Z1 Flow of Funds Accounts of the Federal Reserve Board. However, this table is not available at the quarterly frequency. That is why the value of quarterly stock market wealth is constructed with help of Flow of Funds tables L.213 and L.214 to match the annual values provided in table B.100e. Table L.213 lists direct holdings of corporate equity at market value distinguished by the respective holders, such as direct equity holdings of the household sector. The quarterly equity holdings of bank personal trusts and estates, life insurance companies, private pension funds, state and local government as well as federal government corporate equity holdings match the corresponding annual values of indirect corporate equity holdings of U.S. households provided in table B100e of the Z1 Flow of Funds Accounts. However, the amount of equities indirectly held by U.S. households through mutual fund holdings has to be constructed with help of table L.214. Table L.214 lists direct holdings of mutual fund shares at market value distinguished by the respective holders. In order to calculate the amount of equities held by U.S. households through mutual fund holdings, the fraction of e.g. direct household mutual fund shares holdings at market value is calculated and multiplied with the direct holding of corporate equities by mutual funds (from table L.213). This procedure is applied to all components of stock market wealth listed above which hold mutual fund shares and hence indirectly corporate equity. Summing up all the directly and indirectly held equity positions gives quarterly values of U.S. households' stock market wealth that match the annual values in table B.100e.

The share of foreign equity in household net worth is calculated with help of Flow of Funds table L.213 which provides details about equity issues and holdings at market value. Corporate equity issues at market value include holdings of foreign issues by U.S. residents inclusive American Depositary Receipts. It is assumed that the share of these rest-of-the-world equity holdings in total corporate equity is the same as the share of rest-of-the-world equity in U.S. households´ corporate equity which is a reasonable approximation as U.S. households either directly or indirectly hold roughly 90% of total corporate equity issues.

U.S. household foreign bond holdings are constructed as follows. Note first that the balance sheet of households, Table B.100, only includes the Flow of Funds category FL 153063005 (Corporate and Foreign Bond Holdings) holdings. In order to isolate the component of this category which comprises foreign bonds only, a ratio of foreign

to domestic bond holdings for the whole economy is calculated and then multiplied by the Flow of Funds category FL153063005 (household holdings of corporate and foreign bonds). The ratio is calculated as Flow of Funds category 263163003.Q (Rest of the World Bond Liabilities Position) divided by total bonds outstanding. Total bonds outstanding is calculated as the sum of the following categories: FL103163003 (Nonfinancial Business Corporate Bond Liabilities), FL763163005 (Commercial Banking Corporate Bond Liabilities), FL723163003 (US Chartered Commercial Banks Corporate Bond Liabilities), FL733163003 (Bank Holding Companies Corporate Bond Liabilities), FL443163053 (Savings Institutions Corporate Liabilities), FL673163005 (Issuers of Asset Backed Securities Corporate Bond Liabilities), FL613163003 (Corporate Bond Liabilities of Finance Companies), FL643163003 (Corporate Bond Liabilities of Real Estate Investment Trusts), FL503163005 (Corporate Bond Liabilities of Funding Corporations). The ratio is then multiplied by Flow of Funds category FL 153063005 (Corporate and Foreign Bond Holdings) in order to obtain household foreign bond holdings at market value. For the robustness check using the data from Gourinchas and Rey (2007b), a suitable normalisation of their data is needed in order to compute the proportion of foreign bond holdings attributable to the household sector. This normalisation is achieved by multiplying the ratio of household to total economy holdings of foreign bond assets by the nominal holdings of foreign debt assets as computed by Gourinchas and Rey (2007b).

7.3 Appendix 3: The Permanent Transitory Decomposition

The permanent transitory decomposition exploits the low frequency comovements of nonstationary data in order to identify shocks by their degree of persistence. Thus Gonzalo and Ng (2001), as elaborated in Chen (2006), state that shocks / innovations to each variable can be said to have permanent effects on the levels of a differenced series Y_t if its impact does not vanish in the long run, i.e. if $\lim_{k\to\infty} \frac{\partial E(Y_{t+k})}{\partial \tilde{\eta}} \neq 0$, and has transitory effects if the opposite holds, i.e. $\lim_{k\to\infty} \frac{\partial E(Y_{t+k})}{\partial \tilde{\eta}} = 0$.

