International Financial Adjustment: Evidence from the G6 Countries*

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Abstract

The increase of financial integration has vastly increased gross foreign asset holdings, has introduced a scope of external adjustment through changes in financial asset prices, the so–called valuation channel. Recent research has emphasized the role of valuation effects – exchange rate and asset price movements – in easing the process of adjustment of the external balance of the US. This paper examines the relative importance of the trade and valuation channels for correcting external imbalances for Canada, France, Italy, Japan and the UK. We find that valuation effects are present for Japan only, they are of modest magnitude and are dominated by trade effects. For the other countries external imbalances are shown to be corrected exclusively by trade flows.

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Abstract

The increase of financial integration has vastly increased gross foreign asset holdings, has introduced a scope of external adjustment through changes in financial asset prices, the so–called valuation channel. Recent research has emphasized the role of valuation effects – exchange rate and asset price movements – in easing the process of adjustment of the external balance of the US. This paper examines the relative importance of the trade and valuation channels for correcting external imbalances for Canada, France, Italy, Japan and the UK. We find that valuation effects are present for Japan only, they are of modest magnitude and are dominated by trade effects. For the other countries external imbalances are shown to be corrected exclusively by trade flows.

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1 Introduction

Understanding the process of external adjustment lies at the core of international macroeconomics. The dominant paradigm to approach this issue, characterizes the dynamics of a country's external position as the result of forward-looking savings and investment decisions by households and firms (Obstfeld and Rogoff [1996]). The so-called 'intertemporal approach to the current account' asserts that external adjustment of a country occurs through movements in the trade balance, as a consequence of changes in the allocation of real quantities and equilibrium relative prices (Obstfeld and Rogoff [2005]).

Recent financial globalization has led to increases in gross assets and liabilities positions, resulting country portfolios that may be heavily affected by fluctuations in asset prices (Ventura [2001]). These *valuation effects* are largely absent from the theory and empirical analyses of the current account (Gourinchas and Rey [2005, 2006a, 2006b], Lane and Milesi-Ferretti [2001, 2004, 2006a, 2006b], Obstfeld [2004]). Gourinchas and Rey [2005, 2006a, 2006b], Lane and Milesi-Ferretti [2001, 2004, 2006a, 2006b] and Tille [2003, 2004] have documented that in the recent experience of the US economy valuation effects have accounted for a large fraction of the changes in the net foreign asset (NFA) position of the country and have concluded that a depreciation of the US dollar can ease the real adjustment needed to restore the external imbalances.

Recent theoretical contributions by Tille [2005], Blanchard, Giavazzi, and Sa [2005], Devereux and Saito [2005], Benigno [2006] and Ghironi, Lee and Rebucci [2006], focus their analysis on valuation effects. For instance, Tille [2005] presents a model and focuses on how valuation effects affect the transmission of monetary shocks. Blanchard, Giavazzi, and Sa [2005] set up a portfolio problem with imperfect asset substitutability and examine the role of the exchange rate in the valuation channel. Devereux and Saito [2005] presents a tractable portfolio model that emphasizes the interaction between monetary policy and the current account for hedging purposes. Benigno [2006] examines whether the valuation channel due to the exchange rate is desirable from a global welfare perspective. Finally, Ghironi, Lee and Rebucci [2006] examines valuation effects by setting up a portfolio problem with imperfect asset substitutability, focusing on the role of underlying return differentials.

On the empirical front, Gourinchas and Rey [2005, 2006b] provide a conceptual and empirical framework to analyze the question of external adjustment. Their analysis relies on a country's intertemporal external constraint and a no-Ponzi condition, and characterizes two adjustment channels. The traditional *trade channel* links current imbalances to future trade surpluses. The *valuation channel* shows that expected future net foreign assets (NFA) portfolio returns can also potentially contribute to the process of adjustment. Their empirical approach builds on Campbell and Shiller [1988] and Lettau and Ludvigson [2001]. Like these papers, they construct a measure of cyclical external imbalances and relate it to future expected net exports growth and excess NFA returns. In their paper, focusing on the US, an imbalance today predicts future positive excess returns on US external assets and a future depreciation of the dollar. They document that roughly 27% of external imbalances can be restored by subsequent movements in NFA portfolio returns (*valuation channel*), while the rest of the adjustment comes from trade flows (*trade channel*). Pan [2006] in a similar exercise examines the dynamics of external imbalances for Korea, and finds that valuation effects are modest and heavily dominated by trade balance effects.

A country like the US is exceptional, however, since the dollar is often thought to be a vehicle currency. For example, Gourinchas and Rey [2006a] document that the US has been earning significantly higher returns on its assets than those paid on its liabilities, a finding the call the *Exorbitant Privilege*. The question that we seek to answer in this paper is whether, similar results hold for other important economies, that do not enjoy the status of a vehicle currency. This will be key in understanding the process of adjustment of global imbalances. Are there important *valuation effects* present in the adjustment of external imbalances for the other G7 countries? Or is it that the *valuation channel* turns out to be weaker compared to the US? If the latter is true, then it remains an open question where do these capital gains that the US enjoys come from.

The present study contributes to the recent literature on external adjustment, by examining the relative importance of the valuation and trade channels of external adjustment for the rest of the G7 countries. We investigate how the valuation and trade channels for these countries have evolved over time, what is the relative magnitude and direction of the two channels, and the horizons at which the two channels operate.

Our main results are as follows. We evaluate the relative importance of the two channels employing a fully parametric approach based on a reduced form Vector Autoregression (VAR), with the cross–equation restrictions imposed, as in the intertemporal financial account model. We also complement our evidence using a non–parametric approach, that delivers similar insights and highlights some differences with the parametric approach. The intertemporal model works very for all countries, with the cross–equation restrictions being satisfied. We find that the valuation channel is present only for Japan, it is quantitatively mild, ranging from 7% to 9% of total external adjustment, and it is strictly dominated by the trade channel. For Canada, France, Italy and the UK, external adjustment comes exclusively from the trade channel. This is in sharp contrast with the US external adjustment, where valuation effects relax the US external imbalances by absorbing about 27% of the external adjustment (Gourinchas and Rey [2006b]).[1] This finding is in accordance with the view of Obstfeld and Rogoff [2004, 2005] concerning current account adjustments through trade to achieve external equilibrium.

Furthermore, the approach of Gourinchas and Rey [2006b] we follow suggests that cyclical external imbalances should embed all relevant information necessary to forecast future rates of return on the NFA portfolio, and net export growth. Our analysis confirms the significant predictive power of the measures of external imbalances, especially for net exports growth. Our analysis also shows that the valuation channel for Japan operates best at short horizons (between one and four quarters) while the trade channel dominates in magnitude virtually at

[1] We also estimate the extent to which valuation effects relax the US external imbalances, and find it to range between 13% and 30% in our dataset.

all horizons. For the other countries in our sample we find that trade flows are the sole source of external adjustment at all horizons.

The structure of the rest of the paper is the following. Section 2 presents the theoretical model of Gourinchas and Rey [2006b] on which we base our analysis. Section 3 discusses the data we use in our analysis, our empirical approach and how we measure cyclical external imbalances, as well as some results for the US in order to compare our results with those in Gourinchas and Rey [2006b]. Section 4 presents our empirical findings for Canada, France, Italy, Japan and the UK. Section 5 studies the robustness of our previous results. The last section concludes.

2 The Mechanics of External Adjustment

Following Gourinchas and Rey [2005, 2006b], consider the accumulation identity for NFA between t and $t+1$:

$$NFA_{t+1} = R_{F,t+1}(NFA_t + NX_t), \tag{1}$$

where $NFA_t \equiv A_t - L_t$ are defined as the difference between gross foreign assets and liabilities, measured in domestic currency, and $NX_t \equiv X_t - M_t$ represents net exports. Equation (1) states that NFA improves with exports in excess of imports, and with the total return on the NFA portfolio $R_{F,t+1}$.

One way to explore the implications of (1) is to assume that if a balanced growth path exists, the ratios of gross assets, liabilities, exports and imports to GDP would be stationary.[2] In this instance, one could follow the methodology of Campbell and Shiller [1988] and Lettau and Ludvigson [2001] and approximate (1) around the steady-state, obtaining an approximate asset accumulation equation. As Gourinchas and Rey [2005, 2006b] note such an assumption is unwarranted for the US and the same holds for the rest of the G7 countries: the ratios show a clear trending behavior. A possible explanation is that these trends represent structural changes in the world economy, such as financial and trade globalization. An alternative explanation would be that they represent strong transitional dynamics, until the world economy has indeed reached a new steady state.

Our approach to this issue is to examine the process of international adjustment around these trends. Like Gourinchas and Rey [2005, 2006b], we make the assumption that the intertemporal budget constraint holds along these trends. Under this assumption, it is possible to derive an approximation of (1) eliminating the trends in the aforementioned rations and focusing on movements of net asset position and net exports in deviation from these trends.

In what follows we use lowercase letters to denote natural logarithms of upper-case variables. In order to proceed, we will make use of the following assumptions:

Assumption 1 *Let $z_t \in \{a_t, l_t, x_t, m_t\}$ and y_t denote stochastic processes.*

[2] Here we use GDP as the 'scaling' variable rather than wealth as Gourinchas and Rey [2005a, 2006] do.

(a) *The variables $z_t - y_t$ admit the following decomposition:*

$$z_t - y_t = \ln \mu_t^{zy} + \varepsilon_t^z,$$

where $\ln \mu_t^{zy}$ represents the trend and ε_t^z the stationary components of $z_t - y_t$.

(b) *The trend components μ_t^{zy} converge asymptotically to a constant value:*

$$\lim_{t\to\infty} \mu_t^{zy} = \mu^{zy}.$$

Assumption 2 *The growth rate of gross domestic product Δy_t is stationary with steady state value γ.*

Assumption 3 *The returns on gross assets R_{t+1}^a, gross liabilities R_{t+1}^l, and net foreign asset portfolio $R_{F,t+1}$ are stationary with a common steady state mean value R_F, that satisfies $\exp(\gamma) < R_F$.*

Assumption 4 *The external constraint (1) holds 'along the trend', that is:*

$$\left(\mu_{t+1}^{ay} - \mu_{t+1}^{al}\right) = R_F / \exp(\gamma) \left(\mu_t^{ay} - \mu_t^{al} + \mu_t^{xy} - \mu_t^{my}\right). \tag{2}$$

Assumption 1 decomposes the four variables of (1) into trend and stationary components, while allowing for the trends to differ in sample. Together with Assumption 2 it implies the existence of a well-defined balanced growth path, with all variables growing at the same rate, $\exp(\gamma)$. Finally, the assumption that the long-term growth rate of the economy is lower than the equilibrium rate of return on the net foreign asset portfolio (Assumption 3) is a common equilibrium condition in many growth models. It implies that in the steady state, countries with creditor positions ($NFA > 0$) should run trade deficits ($NX < 0$), while countries with debtor positions ($NFA < 0$) should run trade surpluses ($NX > 0$). Finally, Assumption 4 it implies that, each country still faces its external constraint, but now evaluated at the mean growth-adjusted return $R_F / \exp(\gamma)$.

Under Assumptions 1–4, Gourinchas and Rey [2006b] show that a first–order approximation of (1) is:

$$na_{t+1} \approx \frac{1}{\rho_t} na_t + (\hat{r}_{F,t+1} - \Delta y_{t+1}) - \left(\frac{1}{\rho_t} - 1\right) nx_t, \tag{3}$$

where $na_t \equiv \mu_t^a \varepsilon_t^a - \mu_t^l \varepsilon_t^l$, $nx_t \equiv \mu_t^x \varepsilon_t^x - \mu_t^m \varepsilon_t^m$, $\hat{r}_{F,t+1} \equiv \mu_{t+1}^a r_{t+1}^a - \mu_{t+1}^l r_{t+1}^l$, while

$$\begin{aligned}
\mu_t^a &= \frac{\mu_t^{ay}}{\mu_t^{ay} - \mu_t^{ly}};\ \mu_t^l = \mu_t^a - 1; \\
\mu_t^x &= \frac{\mu_t^{xy}}{\mu_t^{xy} - \mu_t^{my}};\ \mu_t^m = \mu_t^x - 1;\ \text{and:} \\
\rho_t &= 1 + \frac{\mu_t^{xy} - \mu_t^{my}}{\mu_t^{ay} - \mu_t^{ly}}.
\end{aligned}$$

The weights μ_t^z are not constant but converge asymptotically to a constant μ^z, while the growth-adjusted discount factor ρ_t is also time varying and converges asymptotically to $\rho \equiv \exp(\gamma) / R_F$.

The variable na_t is a linear combination of the stationary components (log) assets and liabilities to output ratios, that one may dub, with some abuse of language, 'net foreign assets'. Similarly, the variable nx_t is a linear combination of the stationary components of (log) exports and imports, that we call 'net exports'. Finally, $\hat{r}_{t+1}$ is an approximation to the net portfolio return (with $r^a_{t+1} \equiv \ln R^a_{t+1}$ and $r^l_{t+1} \equiv \ln R^l_{t+1}$). The main differences between equation (1) and (3) is that the latter involves only the stationary components ε^z_t of the ratios $\ln(Z_t/Y_t)$ and these stationary components are multiplied by time-varying weights μ^z_t that reflect the trends in the data, while everything is normalized by output, hence the rate of return $\hat{r}_{F,t+1}$ is adjusted for the growth rate of output.

Now notice that equation (3), although economically meaningful, is hard to implement empirically, and would simplify greatly by assuming that the trend components μ^{zy}_t share a common growth rate, which is the relevant case asymptotically, according to Assumption 1. In this case, $\mu^z_t = \mu^z$ and $\rho_t = \rho$ which simplifies the analysis a great deal. In order to implement this, we make the following:

Assumption 5 *The trend components admit a common growth rate: for* $z_t \in \{a_t, l_t, x_t, m_t\}$, $\mu^{zy}_t = \mu^{zy} \times \mu_t$.

Under Assumptions 1–5, Gourinchas and Rey [2006b] demonstrate that a first–order approximation of (1) satisfies:

$$nxa_{t+1} \approx \frac{1}{\rho} nxa_t + r_{F,t+1} + \Delta nx_{t+1}, \tag{4}$$

where

$$\begin{aligned} nxa_t &\equiv |\mu^a|\,\varepsilon^a_t - \left|\mu^l\right|\varepsilon^l_t + |\mu^x|\,\varepsilon^x_t - |\mu^m|\,\varepsilon^m_t; & (5)\\ \Delta nx_{t+1} &\equiv |\mu^x|\,\Delta\varepsilon^x_{t+1} - |\mu^m|\,\Delta\varepsilon^m_{t+1} - \Delta y_{t+1};\ \text{and} & (6)\\ r_{F,t+1} &\equiv |\mu^a|\,r^a_{t+1} - \left|\mu^l\right| r^l_{t+1} & (7)\end{aligned}$$

Note nxa_t is a linear combination of the stationary components of assets, liabilities, exports and imports, and serves as a well-defined measure of cyclical external imbalances. Since it is defined using the absolute values of the weights μ^z, nxa_t always increases with assets and exports and decreases with imports and liabilities. On the other hand, Δnx_{t+1} represents net export growth between periods t and $t+1$ – including Δy_{t+1} since ε^x_t and ε^m_t measure stationary components relative to output– while the return $r_{F,t+1}$ is defined so as to increase with return on foreign assets and decrease with the return on foreign liabilities. Note also that (4), like equation (3), shows that a country can improve its net foreign asset position either through a trade surplus ($\Delta nx_{t+1} > 0$) or through a high return on its net foreign asset portfolio ($r_{F,t+1} > 0$).