A number of methods of achieving the permanent - transitory decomposition have been proposed by the literature, all of which seek to express the Δy_t in the VECM Equation (3) in terms of a set of permanent and transitory shocks. The systematic framework of Gonzalo and Ng (2001) employed here proposes a two - step orthogonalisation of the VECM residuals conditional on r cointegrating relationships found in the data. The first step involves the separation of the $m-r$ permanent shocks from the r transitory shocks, using the r prior cointegration restrictions on the residuals of the VECM. Thus for an $mx1$ vector of I(1) processes Y_t with a VECM representation, with r cointegrating vectors and an MA representation $\Delta Y_t = C(L)e_t$, Gonzalo and Ng (2001) show that it is possible to construct the rotation matrix

$$G = \left[\underbrace{\gamma_{\perp}^{'}}_{(m-r)\ x\ m} \quad \underbrace{\alpha^{'}}_{r\ x\ m} \right]^{'} \tag{A.13}$$

, where α is the vector of cointegration coefficients and $\gamma_{\perp}$ are the adjustment coefficients. The permanent shocks u^p and the transitory shocks u^T in the system are isolated by pre multiplying G on the VECM residuals, as follows:

$$Ge_t = \left[\underbrace{\gamma_{\perp}^{'} e_t}_{u^p} \quad \underbrace{\alpha^{'} e_t}_{u^T} \right]^{'} \tag{A.14}$$

In the second step, a Choleski decomposition is applied to $cov(Ge_t) : H = Chol(Ge_t)$ in order make the

$m - r$ permanent shocks mutually uncorrelated with the r transitory shocks. The orthogonalised permanent and transitory shocks are obtained as:

$$\widetilde{\eta} = H^{-1}Ge_t = \begin{bmatrix} \widetilde{\eta_t^P} \\ \widetilde{\eta_t^T} \end{bmatrix} \tag{A.15}$$

Therefore one can express Δy_t in terms of the orthogonalised permanent and transitory shocks as follows:

$$\Delta y_t = C(L)e_t = C(L)G^{-1}HH^{-1}Ge_t = D(L)HH^{-1}Ge_t = \widetilde{D}(L)\widetilde{\eta}_t \tag{A.16}$$

It should be noted that the rotation matrix G is not a unique way to orthogonalise the VECM residuals. Corsetti and Konstantinou (2009) highlight that in the case where G is not of full rank, it is desirable to use a rotation matrix which multiplies the cointegration coefficients α by the inverse of the variance - covariance matrix. However, in the current application this is not an issue.

7.4 Appendix 4: Empirical Results - Cointegration Test

The following table presents the results of the Johansen (1988) trace test for determining the number of cointegrating vectors (CV) in a cointegrating system:

Hypothesised # of CV	**Trace Statistic**	**p-value**
none	107.09	0.00
At most 1	48.88	0.47
At most 2	21.43	0.92
At most 3	9.96	0.95

The way to read the above table is as follows. Starting from the top, each row lists the trace statistics generated by this particular test, as described by Johansen (1988). The righthand most column indicates the $p - value$ of the null hypothesis that is indicated in the left hand most column. It is conventional to test the null hypothesis at the 5% level. Thus the trace test indicates the presence of one cointegrating vector at the 5% level.

7.5 Appendix 5: Variance Decomposition

The below table presents the fractions of the innovations to each variable attributed to the permanent and transitory shocks to the system, given at each horizon h. Inspection of the table reveals that the forecast error variance of consumption, income and domestic wealth holdings are characterised by permanent innovations. In contrast to this, innovations to the value of foreign equity holdings are dominated by transitory fluctuations at short to medium horizons. Interestingly, these results accord with those of Corsetti and Konstantinou (2009) for total gross foreign asset positions. Furthermore, the value of foreign bond holdings is characterised by permanent innovations:

	$\Delta c_{t+h} - E_t \Delta c_{t+h}$		$\Delta y_{t+h} - E_t y c_{t+h}$		$\Delta daw_{t+h} - E_t \Delta daw_{t+h}$		$\Delta fe_{t+h} - E_t \Delta fe_{t+h}$		$\Delta fb_{t+h} - E_t \Delta fb_{t+h}$	
h	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**	**P**	**T**
1	1	0	1	0	1	0	0.209	0.791	0.935	0.065
2	0.993	0.007	0.982	0.018	1	0	0.248	0.752	0.930	0.070
3	0.987	0.013	0.976	0.024	1	0	0.319	0.681	0.932	0.068
4	0.985	0.015	0.974	0.026	1	0	0.401	0.599	0.937	0.063
5	0.986	0.014	0.974	0.026	1	0	0.482	0.518	0.942	0.058
6	0.987	0.013	0.976	0.024	1	0	0.555	0.445	0.948	0.052
7	0.988	0.012	0.977	0.023	1	0	0.618	0.382	0.953	0.047
8	0.989	0.011	0.979	0.021	1	0	0.671	0.329	0.957	0.043
9	0.990	0.010	0.980	0.020	1	0	0.714	0.286	0.961	0.039
10	0.991	0.009	0.982	0.020	1	0	0.750	0.250	0.964	0.036
11	0.992	0.008	0.983	0.017	1	0	0.780	0.220	0.967	0.033
12	0.992	0.008	0.984	0.016	1	0	0.804	0.196	0.969	0.031
13	0.993	0.007	0.985	0.015	1	0	0.824	0.176	0.972	0.029
14	0.993	0.007	0.986	0.014	1	0	0.841	0.159	0.973	0.027
15	0.994	0.006	0.987	0.013	1	0	0.856	0.144	0.975	0.025
16	0.994	0.006	0.987	0.013	1	0	0.868	0.132	0.977	0.023
17	0.995	0.005	0.988	0.012	1	0	0.879	0.121	0.978	0.022
18	0.995	0.005	0.989	0.011	1	0	0.888	0.112	0.979	0.021
19	0.995	0.005	0.989	0.011	1	0	0.896	0.104	0.980	0.020
20	0.995	0.005	0.990	0.010	1	0	0.903	0.097	0.981	0.019
21	0.996	0.004	0.990	0.010	1	0	0.909	0.091	0.982	0.018
22	0.996	0.004	0.991	0.009	1	0	0.914	0.086	0.983	0.017
23	0.996	0.004	0.991	0.009	1	0	0.919	0.081	0.984	0.016
24	0.996	0.004	0.991	0.009	1	0	0.923	0.077	0.984	0.016
25	0.996	0.004	0.992	0.008	1	0	0.927	0.073	0.985	0.015
26	0.996	0.004	0.992	0.008	1	0	0.931	0.069	0.985	0.015
27	0.997	0.003	0.992	0.008	1	0	0.934	0.066	0.986	0.014
28	0.997	0.003	0.992	0.008	1	0	0.937	0.063	0.986	0.014
29	0.997	0.003	0.993	0.007	1	0	0.940	0.060	0.987	0.013
30	0.997	0.003	0.993	0.007	1	0	0.942	0.058	0.987	0.013

7.6 Appendix 6: Standard Errors of the Transitory Shock

The following table presents the standard errors of the transitory shock for both the variance decomposition and impulse response analyses:

	Standard Error				
h	lnc	lny	$lndaw$	$lnfe$	$lnfb$
1	0.01	0.03	0.00	0.07	0.13
2	0.03	0.00	0.02	1.47	0.08
3	0.02	0.00	0.02	0.95	0.12
4	0.01	0.00	0.01	0.18	0.02
5	0.01	0.00	0.00	0.03	0.00
6	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.01	0.00
9	0.00	0.00	0.00	0.01	0.00
10	0.00	0.00	0.00	0.01	0.00
11	0.00	0.00	0.00	0.01	0.00
12	0.00	0.00	0.00	0.01	0.00
13	0.00	0.00	0.00	0.01	0.00
14	0.00	0.00	0.00	0.01	0.00
15	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00

7.7 Appendix 7: Figures

The following graphs illustrate the figures referred to in the main body of the text:

Figure 1 - Graphs of Variables- Levels (top panes) and Growth Rates (bottom panes)