Before we proceed further, there is a point deserving special attention. Note that Assumption 5 implies that although the ratios $z_t - y_t$ are *not* necessarily stationary, the log differences $(a_t - y_t) - (l_t - y_t)$, $(x_t - y_t) - (m_t - y_t)$ and $(x_t - y_t) - (a_t - y_t)$ should be stationary or should 'cointegrate'. This follows directly from the assumption of a common trend in all Z_t/Y_t ratios. In this instance we may express nxa_t, Δnx_t and $r_{F,t+1}$ as (see Appendix A):

$$nxa_t = \begin{cases} \mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) - \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) - \left(\varepsilon_t^x - \varepsilon_t^a\right) & \text{for } \mu^a > 0 \\ -\mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) + \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) + \left(\varepsilon_t^x - \varepsilon_t^a\right) & \text{for } \mu^a < 0 \end{cases}, \tag{8}$$

$$\Delta nx_{t+1} = \begin{cases} -\mu^x \Delta \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) - \Delta\varepsilon_{t+1}^m - \Delta y_{t+1} & \text{for } \mu^a > 0 \\ \mu^x \Delta \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) + \Delta\varepsilon_{t+1}^m + \Delta y_{t+1} & \text{for } \mu^a < 0 \end{cases}, \text{ and:} \tag{9}$$

$$r_{F,t+1} = \begin{cases} \mu^a r_{t+1}^a - \mu^l r_{t+1}^l & \text{for } \mu^a > 0 \\ -\mu^a r_{t+1}^a + \mu^l r_{t+1}^l & \text{for } \mu^a < 0 \end{cases}. \tag{10}$$

We return again to this issue in the next section, where we construct measures of external imbalances for our empirical work.

We can now make another assumption:

Assumption 6 *The measure of external imbalances satisfies the stability condition*

$$\lim_{h\to\infty} \rho^h nxa_{t+h} = 0$$

almost surely.

With Assumption 6 we can iterate forward (4), so the external constraint satisfies approximately (see Gourinchas and Rey [2006b]):

$$nxa_t \approx -\sum_{h=1}^{+\infty} \rho^h \left[r_{F,t+h} + \Delta nx_{t+h}\right], \tag{11}$$

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$$nxa_t \approx -\sum_{h=1}^{+\infty} \rho^h \mathrm{E}_t \left[r_{F,t+h} + \Delta nx_{t+h}\right]. \tag{12}$$

This equation is the basic vehicle for assessing qualitatively and quantitatively the relative importance of the 'valuation' and 'trade' channels in the process of international adjustment. It shows that movements nxa_t must forecast either future net returns, or future net export growth, or some linear combination of the two. Consider a country that is a net debtor ($nxa_t < 0$). External adjustment may come through future increases in next exports $\mathrm{E}_t \Delta nx_{t+h} > 0$ (the *trade channel*); or it may come from high expected net portfolio returns $\mathrm{E}_t r_{F,t+h} > 0$ (the *valuation channel*). Furthermore, as Gourinchas and Rey [2006b] argue, predictable NFA returns may occur with a depreciation of the domestic currency, which can easily be seen by expressing $r_{F,t+1}$ as:

$$r_{F,t+1} = |\mu^a| \left(r_{t+1}^{n,a} + \Delta s_{t+1}\right) - \left|\mu^l\right| r_{t+1}^{n,l} - \pi_{t+1}, \tag{13}$$

where $r_{t+1}^{n,a}$ represents the (log) nominal returns on foreign assets in *foreign currency*, Δs_{t+1} is the rate of depreciation of the domestic currency and π_{t+1} is the inflation rate between periods t and $t+1$. Note that a domestic depreciation increases the return on foreign assets, an effect that can be magnified by the degree of leverage of the NFA portfolio when $|\mu^a| > 1$.

Furthermore, since nxa_t is a well-defined measure of cyclical external imbalances, we may decompose it into a return and a net export component: by observing the variation of these two components, we can gain insights regarding the relative importance of the trade and financial adjustment channels. Note that (12) may be rewritten as:

$$\begin{aligned} nxa_t &\approx -\sum_{h=1}^{+\infty} \rho^h \mathrm{E}_t r_{F,t+h} - \sum_{h=1}^{+\infty} \rho^h \mathrm{E}_t \Delta nx_{t+h} \\ &\approx nxa_t^{\mathrm{r}} + nxa_t^{\Delta \mathrm{nx}} = \widehat{nxa}_t, \end{aligned} \tag{14}$$

where nxa_t^{r} is the component of nxa_t that forecasts future returns, while $nxa_t^{\Delta \mathrm{nx}}$ is the component that forecasts future net exports growth. Estimates of the two components may be obtained using VAR methods (see Campbell and Shiller [1988]), while one can also test the above present value restriction.[3] Additionally, following Cochrane [1992] we use equation (14) to decompose the variance of nxa into components reflecting news about future portfolio returns and news about future net export growth. Given that nxa_t^{r} and $nxa_t^{\Delta \mathrm{nx}}$ may be correlated, there will not be a unique decomposition of the variance of nxa into the variances of nxa_t^{r} and $nxa_t^{\Delta \mathrm{nx}}$. Yet, we can decompose the variance of nxa_t as:

$$\begin{gathered} \mathrm{Var}\,(nxa_t) = \mathrm{Cov}\,(\widehat{nxa}_t, nxa_t) = \mathrm{Cov}\,(nxa_t^{\mathrm{r}}, nxa_t) + \mathrm{Cov}\left(nxa_t^{\Delta \mathrm{nx}}, nxa_t\right) \\ \Leftrightarrow 1 = \frac{\mathrm{Cov}\,(\widehat{nxa}_t, nxa_t)}{\mathrm{Var}\,(nxa_t)} = \frac{\mathrm{Cov}\,(nxa_t^{\mathrm{r}}, nxa_t)}{\mathrm{Var}\,(nxa_t)} + \frac{\mathrm{Cov}\left(nxa_t^{\Delta \mathrm{nx}}, nxa_t\right)}{\mathrm{Var}\,(nxa_t)} = \beta_{\mathrm{r}} + \beta_{\Delta \mathrm{nx}}. \end{gathered} \tag{15}$$

The terms β_{r} and $\beta_{\Delta \mathrm{nx}}$ can be estimated as the regression coefficients of nxa_t^{r} and $nxa_t^{\Delta \mathrm{nx}}$ on nxa_t independently. It is clear that the sum $\beta_{\mathrm{r}} + \beta_{\Delta \mathrm{nx}}$ may well differ from unity, if the volatility of $\widehat{nxa}_t$ relative to that of the actual nxa_t differs from the theoretical value of unity. In addition, there is nothing precluding either of the variance shares β_{r} and $\beta_{\Delta \mathrm{nx}}$ from being negative as well.

Having set the basic framework of the approach we follow, we now move to its empirical implementation.

3 Empirical Findings

In the previous section, we used a country's budget constraint to construct a measure of cyclical external imbalances, nxa_t, which is defined as a linear combination of the stationary components in assets, liabilities, exports and imports. In this section, we estimate nxa_t and quantify

[3] This restriction is equivalent to a test that the error term $\varepsilon_{t+1} = nxa_{t+1} - \frac{1}{\rho} nxa_t - (r_t + \Delta nx_{t+1})$ is conditionally uncorrelated with the variables in the time t information: $\mathrm{E}_t\,(\varepsilon_{t+1}) = 0$.

the share of the adjustment coming from net exports and valuation effects, and additionally we examine the forecasting properties of our measures of external imbalances for the countries in our sample.

3.1 Data

The data we use for the stocks of gross assets and liabilities are from Lane Milesi-Ferretti [2006]. To get the quarterly series, the annual stocks have been interpolated using the quarterly pattern of capital outflows (for assets) and inflows (for liabilities) from International Financial Statistics of the IMF. Nominal returns were constructed following the methodology of Gourinchas and Rey [2005, 2006b], as weighted averages of total returns on equity, long-term debt, FDI and other assets/liabillities. The country weights are taken from the IMF Coordinated Portfolio Investment Survey (CPIS).[4] Nominal stocks and flows have been expressed in ratios to GDP with all the variables expressed in US dollars. Nominal returns have been adjusted for inflation using the appropriate GDP deflator. Exports and imports were obtained from the OECD ADB database, and nominal effective exchange rates from the OECD Economic Outlook database.

3.2 Estimating the Measures of External Imbalances

In order to proceed with our analysis we need to obtain estimates of the stationary components. Recall that nxa_t may be expressed in terms of differences of these stationary components ε_t^z. We also explained above that Assumption 5 implies the log differences $(a_t - y_t) - (l_t - y_t)$, $(x_t - y_t) - (m_t - y_t)$ and $(x_t - y_t) - (a_t - y_t)$ should be stationary. As we demonstrate in Appendix B the differences of the stationary components $\varepsilon_t^a - \varepsilon_t^l$, $\varepsilon_t^x - \varepsilon_t^m$ and $\varepsilon_t^x - \varepsilon_t^a$ can be well approximated by these cointegrating relations. Our approach is to test for the existence of these cointegrating relations allowing for trends and possibly structural breaks in the cointegrating relations. This accords well also with Assumption 1 that only asymptotically the trends in the series converge at a constant value, whereas within sample the trends are allowed to vary.

Essentially, we aim at recovering three cointegrating relations for each country: one between assets and liabilities; one between exports and imports; and one between exports and gross assets. We test for the number of cointegrating relations among these four variables in each country in our sample using a variant of the FIML method of Johansen [1995] proposed by Johansen, Mosconi and Nielsen [2000] that allows for different types of structural breaks (level shifts, trend breaks). Specifically, using four variable systems we find that there exist three cointegrating relations around a deterministic trend for France and UK. We also find that there exist three cointegrating relations for Canada and Italy once we allow for a level shift in the series; for Japan we find that there are three cointegrating relations once we allow for a broken trend in the series; and for Germany, we find that there exist three cointegrating relations once

[4] Full details on data construction are available from the authors upon request.

we allow for two trend breaks.[5] Our results are also confirmed using bivariate systems. The estimated stationary relations for each country are reported in Table 1.

`[Insert Table 1 about here]`

The parameters reported have been estimated using the DOLS method of Stock and Watson [1993]. The table also reports Wald–type tests for the restrictions, the assumption of a common stochastic trend imposes on the variables. It is noteworthy, that the assumption of proportional growth between assets and liabilities seems to square well with the data – exceptions being Germany and Japan. Similar results were obtained when looking at exports and imports. The only implication of Assumption 5 that is rejected by the data is the proportionality of the trend in gross assets and exports.[6]

The next issue we have to address is how to combine these stationary relations into forming nxa and Δnx, as for these we need estimates of the weights μ_t^z. Under Assumption 5 these weights will be constant (see also Gourinchas and Rey [2006b] for a discussion of the benefits of fixing the weights):

$$\begin{aligned}
\mu^a &= \frac{\mu^{ay}}{\mu^{ay}-\mu^{ly}};\ \mu^l = \mu^a - 1; \\
\mu^x &= \frac{\mu^{xy}}{\mu^{xy}-\mu^{my}};\ \mu^m = \mu^x - 1;\ \text{and:} \\
\rho &= 1 + \frac{\mu^{xy}-\mu^{my}}{\mu^{ay}-\mu^{ly}}.
\end{aligned}$$

Let us look for example at μ^a. One can easily see that:

$$\begin{aligned}
\mu^a &= \frac{\mu^{ay}}{\mu^{ay}-\mu^{ly}} = \frac{1}{1-\left(\mu^{ly}/\mu^{ay}\right)} = \frac{1}{1-\exp\left(\ln\mu^{ly}-\ln\mu^{ay}\right)} \\
&\approx \frac{1}{1-\exp\left(\overline{\tilde{l}_t-\tilde{a}_t}\right)} = \frac{1}{1-\exp\left[-\left(\overline{\tilde{a}_t-\tilde{l}_t}\right)\right]},
\end{aligned}$$

where lowercase symbols with tilde denote log deviations from GDP, i.e. $\tilde{a}_t = a_t - y_t$ and the approximate equality follows from the fact that the "trends" approximate the actual values of the processes with high accuracy. Essentially, under the assumption of constant weights, we can base the calculation of these weights and the discount parameter ρ on the average values of the stationary relations we have estimated above, since these are not zero mean variables. Specifically, we have that:

$$\begin{aligned}
\mu^a &= \frac{1}{1-\exp\left[-\left(\overline{\tilde{a}_t-\tilde{l}_t}\right)\right]};\ \mu^l = \mu^a - 1; \\
\mu^x &= \frac{1}{1-\exp\left[-\left(\overline{\tilde{x}_t-\tilde{m}_t}\right)\right]};\ \mu^m = \mu^x - 1;\ \text{and:} \\
\rho &= 1 + \frac{\mu^{xy}-\mu^{my}}{\mu^{ay}-\mu^{ly}} = 1 + \frac{\mu^a}{\mu^x}\times\exp\left(\overline{\tilde{x}_t-\tilde{a}_t}\right).
\end{aligned}$$

[5] Results are not reported for the sake of brevity, are available upon request.

[6] Note that joint tests of the restrictions for France and UK showed that they are not rejected by the data.

The implied weights for each country are summarized in Table 2.

`[Insert Table 2 about here]`

There are three points wee need to underscore here. First, note that with the exception of Canada, all countries seem to have leveraged NFA portfolios ($|\mu^a| > 1$), implying that there might be scope for the *valuation channel*, operating further though the effect of domestic currency depreciation on NFA returns. As far as Canada is concerned, the weight μ^a is very small. Second, the weights we have calculated for Germany, imply that Germany is neither a net creditor/net importer ($\mu^a > 0$ & $\mu^x < 0$) nor a net debtor/net exporter ($\mu^a < 0$ & $\mu^x > 0$) having further a discount factor $\rho > 1$ which does not satisfy Assumption 6, and as a result we will exclude it from the analysis below. It could well be the case that there are still strong transitional dynamics at play in the case of Germany, and the data capture these effects, that show up in the weights we have calculated. Finally, as we explain in Appendix B we also need a measure of the growth rate in the cyclical component of imports, $\Delta\varepsilon^m_{t+1}$, in order to construct 'net exports' Δnx_t below (see also (9)). In practice, ε^m_t employed in constructing Δnx_t, is estimated by linear detrending of the ratio $m_t - y_t$.

3.3 Benchmarking Our Data: The US

A question that arises naturally, given that we employ a dataset different from that put together by Gourinchas and Rey [2005, 2006a, 2006b] is whether, and to what extent, using our dataset we would obtain different results for the US from those reported in Gourinchas and Rey [2006b]. Given that we employ a much shorter sample, the implied shares are bound to differ. But the question is whether our data indicate that the valuation channel is less important. Such a finding would probably raise questions regarding the validity of the data we employ for the other countries in our sample.

To this end, under the assumption that there exist three stationary relations (as in Gourinchas and Rey [2006a]), we have estimated them and are reported in Panel A of Table 3.[7] In Panel B, we report both the implied parameters under the assumption of cointegration as well as those calculated by Gourinchas and Rey [2006b]. We do find that leverage in the NFA portfolio is important ($|\mu^a| > 1$) using our data, but the degree of leverage is less pronounced than that reported by Gourinchas and Rey.

`[Insert Table 3 about here]`

We proceed as follows: As a first step, we use the weights calculated by Gourinchas and Rey [2006b] and cyclical components ε^z_t obtained by HP filtering the data, and examine whether the

[7] The fact that we assume the existence of three stationary relations instead of test it, is not a major drawback as we only want to benchmark our data against those of Gourinchas and Rey [2005a, 2005b, 2006].

present value restriction (14) holds.[8] We also find that 63% of the variability of nxa_t is due to net exports and 17% due to portfolio returns accounting for a total of 80% of the variance in nxa. These findings are close to those reported in Gourinchas and Rey [2006b]. Next, we employ the weights of Gourinchas and Rey, and the estimated stationary relations from Panel A of Table 3. Again we find that the present value restriction is not rejected, and in addition that 31% of the variance of nxa can be attributed to the variability of returns and 51% to the variability of net exports. These numbers are remarkably close to those reported in Gourinchas and Rey [2006b] (27% and 64% respectively). As a last check, we employ the implied weights reported in Panel B.1 of Table 3 and combine them with the estimated relations in Panel A. Again, we find that the present value restriction holds in the data, and in addition that 13% of the variance of nxa_t can be attributed to the variability of NFA portfolio returns, while 86% can be attributed to the variability of net exports.

We view these results as broadly in-line with those reported in Gourinchas and Rey [2006b]. In addition, recall that (14) implies that nxa should forecast either expected future returns or expected net export growth or both. We investigated this question by regressing h-horizon returns $q_{t,h} = \left(\sum_{i=1}^{h} q_{t+i}\right)/h$ between t and $t+h$ on nxa_t.[9] We found results again broadly in-line with those of Gourinchas and Rey: the financial adjustment channel operates at short to medium horizons, between one quarter and two years, whereas the traditional trade adjustment becomes more important at medium to long horizons, after three years.

Our findings thus far indicated that our dataset is consistent with that of Gourinchas and Rey, and in addition that there are strong valuation effects operating for the US. The question that we seek to address next, is whether, and to what extent the valuation channel is operational for Canada, France, Italy, Japan and the UK.[10]

4 External Adjustment in G5

4.1 Assessing Trade and Financial Channels of External Adjustment

Employing the implied weights reported in Table 2, we construct nxa_t for Canada, France, Italy, Japan and the UK. The issue here is how accurate is equation (4) as an approximation to the external constraint (1). Since the stationary components ε_t^z have been obtained by bivariate cointegrating relations (see (8), 9), it might be that (4) does not adequately characterize the external dynamics around the trends. To this end, we define the approximation error $\epsilon_{t+1} = nxa_{t+1} - \frac{1}{\rho} nxa_t - (r_{F,t+1} + \Delta nx_{t+1})$ which we report in Figure 1 (right panel), along with nxa_{t+1} (left panel) and $r_{F,t} + \Delta nx_t$ (mid panel). As can be seen from the Figure, with the exception

[8] We employ a VAR(1) here and in what follows in accordance with the evidence in Gourinchas and Rey [2006]. Similar results were obtained using a VAR(2).

[9] Results not reported for the sake of brevity, are available upon request.

[10] Recall that Germany was excluded from the analysis, as the implied parameters indicate that Assumption 6 is not satisfied.

of France, this error term is quite small relative to both nxa and $(r_{F,t} + \Delta nx_t)$, for most of the sample period.

```
[Insert Figure 1 about here]
```

We next examine the observed variation of nxa_t over time into a return and a net exports components we can gain insights regarding the relative importance of the trade and valuation channel. Based on (14), the valuation and trade channels can be estimated using a reduced form VAR representation, in the spirit of Campbell and Shiller [1988]. Let $\mathbf{w}_t = (nxa_t, r_t, \Delta nx_t)'$. Then a VAR(1) takes the form: $\mathbf{w}_{t+1} = \mathbf{A}\mathbf{w}_t + \mathbf{v}_t$.[11] It is easy to see that since $\mathrm{E}_t(\mathbf{w}_{t+i}) = \mathbf{A}^i\mathbf{w}_t$, we have that equation (14) can be written as:

$$\begin{aligned}\mathbf{e}'_{nxa}\mathbf{w}_t &= -\mathbf{e}'_r \sum_{j=1}^{+\infty} \rho^j \mathbf{A}^j \mathbf{w}_t - \mathbf{e}'_{\Delta nx} \sum_{j=1}^{+\infty} \rho^j \mathbf{A}^j \mathbf{w}_t \\ &= -\mathbf{e}'_r \rho \mathbf{A} (\mathbf{I} - \rho\mathbf{A}) \mathbf{w}_t - \mathbf{e}'_{\Delta nx} \rho \mathbf{A} (\mathbf{I} - \rho\mathbf{A}) \mathbf{w}_t \\ &= nxa_t^{\mathrm{r}} + nxa_t^{\Delta \mathrm{nx}}\end{aligned}$$

where $\mathbf{e}_s$ is a unit vector that selects the s-th variable in the vector $\mathbf{w}_t$. The estimated processes nxa_t^{r} and $nxa_t^{\Delta \mathrm{nx}}$ are represented graphically in Figure 2.[12]

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[Insert Figure 2 about here]
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The general picture that emerges is that our measures of external imbalances are closely tracked by the 'trade' component: this holds clearly for Canada and Italy. Furthermore, some of the adjustment of Japanese external imbalances comes from the valuation component, although this effect is somewhat contained. Similar results hold for the UK: the majority of the variability of nxa is due to the trade components, while the pattern variability of the valuation component seems to be opposite from that of nxa, signifying that adjustment of UK imbalances is probably not due to valuation. France on the other hand, displays a totally different picture. Although some of the variability of external imbalances is well mimicked by the trade component, the valuation component seems to work in the opposite direction. In general, we do see that $nxa_t^{pred} = nxa_t^{\mathrm{r}} + nxa_t^{\Delta \mathrm{nx}}$ tracks well the actual measure of external imbalances, with the exception of France, where nxa_t^{pred} is always close to zero and much less volatile than nxa.

We also want to examine the extent to which the restrictions imposed by (14) are satisfied in the data.[13] These restrictions are equivalent to the restriction that the approximation error term is conditionally uncorrelated with variables known at time t ($nxa_t, r_{F,t}, \Delta nx_t$ and possibly their lags), that is $\mathrm{E}_t(\epsilon_{t+1}) = 0$. We use Wald-type tests, and find that the restrictions imposed by (12) are not rejected by the data.[14] Our results are summarized in Table 4. We can therefore

[11] This can be generalized to higher order VARs by stacking k-th order VAR into a first order companion form.

[12] We use a VAR(1) according to the Schwarz and Hannan-Quinn information criteria.

[13] That is whether $\mathbf{e}'_{nxa} = -\mathbf{e}'_r \rho \mathbf{A}(\mathbf{I} - \rho\mathbf{A})^{-1} - \mathbf{e}'_{\Delta nx}\rho\mathbf{A}(\mathbf{I} - \rho\mathbf{A})^{-1}$ or $\mathbf{e}'_{nxa}\mathbf{I} + (\mathbf{e}'_r + \mathbf{e}'_{\Delta nx} - \mathbf{e}'_{nxa})\,\rho\mathbf{A} = \mathbf{0}$.

[14] Mercereau and Miniane [2004] argue that the one-step-ahead test is preferable when some of the variables are persistent, as is the case here with nxa_t.

conclude that equation (12) provides an adequate statistical characterization of our data, the only exception being France when we use a VAR(2). These tests together with the evidence presented in Figure 2, indicate that the quality of approximation for Canada, Italy, Japan and the UK is extremely good, while there might be some issues with the approximation in the case of France.

[Insert Table 4 about here]

In order to examine the relative importance of the two channels, we decompose the variance of the actual external imbalances measures nxa_t into its covariances with the two channels nxa_t^{r} and $nxa_t^{\Delta \mathrm{nx}}$ as in (15). Table 5 reports the estimated coefficients, β_{r} and $\beta_{\Delta \mathrm{nx}}$. It reveals the relative importance of the two channels and illustrates how well the model prediction captures the fluctuations in the data. For Canada, we find that the valuation channel accounts between 2% and 3% of the variance of the actual external imbalance, whereas the majority of the variability is due to the trade channel. For Italy, the valuation channel becomes a bit more important (between 3% and 7%) but again the trade channel accounts for almost all the variability of nxa. For Japan, we find a somewhat modest contribution of the valuation channel (between 7% and 9%), whereas the trade channel is again more important (between 73% and 79%).

On the other hand, the operation of the valuation and trade channels for France is completely different. We see that the trade channel accounts between 24% and 28%, whereas the coefficient measuring the share of the variation of nxa attributable to the valuation channel is negative (-33% to -24%). In sum, the two effects seem to cancel out in this exercise. Looking at UK, we also see that the variation of nxa attributable to the valuation channel is negative (-33% to -37%). But what is the meaning of saying that net foreign portfolio returns cause a negative fraction of the nxa variance? One interpretation is that when the current nxa is high, future net portfolio returns are expected to be higher than on average. But such an interpretation runs counter to our intuition and the interpretation of equations (12)–(15): a high current value of nxa is associated with future NFA returns that are lower than on average ($r_{F,t+h} < 0$). Another interpretation suggests that net return fluctuations dampen (for France fully, for the UK partially) nxa fluctuations caused by net exports fluctuations.

In fact, as we demonstrate below, neither of these interpretations is valid. The variance shares we report in Table 5 are based on forecasts of future values of net foreign returns, $\mathrm{E}_t r_{F,t+h}$, that are obtained from unrestricted VARs. If some of the coefficients are statistically insignificant, and are such that they imply a positive (insignificant) correlation between $\mathrm{E}_t r_{F,t+h}$ and nxa_t, then obtaining nxa_t^{r} based on these insignificant VAR parameters ($nxa_t^{\mathrm{r}} = -\mathbf{e}_r' \rho \mathbf{A} \left(\mathbf{I} - \rho \mathbf{A}\right) \mathbf{w}_t$) might lead to covariation between nxa_t and nxa_t^{r} that is in fact negative. As we will shortly demonstrate, this is the case for France and the UK.

[Insert Table 5 about here]

4.2 Short and Long Horizon Forecast: Any Role for Valuation Effects and the Exchange Rate

According to equation (12) our measures of external imbalances nxa_t should have predictive power on either future returns on the net foreign asset portfolio $r_{F,t+h}$, or future net export growth Δnx_{t+h}, or both at short and long horizons. In this section we examine the predictive power of nxa_t for future returns on the net foreign asset portfolio and net export growth, both at short and long horizons. Essentially, we investigate whether there is any predictive content in nxa_t and how its predictive ability varies over different horizons, an exercise that will provide us with insights regarding the horizons at which the valuation and trade channels operate.

We investigate this question by regressing H-horizon average returns (NFA portfolio ,net export growth, or exchange rate changes), $q_{t,H} = \left(\sum_{h=1}^{H} q_{t+h}\right)/H$, on the lagged external imbalances measures nxa_t. Table 6 reports the results for forecasting horizons ranging between one and twenty quarters:[15]

$$q_{t,H} = \phi_0 + \phi_1 nxa_t + \eta_t.$$

The general picture that emerges from Table 6 is that NFA portfolio returns are not predictable for all the countries in our sample, with one notable exception that of Japan. For instance, we find that NFA returns are predictable for Japan at horizons between one and four quarters ($\bar{R}^2$ ranging between 0.06 and 0.08), but no predictability whatsoever after eight quarters. Furthermore, looking at the case of the UK we do find some predictability of future NFA returns at horizons of three and four quarters, which is statistically significant, but the coefficients have the wrong sign (positive). Finally, there are some week evidence of return predictability for Italy at one, two and twelve quarters ahead.[16] These findings indicate that the valuation adjustment via asset returns works best at very short horizons (one to four quarters), and seems to work for Japan only.

Recall from our discussion above, that returns on gross assets may be affected by nominal exchange rate depreciation (see equation (13) for instance): a depreciation of the exchange rate increases the return on gross assets relative to the return on gross liabilities. We therefore examine whether there is any exchange rate predictability, both at short and long horizons, despite the fact that we found only weak evidence of predictability of NFA returns. Could it be that our measures of NFA portfolio returns are noisy enough, such that they hide a link between nxa and the exchange rate? Table 6 presents estimates using both the trade-weighted multilateral exchange rate for major currencies ($\Delta s_{t,H}$) as well as the bilateral US dollar exchange rate ($\Delta s^{usd}_{t,H}$). Our findings are as follows. For Canada, we find some evidence of predictability both for the trade-weighted and the US dollar exchange rate depreciation, at horizons beyond 12 quarters: a negative nxa_t predicts a subsequent depreciation of the Canadian dollar against major currencies. For France, there is also some evidence of predictability at horizons beyond

[15] Note that when the forecasting horizon exceeds 1, the use of overlaping observations induces $(H-1)$th -order serial correlation in the error term. We account for this by using Newey-West robust $t - statistics$.

[16] The estimated parameters are significant only at the 10% level, and this is the reason we refer to this finding as weak predictability.

two years, with the sign (negative) conforming with (12). For Italy, on the other hand, we find strong evidence of multirateral exchange rate predictability at all horizons (1–20 quarters), while the US dollar depreciation rate is predictable only one quarter ahead. As far as Japan is concerned, we do find a pattern of exchange rate predictability that is consistent with the predictability of NFA portfolio returns we documented above. The trade-weighted exchange rate depreciation is predictable for horizons up to a year, whereas the US dollar exchange rate depreciation is predictable up to years ahead. This again implies that a negative imbalance for Japan, predicts a future depreciation of the Yen vis-à-vis other major currencies. Finally, for the UK, we find no predictability of the exchange rate whatsoever.

Turning next to net export growth, we find that it is predictable almost at all horizons for all the countries in our sample. Essentially, we find that nxa_t predicts a substantial fraction of future net export growth at horizons of three quarters and beyond.[17] In addition: the $\bar{R}^2$ ranges between 0.32 (for France) and 0.61 (for the UK) at 20 quarters. This result is consistent with short– and long–term adjustment via the trade channel. A large positive external imbalance predicts low future net export growth, which restores equilibrium. Hence, trade adjustments are at work, both at short and long horizons (3 quarters and more).