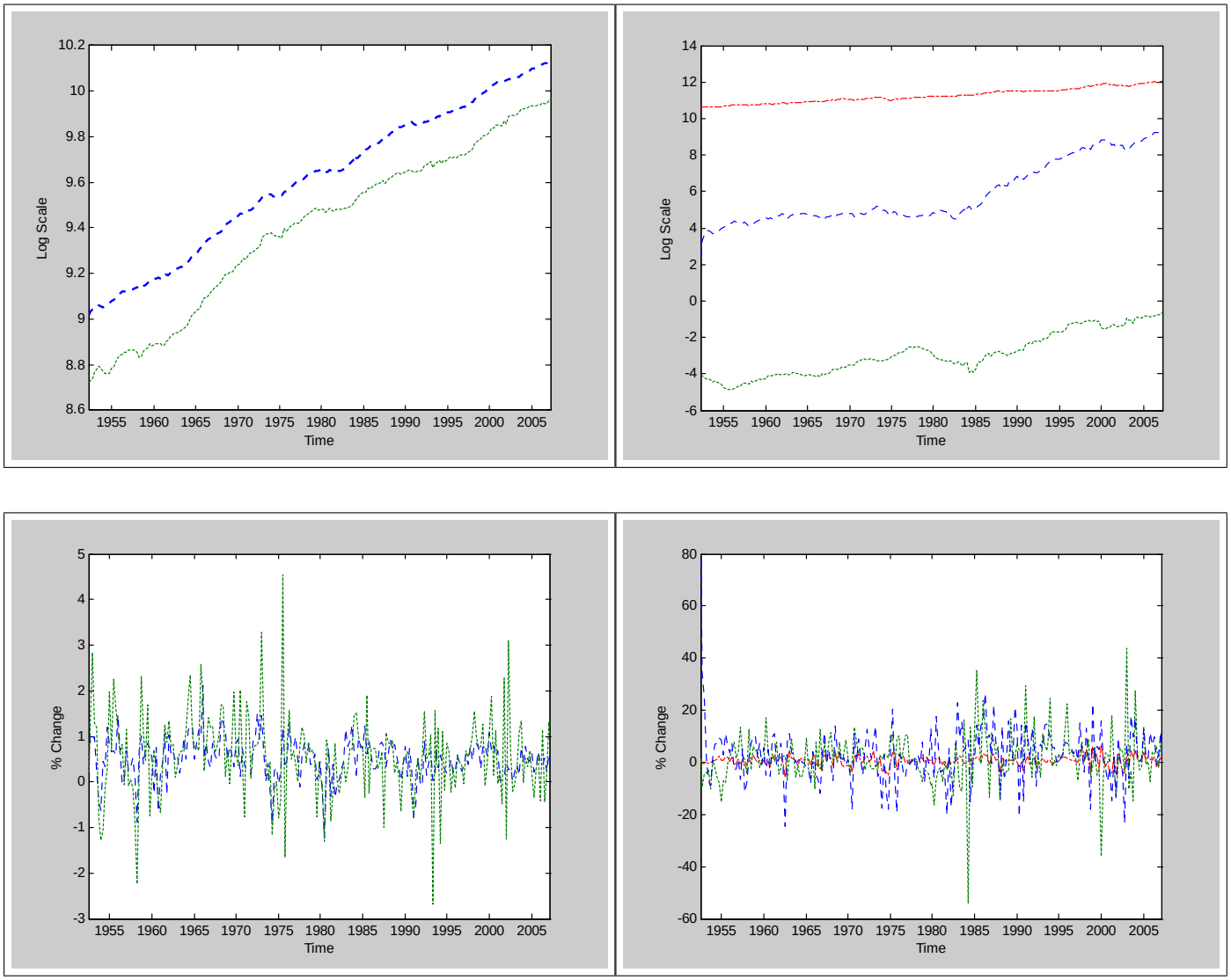
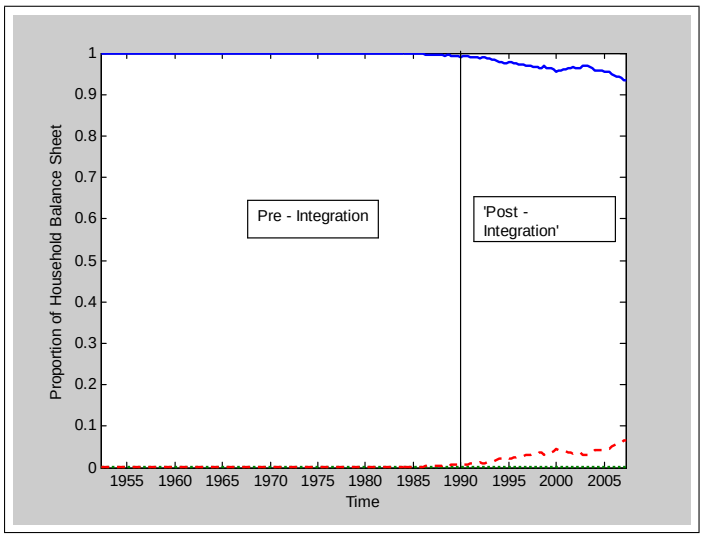


Figure 1 above charts the various data series used in the above analysis, as described above in the Appendix. The top left pane illustrates the evolution of household consumption (dashed line) and household labor income (dotted line) over time. The right top pane illustrates the evolution of the household domestic wealth (dot-dash line), household foreign equity (dash line) and household foreign bond holdings (dotted line) over time. Clearly, all series share an upward trend over time. In terms of the wealth variables, we see that holdings of domestic assets (housing, domestic stock and bond holdings, etc.) predominate, followed by the value of household foreign equity claims, whilst the value of household foreign bond holdings of a relatively small magnitude. The bottom two panes plot the growth rates of the same variables.