`[Insert Table 6 about here]`

Another issue that deserves special attention, and relates to our results in the previous section, is the finding that for France and the UK, the coefficients from the predictive regressions in Table 6 are positive, but insignificant. Recall that in the previous section we found that a negative share of the variance of nxa was caused by NFA portfolio returns fluctuations. The fact that the coefficients in the predictive regressions were positive and insignificant, and since each regression coefficient is merely the sample covariance of nxa with the average return, divided by the sample variance of nxa, we can conclude that our findings in the previous section were driven by these positive, insignificant autocovariances. To further explore this issue we propose to proceed as flows. Iterating forward equation (4) for H periods, we obtain:

$$nxa_t = -\sum_{h=1}^{H} \rho^h r_{F,t+h} - \sum_{h=1}^{H} \rho^h \Delta nx_{t+h} + \rho^{H+1} nxa_{t+H+1}.$$

It then follows that we can decompose the unconditional variance of nxa_t as:

$$\mathrm{Var}\left(nxa_t\right) \approx -\sum_{h=1}^{H} \rho^h \mathrm{Cov}\left(r_{F,t+h}, nxa_t\right) - \sum_{h=1}^{H} \rho^h \mathrm{Cov}\left(\Delta nx_{t+h}, nxa_t\right) + \rho^{H+1} \mathrm{Cov}\left(nxa_{t+H}, nxa_t\right). \tag{16}$$

Equation (16) decomposes the variance of nxa into three parts: predictability of NFA portfolio returns, net exports growth, and the last term of (16) which captures predictability of NFA portfolio returns and net exports growth beyond horizon H (autocorrelation in nxa). Our claim

[17] We do not find net export predictability for France at horizons on one and two quarters ahead.

is that our findings in the previous section (negative variance share), were in fact driven by the fact that were derived based on a VAR model with (i) some of the parameters implying positive covariation between nxa and returns ($\mathrm{Cov}\left(r_{F,t+h}, nxa_t\right) > 0$) being insignificant, and (ii) with present value restrictions imposed in the estimation.[18]

Table 7 presents the (unconditional) variance–decomposition results. Given our results on weak evidence of return predictability beyond four quarters, we choose $H = 8$, and we decompose the variance of nxa into three components according to (16), where estimation is performed by the generalized method of moments (GMM).[19] The percentages in Table 7 are obtained by dividing (16) by the estimated variance of nxa. The last column of the table shows the variance component associated with each variable. Essentially, we find that NFA returns cause a negative fraction of the variance of nxa for Canada, France and the UK, but these negative fractions – if anything – they are insignificant, and hence confirm our earlier claim that the results obtained in the previous section were due to insignificant positive correlations between returns and nxa. Specifically, for Canada we find that 57% of the variance is caused by net exports growth, while 57% is caused by predictability of both returns and net exports growth beyond two years. For France, we find that the total of variance is caused by future predictability (beyond two years), while for Italy 62% of the variance is caused by net exports, 32% is due to future predictability and a modest 6% (insignificant) is due to NFA returns. Our results for Japan, are broadly consistent with those in Table 5: NFA returns account for roughly 10% of the unconditional variance (strongly significant), while 95% is due to net exports growth. Finally for the UK we find that 82% of the unconditional variance is caused by net exports growth.

[Insert Table 7 about here]

In Table 7 we also decompose the variance by horizon: predictability corresponding to a period 1–4, 5–8, and beyond 9 quarters ahead. This provides us with insights about the horizon that matters most for nxa. We find that most of the action in nxa_t is due to events between one and two years ahead into the future, the only exception being France where all the action comes after three years. In addition, the variability in nxa is exhausted within two years for Japan, while for Canada, Italy and the UK, there is still quite some action after two years ahead.

Thus far our findings indicate that for Canada, France, Italy and the UK the adjustment of external imbalances comes entirely from the *trade channel*: changes in trade flows bear the burden of the adjustment. In addition, the fact that for Canada (at horizons beyond 12 quarters)

[18] These were found to hold using the present value tests.

[19] The GMM estimator takes the form:

$$\begin{aligned}\frac{1}{T}\sum_{i=1}^{T} nxa_i^2 &= -\frac{1}{T}\sum_{i=1}^{T}\left(nxa_i\sum_{h=1}^{4}\rho^h r_{F,i+h}\right) - \frac{1}{T}\sum_{i=1}^{T}\left(nxa_i\sum_{h=1}^{4}\rho^h \Delta nx_{i+h}\right)\\ &\quad -\frac{1}{T}\sum_{i=1}^{T}\left(nxa_i\sum_{h=5}^{8}\rho^h r_{F,i+h}\right) - \frac{1}{T}\sum_{i=1}^{T}\left(nxa_i\sum_{h=5}^{8}\rho^h \Delta nx_{i+h}\right) + \frac{1}{T}\sum_{i=1}^{T}\left(nxa_i\rho^9 nxa_{i+9}\right),\end{aligned}$$

so using GMM is just using sample variances and covariances.

and for Italy (at all horizons) exchange rate depreciations are predictable, clearly indicates that the adjustment of net exports is consistent with expenditure switching effects. The case of Japan is slightly different, and are, to some extent, similar to those Gourinchas and Rey [2006] report for the US and we also confirmed above. At horizons smaller than a year, the dynamics of the portfolio returns are important, and exchange rate changes enhance the *valuation channel*, having a direct impact on external imbalances. At horizons beyond one year, there is little predictability both of asset returns and the exchange rate. The key insight here is that the exchange rate is important in the *valuation channel*, hence is predictable at short horizons, but the bulk of external adjustment comes through trade flows. On average, if there are external deficits ($nxa_t < 0$) it is mainly because expected net export growth is high, not because expected future NFA returns and high. Similarly, external surpluses are in general more associated with negative net export growth, rather than low future expected NFA returns.

5 Robustness Analysis

In this section, we try to assess the robustness of our findings in the previous section. First, we try to address whether the absence of NFA return predictability could be due to mismeasurement in weights used to construct r_F. To the extent that the weights μ^a and μ^l are measured with error, the degree of leverage of the NFA portfolio could also be mismeasured, which in turn could influence our results r_F. To this end, in Table 8 we report results of predictive regressions, as in the previous section, where we have used as the dependent variable, portfolio excess returns, defined as the quarterly total return on foreign assets r^a_t minus the quarterly total return on home assets, r^l_t. Specifically, we find a pattern of return predictability for France, Japan and the UK similar to that reported in Table 6, which confirms our earlier results.

On the other hand, we do find some excess return predictability for Canada (between one and four quarters ahead), indicating that the valuation channel might be at play even for Canada at very short horizons, but its contribution is contained ($\bar{R}^2$ range from 0.02 to 0.06). A totally different picture emerges for Italy, however. For instance, we find strong predictability evidence of excess returns between one and sixteen quarters ahead (with an $\bar{R}^2$ of 0.13). This last result shows that valuation effects might be important for Italy as well, and the fact they were not discovered earlier is probably due to measurement error in μ^a and μ^l.

[Insert Table 8 about here]

To further assess the validity of our previous findings we also follow the methodology of Gourinchas and Rey [2006b] and obtain the weights μ^z as sample averages of HP trends of the corresponding series.[20] This leads us to exclude also Japan from this exercise, as it turns out that μ^a and μ^x are both positive, and in addition $\rho > 1$. For the remaining four countries our main findings are the following. Employing a non parametric version of the variance decomposition

[20] Results are not reported for the sake of brevity. They are available however upon request.

of nxa as in (16) the balk of the variance of nxa is again caused by variation in future net exports, with NFA returns playing only a marginal (insignificant) role. In addition, we find that most of the variance of nxa_t is due to events one year ahead into the future.

We also examined the predictive ability of the resulting nxa on future NFA returns, net exports growth and the exchange rate depreciation. Our results are broadly in–line with those reported in Table 6 above. We find that nxa_t forecasts significantly future movements in net exports growth for all the countries in our sample, regardless of the forecast horizon. As far as future NFA returns are concerned, we find that they are not predictable. The only exception relative to Table 6 is that of France, for which we now find that there is indeed some NFA return predictability between one and four quarters, coupled with exchange rate predictability for the same horizon. Furthermore, and contrary to our findings in Table 6, the exchange rate is completely unpredictable for Canada, while it is predictable one quarter ahead for the case of Italy.

6 Conclusions

The increase of financial integration has vastly increased gross foreign asset holdings, has introduced a scope of external adjustment through changes in financial asset prices. Recent research emphasizes the importance of the *valuation channel* as a source of external adjustment, especially for the US. We empirically examine the extent to which the valuation channel relaxes the need for trade balance adjustments to restore external equilibrium for Canada, France, Italy, Japan and the UK.

We find that although there are strong valuation effects present for the US, the *valuation channel* is rather important only for Japan among the countries that we consider. The key difference between the US and Canada, France, Italy and the UK pertains to the fact that these countries do not enjoy a vehicle currency status. Specifically, we demonstrate that valuation adjustments are mild and exist only for Japan, while for the other countries external imbalances are corrected through the more traditional *trade channel*. Our findings point to the importance of external adjustment through trade, even after allowing for the effect of asset prices and asset revaluations in external adjustment.

One implication of our results concerns the effects of monetary and fiscal policy, and how these are transmitted. We have found that valuation adjustment is largely absent for the countries we have examined, hence the impact of monetary and fiscal policy on external adjustment through their influence on asset prices is rather limited. Instead, these policies should still rely on working their way through more traditional channels, by affecting relative goods prices or savings and investment decisions.

The question that still remains open is where do the valuation effects the US has been enjoying come from? Why why does the rest of the world finance the US current account deficit and hold US assets, knowing that those assets will underperform? Conventional wisdom is that the mirror image of the US has been Japan and Germany. For Japan, we found that the correrctive movements in asset returns are of mild importance, definitely not enough to explain the corresponding valuation effects present in US external accounts. An analysis of the German external adjustment would help us shed some light on the issue. We stress again that Germany was not analyzed as certain parameter restrictions of the theoretical model, pertaining to a well–defined steady state, were not satisfied in German data. It could well be that German data pick up transtitional dynamics towards a new steady state.[21] Hence, the question that remains is who bears the losses that appear as capital gains on the US net foreign portfolio. Examining this issue further, both theoretically and empirically is the next step to gain a deeper understanding of external adjustment dynamics.

[21] We leave this for future research.

References

Beveridge, S. and C. R. Nelson [1981] A New Approach to Decomposition of Economic Time Series into Permanent and Transitory Components with Particular Attention to Measurement of the Business Cycle, *Journal of Monetary Economics, 7, 151–74*

Benigno, P. [2006] Are Valuation Effects Desirable from a Global Perspective, *NBER WP 12219*

Blanchard, O., F. Giavazzi, and F. Sa [2005] International Investors, the U.S. Current Account, and the Dollar, *Brookings Papers on Economic Activity, Spring 2005*

Campbell, J. and R. Shiller [1988] The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors, *Review of Financial Studies, 1, 195—227*

Cochrane, J. [1992] Explaining the Variance of Price-Dividend Ratios, *Review of Financial Studies, 5(2), 243–80*

Devereux, M. and M. Saito [2005] A Portfolio Theory of International Capital Flows, *Manuscript, University of British Columbia*

Ghironi, F., J. Lee and A. Rebucci [2006] The Valuation Channel of External Adjustment, *Manuscript, Boston College*

Gonzalo, J. and C. Granger [1995] Estimation of Common Long-memory Components in Cointegrated Systems, *Journal of Business and Economic Statistics 13, 27–35*

Gourinchas, P.-O. and H. Rey [2005] International Financial Adjustment, *NBER WP 11155.*

Gourinchas, P.-O. and H. Rey [2006a] From World Banker to World Venture Capitalist: US External Adjustment and the Exorbitant Privilege, in: Richard Clarida (ed.), *G7 Current Account Imbalances: Sustainability and Adjustment*, The University of Chicago Press, *forthcoming*

Gourinchas, P.-O. and H. Rey [2006b] International Financial Adjustment, *Manuscript, UC at Berkeley, April 2006*

Johansen, S. [1995] *Likelihood Based Inference on Cointegration in the Vector Autoregressive Model*, Oxford: Oxford University Press

Johansen, S., Mosconi, R. and B. Nielsen [2000] Cointegration Analysis in the Presence of Structural Breaks in the Deterministic Trend, *Econometrics Journal, 3, 216–249*

Lane, P. R. and G.M. Milesi-Ferretti [2001] The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries, *Journal of International Economics, 55, 263—94.*

Lane, P. R. and G.M. Milesi-Ferretti [2004] Financial Globalization and Exchange Rates, *mimeo, IMF .*

Lane, P. R. and G.M. Milesi-Ferretti [2006a] A Global Perspective on External Positions, in: Richard Clarida (ed.), *G7 Current Account Imbalances: Sustainability and Adjustment, The University of Chicago Press, forthcoming*

Lane, P. R. and G.M. Milesi-Ferretti [2006b] The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004, *IMF WP 06/69,*

Lettau, M. and S. Ludvigson [2001] Consumption, Aggregate Wealth and Expected Stock Returns, *Journal of Finance, 56, 815—49.*

Mercereau, B. [2003] The Role of Stock Markets in Current Account Dynamics: a Time Series Approach, *Topics in Macroeconomics, 3 (1), Article 6*

Mercereau, B. and J. Miniane [2004] Challenging the Empirical Evidence from Present Value Models of the Current Account, *IMF WP 106/04*

Obstfeld, M. [2004] External Adjustment, *NBER WP 10843*.

Obstfeld, M. and K. Rogoff [1996] *Foundations of International Macroeconomics*, Cambridge MA: MIT Press.

Obstfeld, M. and K. Rogoff [2004] The unsustainable U.S. current account position revisited, *NBER WP 10869*

Obstfeld, M. and K. Rogoff [2005] Global Current Account Imbalances and Exchange Rate Adjustments, *Brookings Papers on Economic Activity 1*

Proietti, T. [1997] Short-run Dynamics in Cointegrated Systems, *Oxford Bulletin of Economics and Statistics, 59, 405–22*

Stock, J. and M. Watson [1993] A simple estimator of cointegrating vectors in higher order integrated systems, *Econometrica 61, 783—820*

Tille, C. [2003] The Impact of Exchange Rate Movements on U.S. Foreign Debt, *FRB of New York, Current Issues in Economics and Finance, 9 (1), 1–7*

Tille, C. [2005] Financial Integration and the Wealth Effect of Exchange Rate Fluctuations,*FRB of New York, Staff Report 226*

Ventura, J. [2001] A Portfolio View of the U.S. Current Account Deficit, *Brookings Papers on Economic Activity, 241–53*.

A Appendix: Measures of External Imbalances

By Assumption 1 it follows that each (log) ratio $z_t - y_t$ is split between a trend and a zero mean stationary component. Recall also that under Assumptions 1–5, we may write (4) as

$$nxa_{t+1} \approx \frac{1}{\rho} nxa_t + r_{F,t+1} + \Delta nx_t.$$

Let us first assume that, $\mu^a > 0$ and $\mu^x < 0$. Then (4) reads

$$nxa_{t+1} \approx \frac{1}{\rho} nxa_t + r_{F,t+1} + \Delta nx_{t+1},$$

with $na_t \equiv \mu^a \varepsilon_t^a - \mu^l \varepsilon_t^l$, $nx_t \equiv \mu^x \varepsilon_t^x - \mu^m \varepsilon_t^m$, and $r_{F,t+1} \equiv \mu^a r_{t+1}^a - \mu^l r_{t+1}^l$. In this case we define $nxa_t \equiv na_t - nx_t$ and $\Delta nx_{t+1} = -nx_{t+1} + nx_t - \Delta y_{t+1}$. Note, first that nxa_t may be written as:

$$\begin{aligned}
nxa_t &= \mu^a \varepsilon_t^a - \mu^l \varepsilon_t^l - \mu^x \varepsilon_t^x + \mu^m \varepsilon_t^m \\
&= \mu^a \varepsilon_t^a + \mu^l \varepsilon_t^a - \mu^l \varepsilon_t^a - \mu^l \varepsilon_t^l - \mu^x \varepsilon_t^x + \mu^m \varepsilon_t^x - \mu^m \varepsilon_t^x + \mu^m \varepsilon_t^m \\
&= \mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) + \left(\mu^a - \mu^l\right) \varepsilon_t^a - \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) - \left(\mu^x - \mu^m\right) \varepsilon_t^x \\
&\underset{\mu^a - 1 = \mu^l}{\overset{\mu^x - 1 = \mu^m}{=}} \mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) - \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) - \left(\varepsilon_t^x - \varepsilon_t^a\right),
\end{aligned} \tag{A.1}$$

and that Δnx_{t+1} may be expressed as:

$$\begin{aligned}
\Delta nx_{t+1} &= -\mu^x \varepsilon_{t+1}^x + \mu^m \varepsilon_{t+1}^m + \mu^x \varepsilon_t^x - \mu^m \varepsilon_{t+1}^m - \Delta y_{t+1} \\
&= -\mu^x \varepsilon_{t+1}^x + \mu^x \varepsilon_{t+1}^m - \mu^x \varepsilon_{t+1}^m + \mu^m \varepsilon_{t+1}^m + \mu^x \varepsilon_t^x - \mu^x \varepsilon_t^m + \mu^x \varepsilon_t^m - \mu^m \varepsilon_{t+1}^m - \Delta y_{t+1} \\
&= -\mu^x \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) - \left(\mu^x - \mu^m\right) \varepsilon_{t+1}^m + \mu^x \left(\varepsilon_t^x - \varepsilon_t^m\right) + \left(\mu^x - \mu^m\right) \varepsilon_t^m - \Delta y_{t+1} \\
&\underset{\mu^a - 1 = \mu^l}{\overset{\mu^x - 1 = \mu^m}{=}} -\mu^x \left[\left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) - \left(\varepsilon_t^x - \varepsilon_t^m\right)\right] - \left(\varepsilon_{t+1}^m - \varepsilon_t^m\right) - \Delta y_{t+1} \\
&= -\mu^x \Delta \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) - \Delta \varepsilon_{t+1}^m - \Delta y_{t+1}.
\end{aligned} \tag{A.2}$$

Next, assume that $\mu^a < 0$ and $\mu^x > 0$. Then (4) reads

$$nxa_{t+1} \approx \frac{1}{\rho} nxa_t + r_{F,t+1} + \Delta nx_{t+1},$$

with $na_t \equiv \mu^a \varepsilon_t^a - \mu^l \varepsilon_t^l$, $nx_t \equiv \mu^x \varepsilon_t^x - \mu^m \varepsilon_t^m$, and $r_{F,t+1} \equiv -\mu^a r_{t+1}^a + \mu^l r_{t+1}^l$. In this case we define $nxa_t \equiv -na_t + nx_t$ and $\Delta nx_{t+1} = nx_{t+1} - nx_t + \Delta y_{t+1}$. Note, first that nxa_t may be written as:

$$\begin{aligned}
nxa_t &= -\mu^a \varepsilon_t^a + \mu^l \varepsilon_t^l + \mu^x \varepsilon_t^x - \mu^m \varepsilon_t^m \\
&= -\mu^a \varepsilon_t^a + \mu^l \varepsilon_t^a - \mu^l \varepsilon_t^a + \mu^l \varepsilon_t^l + \mu^x \varepsilon_t^x + \mu^m \varepsilon_t^x - \mu^m \varepsilon_t^x - \mu^m \varepsilon_t^m \\
&= -\mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) + \left(\mu^a - \mu^l\right) \varepsilon_t^a + \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) + \left(\mu^x - \mu^m\right) \varepsilon_t^x \\
&\underset{\mu^a - 1 = \mu^l}{\overset{\mu^x - 1 = \mu^m}{=}} -\mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) + \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) + \left(\varepsilon_t^x - \varepsilon_t^a\right)
\end{aligned} \tag{A.3}$$

and that Δnx_{t+1} may be expressed as:

$$\begin{aligned}
\Delta nx_{t+1} &= \mu^x \varepsilon_{t+1}^x - \mu^m \varepsilon_{t+1}^m - \mu^x \varepsilon_t^x + \mu^m \varepsilon_{t+1}^m + \Delta y_{t+1} \\
&= \mu^x \varepsilon_{t+1}^x - \mu^x \varepsilon_{t+1}^m + \mu^x \varepsilon_{t+1}^m - \mu^m \varepsilon_{t+1}^m - \mu^x \varepsilon_t^x + \mu^x \varepsilon_t^m - \mu^x \varepsilon_t^m + \mu^m \varepsilon_{t+1}^m + \Delta y_{t+1} \\
&= \mu^x \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) + \left(\mu^x - \mu^m\right) \varepsilon_{t+1}^m - \mu^x \left(\varepsilon_t^x - \varepsilon_t^m\right) - \left(\mu^x - \mu^m\right) \varepsilon_t^m + \Delta y_{t+1} \\
&\underset{\mu^a - 1 = \mu^l}{\overset{\mu^x - 1 = \mu^m}{=}} \mu^x \left[\left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) - \left(\varepsilon_t^x - \varepsilon_t^m\right)\right] + \left(\varepsilon_{t+1}^m - \varepsilon_t^m\right) + \Delta y_{t+1} \\
&= \mu^x \Delta \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) + \Delta \varepsilon_{t+1}^m + \Delta y_{t+1}.
\end{aligned} \tag{A.4}$$

So in general it holds that

$$nxa_t = \begin{cases} \mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) - \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) - \left(\varepsilon_t^x - \varepsilon_t^a\right) & \text{for } \mu^a > 0 \\ -\mu^l \left(\varepsilon_t^a - \varepsilon_t^l\right) + \mu^m \left(\varepsilon_t^x - \varepsilon_t^m\right) + \left(\varepsilon_t^x - \varepsilon_t^a\right) & \text{for } \mu^a < 0 \end{cases}, \tag{A.5}$$

$$\Delta nx_{t+1} = \begin{cases} -\mu^x \Delta \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) - \Delta\varepsilon_{t+1}^m - \Delta y_{t+1} & \text{for } \mu^a > 0 \\ \mu^x \Delta \left(\varepsilon_{t+1}^x - \varepsilon_{t+1}^m\right) + \Delta\varepsilon_{t+1}^m + \Delta y_{t+1} & \text{for } \mu^a < 0 \end{cases}, \text{ and:} \tag{A.6}$$

$$r_{F,t+1} = \begin{cases} \mu^a r_{t+1}^a - \mu^l r_{t+1}^l & \text{for } \mu^a > 0 \\ -\mu^a r_{t+1}^a + \mu^l r_{t+1}^l & \text{for } \mu^a < 0 \end{cases}. \tag{A.7}$$

B Appendix: Permanent – Transitory Decomposition

Suppose that the vector of 2 series $\mathbf{x}_t$ is cointegrated with 1 cointegrating vector $\boldsymbol{\beta} = [1, -1]'$. Then, it is possible to estimate the following VEqCM representation

$$\boldsymbol{\Gamma}(L)\,\boldsymbol{\Delta}\mathbf{x}_t = \boldsymbol{\alpha}\boldsymbol{\beta}'\mathbf{x}_{t-1} + \mathbf{u}_t. \tag{B.1}$$

For the sake of exposition, we derive the results using a model with no deterministic terms. The generalization for a model with deterministic terms is straightforward. We start by defining the trend of an $I(1)$ process $\mathbf{x}_t$ as

$$\mathbf{x}_t^P = \mathbf{x}_t + \Sigma_{i=1}^{\infty} \mathrm{E}_t\left(\boldsymbol{\Delta}\mathbf{x}_{t+i}\right), \tag{B.2}$$

i.e. the permanent value is given by today's value plus the sum of all forecastable changes as in the case of the BNSW decomposition. Johansen [1995] also explains that one can find a solution of (B.1), for the levels $\mathbf{x}_t$,as:[22]

$$\mathbf{x}_t = \mathbf{C}(1)\sum_{s=1}^{t}\mathbf{u}_s + \mathbf{C}^*(L)\,\mathbf{u}_t + \mathbf{A}, \tag{B.3}$$

where $\mathbf{A}$ depends on initial values, such that $\boldsymbol{\beta}'\mathbf{A} = \mathbf{0}$, and $\mathbf{C}_i^* = -\sum_{l=i+1}^{\infty}\mathbf{C}_l$.

The transitory part of $\mathbf{x}_t$ is a Vector Moving Average (VMA) of reduced-form innovations (Beveridge and Nelson [1981]):

$$\mathbf{x}_t - \mathbf{x}_t^P = \mathbf{C}^*(L)\,\mathbf{u}_t. \tag{B.4}$$

The idea is. as in the Gonzalo and Granger [1995] decomposition, to approximate the transitory part of the process by a linear combination of the equilibrium errors $\boldsymbol{\beta}'\mathbf{x}_t$. Pre-multiplying the VEqCM representation (B.1) by $\mathbf{C}(\mathbf{1})$ we have:

$$\mathbf{C}(1)\,\boldsymbol{\Gamma}(L)\,\boldsymbol{\Delta}\mathbf{x}_t = \mathbf{C}(1)\,\mathbf{u}_t, \tag{B.5}$$

since $\mathbf{C}(1)\,\boldsymbol{\alpha} = \mathbf{0}$. Integrating yields:

$$\mathbf{C}(1)\,\boldsymbol{\Gamma}(L)\,\mathbf{x}_t = \mathbf{C}(1)\sum\nolimits_{s=1}^{t}\mathbf{u}_s + \boldsymbol{\Upsilon}_1, \tag{B.6}$$

where $\boldsymbol{\Upsilon}_1$ depends on initial conditions. The above expression provides a representation of the permanent components in terms of the present and past levels of the process itself. Accordingly, the transitory component is given by:

$$\left\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(L)\right\}\mathbf{x}_t = \mathbf{C}^*(\mathbf{L})\mathbf{u}_t. \tag{B.7}$$

Let us now rewrite

$$\mathbf{C}(1)\,\boldsymbol{\Gamma}(L) = \mathbf{C}(1)\,\boldsymbol{\Gamma}(1) + \boldsymbol{\Delta}\mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L), \tag{B.8}$$

[22]The necessary and sufficient conditions are given in Theorem 4.2 in Johansen (1995) pp. 49.

where $\boldsymbol{\Gamma}_i^* = -\sum_{j>i} \boldsymbol{\Gamma}_j$. Substituting in (B.7), we have:

$$\mathbf{C}^*(L)\,\mathbf{u}_t = \{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t - \mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t. \tag{B.9}$$

This last expression (B.9) shows that the transitory component of the series is a linear combination of the levels of the process plus some moving average of past changes. Notice in particular that $\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t$ has rank $n - h = r$ and that $\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t$ is just a linear combination of the equilibrium error $\boldsymbol{\beta}'\mathbf{x}_t$. This can be seen from the following representation of the matrix $\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}$ which has been derived by Proietti [1997]:

$$\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1) = \underbrace{\left(\boldsymbol{\Gamma}(1) + \boldsymbol{\alpha}\boldsymbol{\beta}'\right)^{-1}\boldsymbol{\alpha}\left[\boldsymbol{\beta}'\left(\Gamma(1) + \alpha\beta'\right)^{-1}\boldsymbol{\alpha}\right]}_{\boldsymbol{\xi}}\boldsymbol{\beta}' = \boldsymbol{\xi}\boldsymbol{\beta}' . \tag{B.10}$$

The expression $\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t$ therefore captures the equilibrium-correction mechanism of the model and we can rewrite:

$$\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t = \boldsymbol{\xi}\boldsymbol{\beta}'\mathbf{x}_t. \tag{B.11}$$

For the second expression of the RHS of (B.9) we can write:

$$\mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t \equiv \boldsymbol{\beta}_\perp\underbrace{\left(\boldsymbol{\alpha}_\perp\boldsymbol{\Gamma}(1)\,\boldsymbol{\beta}_\perp\right)^{-1}\boldsymbol{\alpha}_\perp'\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t}_{\boldsymbol{\varphi}_t} = \boldsymbol{\beta}_\perp\boldsymbol{\varphi}_t , \tag{B.12}$$

where $\boldsymbol{\varphi}_t = \left(\boldsymbol{\alpha}_\perp\boldsymbol{\Gamma}(1)\,\boldsymbol{\beta}_\perp\right)^{-1}\boldsymbol{\alpha}_\perp'\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t$ is a "common factor".

Thus far, what we have shown is that equation (B.9) states that $\mathbf{C}^*(L)\,\mathbf{u}_t$ can be decomposed into one part (B.10) which captures the equilibrium-correction of the model (6), and another part, given by (B.12), which captures pure short-run dynamics.