The below Figure 2 illustrates the evolution of the household balance sheet over time. It is demonstrated that althought the proportion of foreign equity assets in the household balance sheet has risen over time, domestically held assets still predominate for US households. The value of household foreign bond holdings continues to remain small.

Figure 2 - Evolution of the Household Balance Sheet Over Time



The below Figure 3 highlights the variance decomposition for the cointegrated system used in the above analysis of the marginal propensity to consume from different forms of asset wealth. It shows the point estimates of the proportion of the forecast error variance of each variable which is attributable to the transitory shock. It is clear that foreign equity holdings (dashed line, circle markers) are predominated by the transitory (exchange rate) shock, highlighting that the households tend not to view innovations to foreign equity wealth as part of their permanent income. In contrast, a tiny proportion of the forecast error variance of foreign bond wealth (dotted line, square markers) and consumption, labor income and domestic wealth holdings (solid lines) is transitory in nature.

Figure 3 -Point Estimates of The Proportion Of Forecast Error Variance Attributable To The Transitory (Exchange Rate) Shock

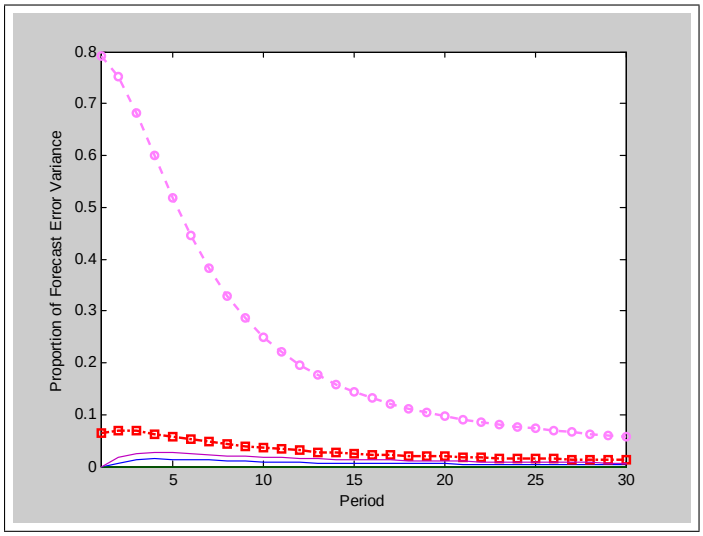


Figure 4 below shows the impulse response of the system to a transitory shock. It is evident that the transitory shock has negligible impacts upon household consumption, labor income and domestic wealth (solid lines), whilst it is clear that the value of foreign equity holdings (dashed line, circle markers) reacts in a highly positive and persistent manner to the one standard deviation transitory innovation. Furthermore, the value of foreign bonds responds to a much lesser extent to the transitory shock, but in a negative fashion (dotted line, square markers). Moreover, the effect of the transitory shock on asset values is quite persistent, with the shock continuing to affect asset values for over 5 years in the case of foreign equity, and four years in the case of foreign bond wealth. The intuition is as follows. Interpreting the transitory innovation as an exchange rate shock , it leads to an increase in the market value of foreign equity holdings - given that the evidence shows that these are denominated predominantly in foreign currencies (whereas foreign bond holdings are denominated in US dollars), a depreciation boosts the US dollar value of foreign equity holdings, whilst the market value of foreign bond holdings initially falls to a lesser extent. These initial reactions persists for sometime, more so for the market value of foreign equity holdings. Thus the majority of fluctuations in the value of foreign equity holdings due to exchange rate valuation effects are transitory in nature (i.e. disassociated from consumption outcomes), whereas this is true to some limited extent for foreign bond holdings. Intuitively, domestic wealth holdings, consumption and income are unaffected by the transitory (exchange rate) shock.

Figure 4 - Impulse Responses To A One Standard Deviation Transitory (Exchange Rate) Shock