Hence, we have that

$$\mathbf{x}_t = \mathbf{x}_t^P + \mathbf{x}_t^T = \mathbf{C}(1)\sum_{s=1}^{t}\mathbf{u}_s + \mathbf{C}^*(L)\,\boldsymbol{\varepsilon}_t.$$

But using (B.8) we have:

$$\mathbf{C}(1)\sum_{s=1}^{t}\mathbf{u}_s = \mathbf{C}(1)\,\boldsymbol{\Gamma}(L)\,\mathbf{x}_t = \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\,\mathbf{x}_t + \mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t, \tag{B.13}$$

$$\text{and} : \mathbf{C}^*(L)\,\mathbf{u}_t = \{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t - \mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t.$$

It then follows that

$$\mathbf{x}_t = \mathbf{x}_t^P + \mathbf{x}_t^T$$

with

$$\mathbf{x}_t = \underbrace{\mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\,\mathbf{x}_t + \mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t}_{\mathbf{x}_t^P} + \underbrace{\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t - \mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t}_{\mathbf{x}_t^T} ,$$

or

$$\mathbf{x}_t = \underbrace{\mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\,\mathbf{x}_t + \boldsymbol{\beta}_\perp\boldsymbol{\varphi}_t}_{\mathbf{x}_t^P} + \underbrace{\{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t - \boldsymbol{\beta}_\perp\boldsymbol{\varphi}_t}_{\mathbf{x}_t^T} ,$$

or

$$\mathbf{x}_t = \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\,\mathbf{x}_t + \{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t, \tag{B.14}$$

so that

$$\mathbf{x}_t^P = \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\,\mathbf{x}_t$$

$$\mathbf{x}_t^T = \{\mathbf{I}_n - \mathbf{C}(1)\,\boldsymbol{\Gamma}(1)\}\,\mathbf{x}_t$$

since the "common factors" $\boldsymbol{\beta}_\perp\boldsymbol{\varphi}_t \equiv \boldsymbol{\beta}_\perp\left(\boldsymbol{\alpha}_\perp\boldsymbol{\Gamma}(1)\,\boldsymbol{\beta}_\perp\right)^{-1}\boldsymbol{\alpha}_\perp'\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t \equiv \mathbf{C}(1)\,\boldsymbol{\Gamma}^*(L)\,\boldsymbol{\Delta}\mathbf{x}_t$ that are contained in both the permanent $\mathbf{x}_t^P$ and the transitory $\mathbf{x}_t^T$ part of the process, cancel out.

As a result, we can approximate the particular stationary components in our approach $\varepsilon_t^a - \varepsilon_t^l$, $\varepsilon_t^x - \varepsilon_t^m$ and $\varepsilon_t^x - \varepsilon_t^a$ by the cointegrating relations $\tilde{a}_t - \tilde{l}_t$, $\tilde{x}_t - \tilde{m}_t$ and $\tilde{x}_t - \tilde{a}_t$,[23] in deviations from their deterministic components that may include deterministic trends and dummies. To make this more clear assume that $\boldsymbol{\beta}'\mathbf{x}_t = \tilde{a}_t - \tilde{l}_t$. From (B.11) it follows that $\mathbf{x}_t^T = \boldsymbol{\xi}\left[\tilde{a}_t - \tilde{l}_t\right]$ i.e. $\varepsilon_t^a = \xi_1\left[\tilde{a}_t - \tilde{l}_t\right]$ and $\varepsilon_t^l = \xi_2\left[\tilde{a}_t - \tilde{l}_t\right]$. Hence $\varepsilon_t^a - \varepsilon_t^l = (\xi_1 - \xi_2)\left[\tilde{a}_t - \tilde{l}_t\right]$ hence proportional to the stationary (around deterministic trends) relation $\tilde{a}_t - \tilde{l}_t$.

[23]Here tilde denote log deviations from GDP, i.e. $\tilde{a}_t = a_t - y_t$, and so forth.

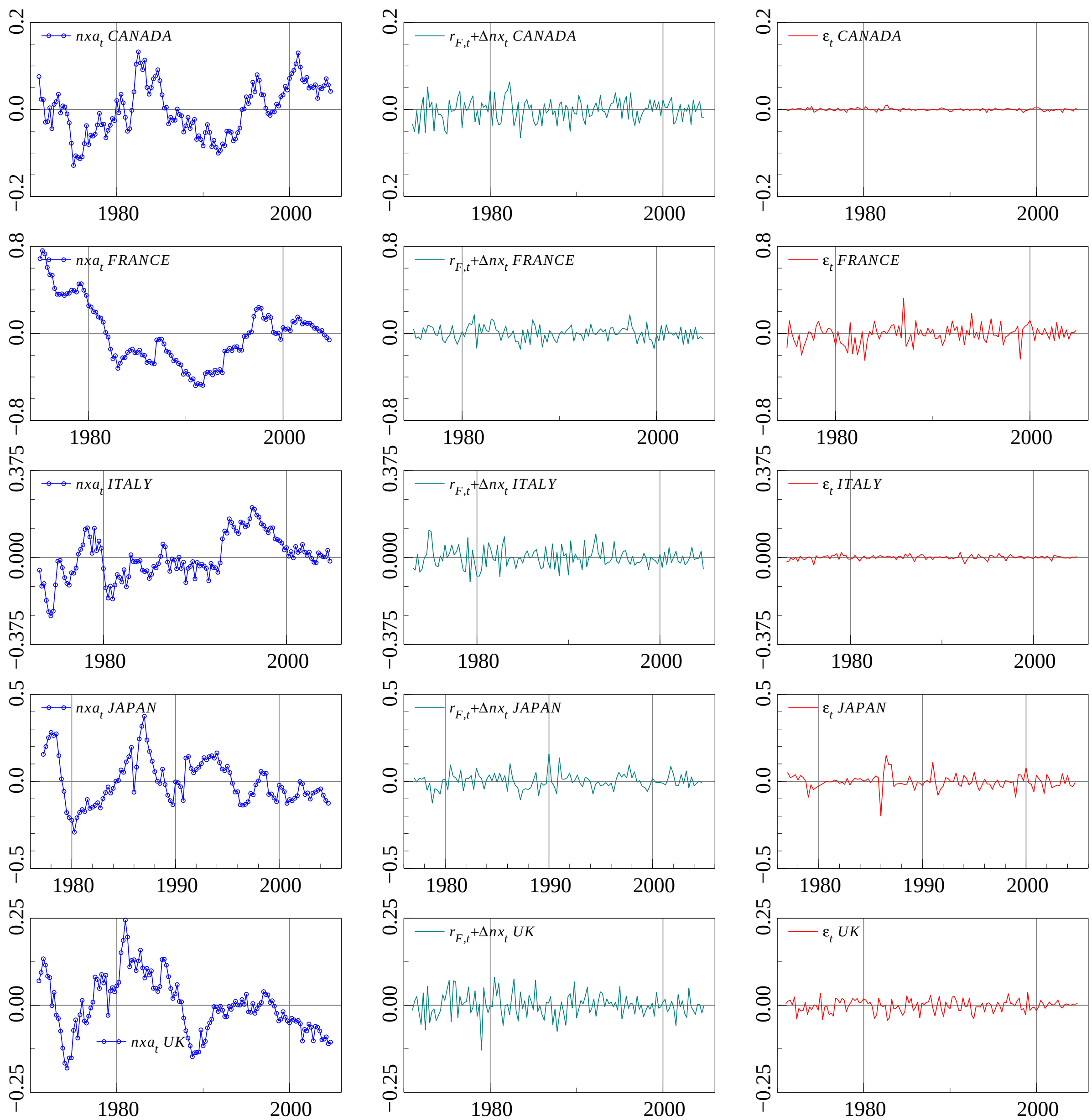

Figure 1:nxa_t, the flow $r_t + \Delta nx_t$ and the approximation error ϵ_t from equation (4).

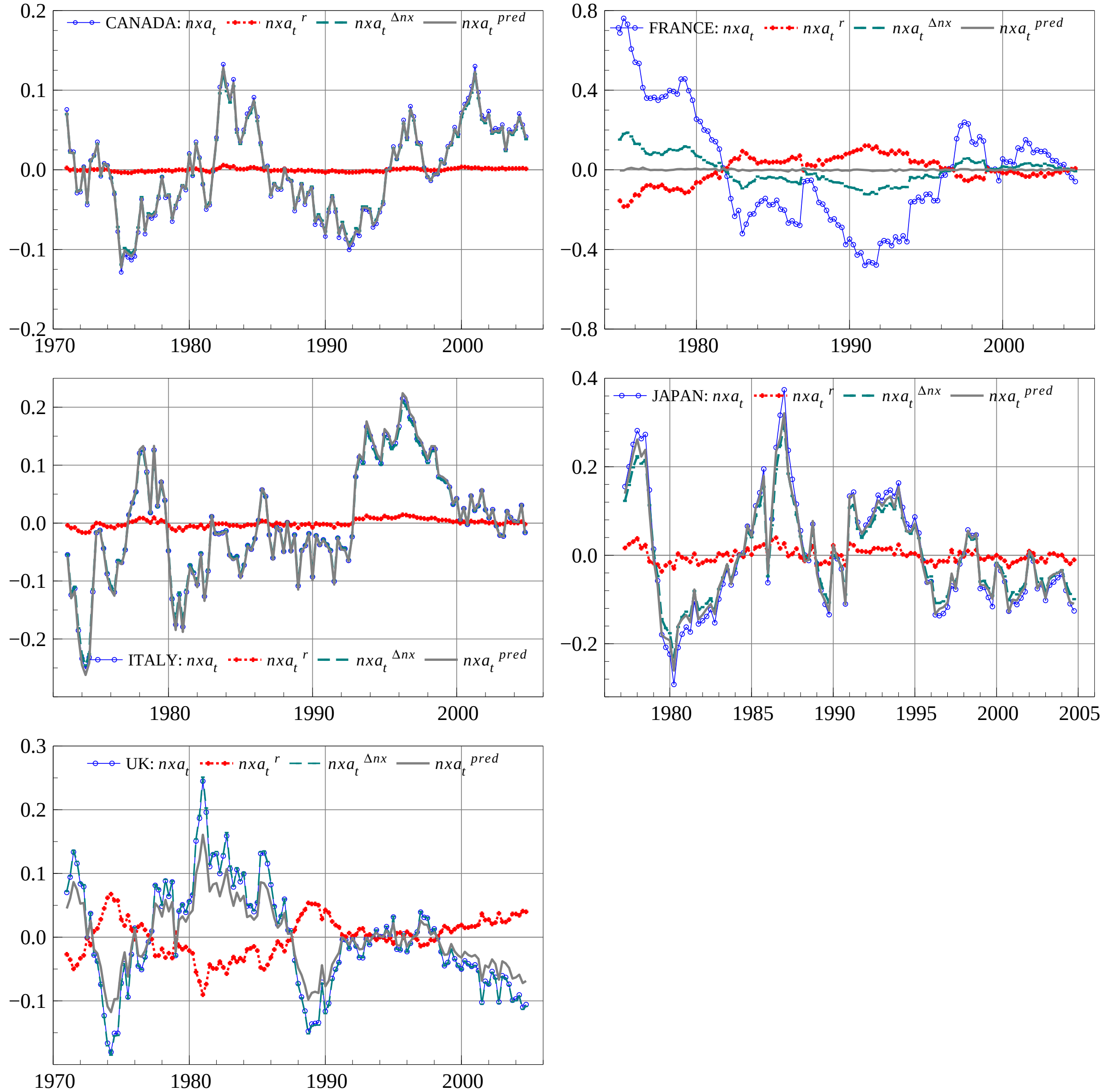

Figure 2: Decomposition of nxa_t, into valuation and trade components.

Notes for Table 1: The long-run relations are estimated by the DOLS method of Stock and Watson [1993]. The last column in each row reports a Wold test of whether the theoretical restriction of a cointegrating vector $\boldsymbol{\beta}' = [1, -1]$ holds in the sample. The samples run: for Canada 1971:Q1–2004:Q4; France: 1975:Q1–2004:Q4; Germany: 1971:Q1–2004:Q4; Italy: 1973:Q1–2004:Q4; Japan: 1977:Q1–2004:Q4; and for the UK: 1971:Q1–2004:Q4. For Canada $DS_{1989:Q1}$ denotes a level-shift dummy that takes the value 1 from the first quarter of 1989 until the end of the sample. For Germany $DT_{1985:Q1}$ denotes a trend-break dummy that takes the value t from the first quarter of 1985 until the end of the sample; $DT_{1991:Q1}$ denotes a trend-break dummy that takes the value t from the first quarter of 1991 until the end of the sample. For Italy $DS_{1988:Q1}$ denotes a level-shift dummy that takes the value 1 from the first quarter of 1988 until the end of the sample. For Japan, $DT_{1990:Q1}$ denotes a trend-break dummy that takes the value t from the first quarter of 1990 until the end of the sample. Tilde over variables denote log deviations from GDP: $\tilde{a}_t = a_t - y_t$, $\tilde{l}_t = l_t - y_t$, $\tilde{x}_t = x_t - y_t$, and $\tilde{m}_t = m_t - y_t$.

† Joint tests of the restrictions using FIML gave a test statistic of 6.964 [0.138] which is distributed as a $\chi^2(4)$. The restricted estimates using Johansen's FIML were $\tilde{a}_t - \tilde{l}_t$, $\tilde{x}_t - \tilde{m}_t - 0.0010t$ and $\tilde{x}_t - \tilde{a}_t + 0.0162t$.

‡ Joint tests of the restrictions using FIML gave a test statistic of 8.277 [0.082] which is distributed as a $\chi^2(4)$. The restricted estimates using Johansen's FIML were $\tilde{a}_t - \tilde{l}_t + 0.0010t$, $\tilde{x}_t - \tilde{m}_t$ and $\tilde{x}_t - \tilde{a}_t + 0.0099t$.

Table 1: Stationary Relations

Panel A: Canada	
$\underset{[t-stat]}{\tilde{a}_t} = \underset{[-22.363]}{-0.889} + \underset{[10.014]}{0.0056t} + \tilde{l}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.059]}{3.553}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[3.802]}{0.056} + \tilde{m}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.386]}{0.751}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-154.176]}{-6.990} \underset{[-6.802]}{-0.0050\,t} - \underset{[-2.173]}{0.1058 DS_{1989:Q1}} + \tilde{a}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{15.934}$
Panel B: France†	
$\underset{[t-stat]}{\tilde{a}_t} = \underset{[0.919]}{-0.025} + \tilde{l}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.160]}{2.007}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-2.483]}{-0.059} \underset{[3.085]}{+0.0008\,t} + \tilde{m}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{24.291}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-249.900]}{-6.706} \underset{[-36.831]}{-0.015\,t} + \tilde{a}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{28.961}$
Panel C: Germany	
$\underset{[t-stat]}{\tilde{a}_t} = \underset{[7.890]}{0.314} \underset{[-2.277]}{-0.0021\,t} + \underset{[2.916]}{0.0022 DT_{1985:Q1}} - \underset{[-4.069]}{0.0022 DT_{1991:Q1}} + \tilde{l}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.010]}{7.486}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[5.770]}{0.125} \underset{[-2.327]}{-0.0016\,t} + \underset{[2.594]}{0.0018 DT_{1985:Q1}} - \underset{[-1.419]}{0.0007 DT_{1991:Q1}} + \tilde{m}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.001]}{10.492}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-194.026]}{-6.918} \underset{[-6.226]}{-0.005\,t} - \underset{[-7.201]}{0.0041 DT_{1985:Q1}} - \underset{[-5.644]}{0.0022 DT_{1991:Q1}} + \tilde{a}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.010]}{7.554}$
Panel D: Italy	
$\underset{[t-stat]}{\tilde{a}_t} = \underset{[-5.201]}{-0.144} + \tilde{l}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.109]}{2.568}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[1.478]}{0.028} + \tilde{m}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.043]}{4.104}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-92.892]}{-6.340} \underset{[-10.392]}{-0.013\,t} - \underset{[-1.623]}{0.147\, DS_{1988:Q1}} + \tilde{a}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{117.660}$
Panel E: Japan	
$\underset{[t-stat]}{\tilde{a}_t} = \underset{[4.640]}{0.141} + \underset{[7.839]}{0.0038 DT_{1990:Q1}} + \tilde{l}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.005]}{8.563}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-1.596]}{-0.079} \underset{[4.750]}{+0.0043\,t} \underset{[-3.682]}{-0.0027\, DT_{1990:Q1}} + \tilde{m}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{70.866}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-24.002]}{-5.867} \underset{[-7.675]}{-0.037\,t} + \underset{[3.707]}{0.0139 DT_{1990:Q1}} + \tilde{a}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{130.944}$
Panel F: UK‡	
$\underset{[t-stat]}{\tilde{a}_t} = \underset{[3.351]}{0.084} - \underset{[-3.429]}{0.0008t} + \tilde{l}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.332]}{0.942}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-1.859]}{-0.031} + \tilde{m}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.116]}{2.469}$
$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-103.333]}{-7.895} \underset{[-16.249]}{-0.0112\,t} + \tilde{a}_t$	$\underset{[p-val.]}{W(1)} = \underset{[0.000]}{36.129}$

Table 2: Implied Weights used for nxa_t

Canada	France	Germany	Italy	Japan	UK
A: Assets' Weight $\mu^a = \left(1 - \exp\left[-\left(\overline{\tilde{a}_t - \tilde{l}_t}\right)\right]\right)^{-1}$					
-0.680	37.748	3.748	-6.219	6.442	11.678
B: Liabilities' Weight $\mu^l = \mu^a - 1$					
-1.680	36.748	2.748	-7.219	5.442	10.678
C: Exports' Weight $\mu^x = \left(1 - \exp\left[-\left(\overline{\tilde{x}_t - \tilde{m}_t}\right)\right]\right)^{-1}$					
18.633	-15.258	8.218	37.715	-12.556	-28.998
D: Imports' Weight $\mu^m = \mu^x - 1$					
17.633	-16.258	7.218	36.715	-13.556	-29.998
$\exp\left(\overline{\tilde{x}_t - \tilde{a}_t}\right)$					
0.0009	0.0012	0.0010	0.0018	0.0034	0.0004
E: Implied Discount Factor $\rho = 1 + (\mu^a/\mu^x) \times \exp\left(\overline{\tilde{x}_t - \tilde{a}_t}\right)$					
0.999	0.997	1.0005	0.999	0.998	0.999

Notes for Table 2: The table reports the weights of Assets, Liabilities, Exports and Imports used in constructing the variable nxa_t for the G6 countries. The weights are calculated using sample average ratios of the stationary relations. The samples run: for Canada 1971:Q1–2004:Q4; France: 1975:Q1–2004:Q4; Germany: 1971:Q1–2004:Q4; Italy: 1973:Q1–2004:Q4; Japan: 1977:Q1–2004:Q4; and for the UK: 1971:Q1–2004:Q4. Tilde over variables denote log deviations from GDP: $\tilde{a}_t = a_t - y_t$, $\tilde{l}_t = l_t - y_t$, $\tilde{x}_t = x_t - y_t$, and $\tilde{m}_t = m_t - y_t$.

Table 3: Benchmarking Our Data: The US

Panel A: Estimated Equilibrium Relations

$$\underset{[t-stat]}{\tilde{a}_t} = \underset{[11.106]}{0.268} \underset{[-18.839]}{-0.0043}\, t + \tilde{l}_t \qquad \underset{[p-val.]}{W(1)} = \underset{[0.037]}{4.344}$$

$$\underset{[t-stat]}{\tilde{x}_t} = \underset{[0.032]}{0.0015} \underset{[-3.869]}{-0.0021}\, t + \tilde{m}_t \qquad \underset{[p-val.]}{W(1)} = \underset{[0.154]}{2.034}$$

$$\underset{[t-stat]}{\tilde{x}_t} = \underset{[-120.945]}{-7.368} \underset{[-20.430]}{-0.0115}\, t + \tilde{a}_t \qquad \underset{[p-val.]}{W(1)} = \underset{[0.004]}{8.435}$$

Panel B.1: Implied Weights used in nxa_t

μ^a	μ^l	μ^x	μ^m	ρ
3.80	2.80	-29.19	-30.19	0.99

Panel B.2: Gourinchas and Rey's [2006] Weights used in nxa_t

8.49	7.49	-9.98	-10.98	0.95

Panel C: Properties of nxa_t

$W(3)$	β_{r}	$\beta_{\Delta\mathrm{nx}}$	$\beta = \beta_{\mathrm{r}} + \beta_{\Delta\mathrm{nx}}$
Panel C.1: Gourinchas and Rey's [2006] Weights & HP-Filtered Data			
2.916 [0.405]	0.171	0.631	0.802
Panel C.2: Gourinchas and Rey's [2006] Weights & Stationary Relations			
0.965 [0.809]	0.309	0.513	0.822
Panel C.3: Implied Weights & Stationary Relations			
6.784 [0.079]	0.133	0.857	0.990

Notes for Table 3: Panel A reports the estimated long-run relationships for the US (under the assumption that they exist) that are employed in Panel B to back out the implied weights in nxa_t. Panel C of the table reports the decomposition of the variability of nxa_t due to net foreign returns and net export growth. $W(\nu)$ denotes a Wald-type test of the present value restriction with p-value in brackets. In panel C.1. we employ the GR parameters and HP filtered data (as in Gourinchas and Rey [2006]); in Panel C.2. we employ the GR parameters and the stationary relations from Panel A; in Panel C.3 we employ the implied parameters from Panel B and the stationary relations from Panel A. Tilde over variables denote log deviations from GDP: $\tilde{a}_t = a_t - y_t$, $\tilde{l}_t = l_t - y_t$, $\tilde{x}_t = x_t - y_t$, and $\tilde{m}_t = m_t - y_t$. The sample runs from 1973:Q1 to 2004:Q4.

Table 4: Present Value Test for Approximation

lag length $k =$	1	2
$\chi^2(\nu)$	$\nu = 3$	$\nu = 6$
Canada	5.401 [0.145]	7.688 [0.262]
France	4.667 [0.198]	**19.590** [0.003]
Italy	3.744 [0.291]	6.900 [0.330]
Japan	3.643 [0.303]	8.283 [0.218]
UK	2.086 [0.555]	4.196 [0.650]

Notes for Table 4: The Table reports a present value test to examine the accuracy of the approximation. Essentially, the test employed is the one-step ahead test $\mathrm{E}_t(\epsilon_{t+1}) = 0$ where $\epsilon_{t+1} = nxa_{t+1} - nxa_t/\rho - (r_{F,t+1} + \Delta nx_{t+1})$. The test reported is a Wald-type test with robust standard errors, and the numbers in square brackets are p-values. See also notes for Table 2.

Table 5: Unconditional Variance Decomposition of nxa_t

lag length $k =$	1	2
Panel A: Canada		
$\frac{\text{Cov}(nxa_t^{\text{r}}, nxa_t)}{\text{Var}(nxa_t)} = \beta_{\text{r}}$	0.0314	0.0193
$\frac{\text{Cov}\left(nxa_t^{\Delta\text{nx}}, nxa_t\right)}{\text{Var}(nxa_t)} = \beta_{\Delta\text{nx}}$	0.9240	0.9365
	0.9554	0.9558
Panel B: France		
$\frac{\text{Cov}(nxa_t^{\text{r}}, nxa_t)}{\text{Var}(nxa_t)} = \beta_{\text{r}}$	−0.2400	−0.3314
$\frac{\text{Cov}\left(nxa_t^{\Delta\text{nx}}, nxa_t\right)}{\text{Var}(nxa_t)} = \beta_{\Delta\text{nx}}$	0.2455	0.2763
	0.0055	−0.0551
Panel C: Italy		
$\frac{\text{Cov}(nxa_t^{\text{r}}, nxa_t)}{\text{Var}(nxa_t)} = \beta_{\text{r}}$	0.0684	0.0281
$\frac{\text{Cov}\left(nxa_t^{\Delta\text{nx}}, nxa_t\right)}{\text{Var}(nxa_t)} = \beta_{\Delta\text{nx}}$	0.9768	0.9930
	1.0452	1.0211
Panel D: Japan		
$\frac{\text{Cov}(nxa_t^{\text{r}}, nxa_t)}{\text{Var}(nxa_t)} = \beta_{\text{r}}$	0.0942	0.0682
$\frac{\text{Cov}\left(nxa_t^{\Delta\text{nx}}, nxa_t\right)}{\text{Var}(nxa_t)} = \beta_{\Delta\text{nx}}$	0.7899	0.7332
	0.8841	0.8014
Panel E: UK		
$\frac{\text{Cov}(nxa_t^{\text{r}}, nxa_t)}{\text{Var}(nxa_t)} = \beta_{\text{r}}$	−0.3743	−0.3336
$\frac{\text{Cov}\left(nxa_t^{\Delta\text{nx}}, nxa_t\right)}{\text{Var}(nxa_t)} = \beta_{\Delta\text{nx}}$	1.0253	0.9729
	0.6510	0.6393

Notes for Table 5: The table reports the decomposition of the unconditional variance of nxa into a ‘valuation’ and a ‘trade’ component employing a VAR(1) using the parametric restrictions implied by equation (14) (see also (15)). The weights and the discount factors are as in Table 2. The samples run: for Canada 1971:Q1–2004:Q4; France: 1975:Q1–2004:Q4; Germany: 1971:Q1–2004:Q4; Italy: 1973:Q1–2004:Q4; Japan: 1977:Q1–2004:Q4; and for the UK: 1971:Q1–2004:Q4.

Table 6: Long Horizon Regressions

	Forecast Horizon (Quarters)							
	1	2	3	4	8	12	16	20
Panel A: Canada								
A.1: Real Total Net Portfolio Returns $r_{F,t,H}$								
nxa_t	-0.004	-0.004	-0.003	-0.002	-0.00002	-0.0003	0.0005	-0.0001
	$[-0.979]$	$[-0.851]$	$[-0.766]$	$[-0.562]$	$[-0.009]$	$[-0.123]$	$[0.172]$	$[-0.042]$
$\bar{R}^2$	0.002	0.004	0.005	-0.0003	-0.008	-0.007	-0.006	0.008
A.2: Trade-Weighted Rate of Depreciation $\Delta s_{t,H}$								
nxa_t	-0.048	-0.044	-0.044	-0.045	-0.048	-0.054	$\mathbf{-0.054}$	$\mathbf{-0.052}$
	$[-1.733]$	$[-1.520]$	$[-1.469]$	$[-1.450]$	$[-1.490]$	$[-1.700]$	$[-1.958]$	$[-2.566]$
$\bar{R}^2$	0.013	0.019	0.028	0.038	0.072	0.137	0.199	0.281
A.3: USD Rate of Depreciation $\Delta s^{usd}_{t,H}$								
nxa_t	-0.041	-0.036	-0.040	-0.044	-0.050	$\mathbf{-0.067}$	$\mathbf{-0.070}$	$\mathbf{-0.067}$
	$[-1.102]$	$[-1.156]$	$[-1.284]$	$[-1.326]$	$[-1.425]$	$[-2.027]$	$[-2.583]$	$[-3.426]$
$\bar{R}^2$	0.002	0.006	0.019	0.029	0.067	0.171	0.254	0.328
A.4: Net Export Growth $\Delta nx_{t,H}$								
nxa_t	$\mathbf{-0.102}$	$\mathbf{-0.096}$	$\mathbf{-0.096}$	$\mathbf{-0.097}$	$\mathbf{-0.068}$	$\mathbf{-0.064}$	$\mathbf{-0.059}$	$\mathbf{-0.057}$
	$[-3.083]$	$[-3.766]$	$[-4.383]$	$[-4.970]$	$[-5.446]$	$[-5.775]$	$[-5.635]$	$[-6.433]$
$\bar{R}^2$	0.051	0.099	0.145	0.195	0.263	0.374	0.437	0.539
Panel B: France								
B.1: Real Total Net Portfolio Returns $r_{F,t,H}$								
nxa_t	0.013	0.013	0.014	0.016	0.017	0.0150	0.0151	0.014
	$[0.763]$	$[0.789]$	$[0.878]$	$[1.025]$	$[1.365]$	$[1.136]$	$[1.092]$	$[1.114]$
$\bar{R}^2$	-0.005	-0.0006	0.003	0.012	0.037	0.045	0.073	0.085
B.2: Trade-Weighted Rate of Depreciation $\Delta s_{t,H}$								
nxa_t	-0.0008	-0.0027	-0.005	-0.0066	$\mathbf{-0.0101}$	$\mathbf{-0.011}$	$\mathbf{-0.011}$	$\mathbf{-0.0108}$
	$[0.116]$	$[0.424]$	$[0.909]$	$[1.348]$	$[3.058]$	$[3.096]$	$[3.034]$	$[3.285]$
$\bar{R}^2$	-0.008	-0.005	0.008	0.027	0.141	0.235	0.325	0.389
B.3: USD Rate of Depreciation $\Delta s^{usd}_{t,H}$								
nxa_t	0.0116	0.0137	0.0167	0.0171	0.0188	0.0207	0.0228	0.0226
	$[0.628]$	$[0.947]$	$[1.305]$	$[1.319]$	$[1.479]$	$[1.558]$	$[1.688]$	$[1.920]$
$\bar{R}^2$	-0.005	0.0002	0.011	0.016	0.040	0.074	0.133	0.183
B.4: Net Export Growth $\Delta nx_{t,H}$								
nxa_t	-0.0126	-0.0151	$\mathbf{-0.0167}$	$\mathbf{-0.0172}$	$\mathbf{-0.0123}$	$\mathbf{-0.0089}$	$\mathbf{-0.0081}$	$\mathbf{-0.0076}$
	$[-1.184]$	$[-1.618]$	$[-2.055]$	$[-2.344]$	$[-2.286]$	$[-2.250]$	$[-3.489]$	$[-3.518]$
$\bar{R}^2$	0.017	0.053	0.104	0.139	0.168	0.173	0.238	0.318

Table 6: Long Horizon Regressions (Cont'd)

Forecast Horizon (Quarters)

	1	2	3	4	8	12	16	20
				Panel C: Italy				
				C.1: Real Total Net Portfolio Returns $r_{F,t,H}$				
nxa_t	*−0.0101*	*−0.0078*	−0.0063	−0.0067	−0.0074	*−0.0074*	−0.0048	−0.0027
	[−1.677]	[−1.624]	[−1.356]	[−1.399]	[−1.519]	[−1.803]	[−1.302]	[−0.768]
$\bar{R}^2$	0.012	0.016	0.014	0.023	0.063	0.087	0.051	0.016
				C.2: Trade-Weighted Rate of Depreciation $\Delta s_{t,H}$				
nxa_t	**−0.0703**	**−0.061**	**−0.0517**	**−0.0465**	**−0.0472**	**−0.0499**	**−0.0437**	**−0.0398**
	[−3.043]	[−3.062]	[−2.653]	[−2.457]	[−3.409]	[−3.545]	[−3.610]	[−3.473]
$\bar{R}^2$	0.061	0.071	0.074	0.075	0.143	0.211	0.217	0.243
				C.3: USD Rate of Depreciation $\Delta s^{usd}_{t,H}$				
nxa_t	**−0.0913**	−0.0718	−0.0558	−0.0544	−0.0455	−0.0299	−0.0139	−0.0043
	[−2.045]	[−1.637]	[−1.286]	[−1.300]	[−1.164]	[−0.781]	[−0.489]	[−0.232]
$\bar{R}^2$	0.015	0.017	0.014	0.018	0.022	0.010	-0.003	-0.008
				C.4: Net Export Growth $\Delta nx_{t,H}$				
nxa_t	**−0.1129**	**−0.1044**	**−0.1049**	**−0.1031**	**−0.0812**	**−0.0653**	**−0.0566**	**−0.0482**
	[−2.859]	[−2.820]	[−3.277]	[−3.973]	[−4.645]	[−5.483]	[−8.7901]	[−11.487]
$\bar{R}^2$	0.057	0.113	0.175	0.234	0.427	0.499	0.566	0.592
				Panel D: Japan				
				D.1: Real Total Net Portfolio Returns $r_{F,t,H}$				
nxa_t	**−0.037**	**−0.0287**	**−0.0266**	**−0.0225**	−0.0115	−0.0002	0.0068	0.0095
	[−3.153]	[−2.633]	[−2.373]	[−2.052]	[−1.384]	[−0.045]	[1.305]	[1.782]
$\bar{R}^2$	0.064	0.066	0.079	0.069	0.030	-0.010	0.022	0.083
				D.2: Trade-Weighted Rate of Depreciation $\Delta s_{t,H}$				
nxa_t	**−0.0984**	**−0.0827**	**−0.0721**	*−0.0589*	−0.0277	0.0015	0.0172	0.0187
	[−2.924]	[−2.363]	[−2.084]	[−1.851]	[−1.212]	[0.111]	[1.381]	[1.399]
$\bar{R}^2$	0.067	0.073	0.078	0.063	0.026	-0.009	0.024	0.057
				D.3: USD Rate of Depreciation $\Delta s^{usd}_{t,H}$				
nxa_t	**−0.1391**	**−0.1173**	**−0.1092**	**−0.0947**	**−0.0546**	−0.0133	0.0082	0.0145
	[−3.063]	[−2.901]	[−2.971]	[−2.793]	[−2.285]	[−0.903]	[0.699]	[1.230]
$\bar{R}^2$	0.073	0.096	0.134	0.126	0.084	-0.0002	-0.004	0.016
				D.4: Net Export Growth $\Delta nx_{t,H}$				
nxa_t	**−0.1035**	**−0.1046**	**−0.1078**	**−0.110**	**−0.1072**	**−0.0849**	**−0.0648**	**−0.0458**
	[−3.166]	[−3.594]	[−3.760]	[−4.157]	[−6.756]	[−10.754]	[−8.529]	[−5.469]
$\bar{R}^2$	0.092	0.164	0.225	0.291	0.527	0.604	0.639	0.577

Table 6: Long Horizon Regressions (Cont'd)

Forecast Horizon (Quarters)

	1	2	3	4	8	12	16	20
Panel E: UK								
E.1: Real Total Net Portfolio Returns $r_{F,t,H}$								
nxa_t	0.0301	0.0292	**0.0288**	**0.0264**	0.0213	0.0194	0.0187	0.0159
	[1.647]	[1.804]	[2.025]	[1.994]	[1.308]	[1.446]	[1.744]	[1.729]
$\bar{R}^2$	0.017	0.031	0.048	0.053	0.073	0.091	0.117	0.134
E.2: Trade-Weighted Rate of Depreciation $\Delta s_{t,H}$								
nxa_t	-0.0008	0.0075	0.0082	0.0081	-0.0013	-0.0058	0.0049	0.0112
	[-0.024]	[0.239]	[0.298]	[0.315]	[-0.047]	[-0.226]	[0.242]	[0.703]
$\bar{R}^2$	-0.007	-0.007	-0.006	-0.006	-0.007	-0.006	-0.006	0.004
E.3: USD Rate of Depreciation $\Delta s^{usd}_{t,H}$								
nxa_t	0.0435	0.0426	0.0407	0.0335	0.0279	0.0286	0.0365	0.0244
	[0.723]	[0.752]	[0.766]	[0.623]	[0.451]	[0.532]	[0.904]	[0.815]
$\bar{R}^2$	-0.002	0.001	0.005	0.003	0.006	0.012	0.040	0.026
E.4: Net Export Growth $\Delta nx_{t,H}$								
nxa_t	**-0.092**	**-0.0866**	**-0.0853**	**-0.0891**	**-0.0826**	**-0.0719**	**-0.0625**	**-0.0525**
	[-2.448]	[-2.973]	[-3.912]	[-4.877]	[-4.962]	[-4.727]	[-6.087]	[-8.533]
$\bar{R}^2$	0.046	0.095	0.146	0.209	0.387	0.487	0.577	0.606

Notes for Table 6: The table reports results from long-horizon regressions of the real total portfolio returns, trade-weighted depreciation rate, depreciation rate vis-à-vis the US dollar, and net export growth. The dependent variable in panel 1 is the H - period (average) net portfolio returns $\left(\sum_{h=1}^{H} r_{F,t+h}\right)/H$, and in panels 2 and 3 the H - period (average) nominal exchange rate depreciation $\left(\sum_{h=1}^{H} \Delta s_{t+h}\right)/H$ and in panel 4 the H - period (average) net export growth $\left(\sum_{h=1}^{H} \Delta nx_{t+h}\right)/H$. The regressor is one-period lagged values of nxa_t. For each regression, the table reports OLS estimates, Newey–West corrected t - statistics in square brackets and adjusted R^2 statistics. Significant coefficients at the five percent level are highlighted in bold. The samples span various periods from 1971:Q1 to 2003:Q4. Specifically, Canada 1971:Q1–2004:Q4; France: 1975:Q1–2004:Q4; Germany: 1971:Q1–2004:Q4; Italy: 1973:Q1–2004:Q4; Japan: 1977:Q1–2004:Q4; and for the UK: 1971:Q1–2004:Q4.

Table 7: Unconditional Variance Decomposition by Horizon

Variance Component	Quarters: $1-4$		Quarters: $5-8$		Quarters: $9-$		Total (Variable)	
Panel A: Canada								
r_F $(\times 10^3)$	-0.0062 [-0.051]	-0.19%	-0.0689 [-0.664]	-2.12%			-0.0751 [-0.345]	-2.31%
Δnx $(\times 10^3)$	$\mathbf{1.3129}$ [4.094]	40.42%	$\mathbf{0.5388}$ [2.276]	16.59%			$\mathbf{1.8517}$ [4.825]	57.00%
nxa_{t+H} $(\times 10^3)$					$\mathbf{1.4718}$ [3.743]	45.31%	$\mathbf{1.4718}$ [3.743]	45.31%
Total (Horizon) $(\times 10^3)$	$\mathbf{1.3067}$ [3.496]	40.23%	$\mathbf{0.4698}$ [1.954]	14.46%	$\mathbf{1.4718}$ [3.743]	45.31%	$\mathbf{3.2484}$ [7.531]	100.00%
Panel B: France								
r_F $(\times 10^3)$	-6.3283 [-1.229]	-13.88%	-4.5338 [-0.715]	-9.94%			-10.8621 [-1.089]	-23.83%
Δnxa $(\times 10^3)$	$\mathbf{6.0708}$ [2.247]	13.32%	2.1583 [1.138]	4.73%			$\mathbf{8.2292}$ [2.578]	18.05%
nxa_{t+H} $(\times 10^3)$					$\mathbf{48.2229}$ [2.547]	105.78%	$\mathbf{48.2229}$ [2.547]	105.78%
Total (Horizon) $(\times 10^3)$	-0.2574 [-0.061]	-0.56%	-2.3755 [-0.353]	-5.21%	$\mathbf{48.2229}$ [2.547]	105.78%	$\mathbf{45.5900}$ [2.565]	100.00%
Panel C: Italy								
r_F $(\times 10^3)$	0.2539 [0.850]	2.57%	0.3155 [1.002]	3.19%			0.5693 [0.949]	5.76%
Δnx $(\times 10^3)$	$\mathbf{3.9132}$ [2.813]	39.58%	$\mathbf{2.2687}$ [3.258]	22.95%			$\mathbf{6.1820}$ [3.306]	62.52%
nxa_{t+H} $(\times 10^3)$					3.1359 [1.448]	31.72%	3.1359 [1.448]	31.72%
Total (Horizon) $(\times 10^3)$	$\mathbf{4.1671}$ [2.811]	42.15%	$\mathbf{2.5842}$ [2.936]	26.14%	3.1359 [1.448]	31.72%	$\mathbf{9.8873}$ [3.232]	100.00%
Panel D: Japan								
r_F $(\times 10^3)$	$\mathbf{1.6398}$ [2.511]	10.42%	-0.1344 [-0.231]	-0.85%			1.5054 [1.470]	9.57%
Δnx $(\times 10^3)$	$\mathbf{7.9038}$ [2.606]	50.23%	$\mathbf{7.2661}$ [3.457]	46.18%			$\mathbf{15.1699}$ [3.108]	96.40%
nxa_{t+H} $(\times 10^3)$					-0.9395 [-0.384]	-5.97%	-0.9395 [-0.384]	-5.97%
Total (Horizon) $(\times 10^3)$	$\mathbf{9.5437}$ [3.456]	60.65%	$\mathbf{7.1317}$ [4.362]	45.32%	-0.9395 [-0.384]	-5.97%	$\mathbf{15.7359}$ [5.265]	100.00%
Panel E: UK								
r_F $(\times 10^3)$	-0.7085 [-1.303]	-13.40%	-0.4313 [-0.743]	-8.15%			-1.1398 [-1.063]	-21.55%
Δnx $(\times 10^3)$	$\mathbf{2.4934}$ [3.234]	47.14%	$\mathbf{1.8635}$ [2.303]	35.23%			$\mathbf{4.3569}$ [2.860]	82.38%
nxa_{t+H} $(\times 10^3)$					2.0717 [1.391]	39.17%	2.0717 [1.391]	39.17%
Total (Horizon) $(\times 10^3)$	$\mathbf{1.7849}$ [2.136]	33.75%	1.4322 [1.292]	27.08%	2.0717 [1.391]	39.17%	$\mathbf{5.2889}$ [3.566]	100.00%

Notes for Table 7: The table decomposes the variance of nxa_t into three components. The components are due to (a) the predictability of net portfolio returns, (b) the predictability of net export growth, and (c) autocorrelation of nxa (a residual component). Each of the first two components are further decomposed by horizon into two components: Predictability corresponding to a period 1-4, and 4-8 quarters ahead. The third component is a residual term that captures predictability at horizon of 9 quarters (2 years) and beyond.

Table presents the variance component estimate (multiplied by 1000) and the corresponding t-statistic (in brackets). The variance decomposition is estimated using GMM. The Newey-West t-statistics are calculated employing a Bartlett window with 24 lags. The percentage figure normalizes the variance component by the variance of the nxa.

Table 8: Long Horizon Regressions

	Forecast Horizon (Quarters)							
	1	2	3	4	8	12	16	20
	Real Net Portfolio Returns $r^a_{t,H} - r^l_{t,H}$							
	Panel A:Canada							
nxa_t	$-\mathbf{0.1094}$	$-\mathbf{0.1008}$	$-\mathbf{0.0952}$	$-\mathbf{0.0844}$	-0.0607	-0.0547	-0.0390	-0.0368
	$[-2.216]$	$[-2.462]$	$[-2.467]$	$[-2.199]$	$[-1.432]$	$[-1.239]$	$[-1.090]$	$[-1.330]$
$\bar{R}^2$	0.026	0.045	0.065	0.062	0.061	0.083	0.055	0.061
	Panel B: France							
nxa_t	0.0061	0.0058	0.0062	0.0069	0.0074	0.0065	0.0067	0.0063
	[0.840]	[0.876]	[0.964]	[1.107]	[1.457]	[1.228]	[1.180]	[1.207]
$\bar{R}^2$	-0.004	0.001	0.006	0.015	0.043	0.055	0.087	0.101
	Panel C: Italy							
nxa_t	$-\mathbf{0.0768}$	$-\mathbf{0.0622}$	$-\mathbf{0.0536}$	$-\mathbf{0.0551}$	$-\mathbf{0.0577}$	$-\mathbf{0.0572}$	$-\mathbf{0.0426}$	-0.0309
	$[-2.219]$	$[-2.288]$	$[-2.063]$	$[-2.120]$	$[-2.201]$	$[-2.561]$	$[-2.104]$	$[-1.563]$
$\bar{R}^2$	0.025	0.035	0.038	0.053	0.116	0.157	0.126	0.092
	Panel D: Japan							
nxa_t	$-\mathbf{0.0763}$	$-\mathbf{0.0582}$	$-\mathbf{0.0539}$	$-\mathbf{0.0454}$	-0.0230	0.0009	0.0158	0.0212
	$[-3.097]$	$[-2.579]$	$[-2.288]$	$[-1.963]$	$[-1.268]$	[0.092]	[1.369]	[1.762]
$\bar{R}^2$	0.065	0.062	0.074	0.063	0.025	-0.010	0.027	0.087
	Panel E: UK							
nxa_t	0.0707	0.0680	0.0673	0.0614	0.0497	0.0461	0.0443	0.0376
	[1.537]	[1.681]	[1.899]	[1.865]	[1.214]	[1.382]	[1.719]	[1.734]
$\bar{R}^2$	0.014	0.027	0.042	0.046	0.064	0.083	0.106	0.121

Notes for Table 8: The table reports results from long-horizon regressions of the real net portfolio returns ($r^a_t - r^l_t$). The dependent variable is the H - period (average) real net portfolio returns $\left(\sum_{h=1}^{H}\left(r^a_{t+h} - r^l_{t+h}\right)\right)/H$. The regressor is one-period lagged values of nxa_t. For each regression, the table reports OLS estimates, Newey–West corrected t - statistics in square brackets and adjusted R^2 statistics. Significant coefficients at the five percent level are highlighted in bold. The samples span various periods from 1971:Q1 to 2003:Q4. Specifically, Canada 1971:Q1–2004:Q4; France: 1975:Q1–2004:Q4; Germany: 1971:Q1–2004:Q4; Italy: 1973:Q1–2004:Q4; Japan: 1977:Q1–2004:Q4; and for the UK: 1971:Q1–2004:Q4.