ISSN 1791-3144

DEPARTMENT OF ECONOMICS

DISCUSSION PAPER SERIES

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WP 2008 - 18

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Adjustment of US External Imbalances: At What Horizon?*

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December 17, 2008

Abstract

The relative importance of the trade and financial (valuation) channels for correcting cyclical external imbalances of the US is examined, with the contribution of each component broken-down by horizon. The evidence presented demonstrate that valuation effects contribute to cyclical external adjustments for horizons less than six quarters. The bulk of cyclical imbalances are shown to be corrected by trade flows, which operate at short- to medium-term horizons, and there seems to be no long-run contribution to the process of cyclical external adjustment.

*I have benefited from discussions with Roberto Cardarelli, Costas Roumanias, Theodore Panagiotidis, and Jens Søndergaard. I would also like to thank Pierre-Olivier Gourinchas and Hlne Rey for sharing their data. The usual disclaimer applies.

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1 Introduction

Determining the process of external adjustment has been at the top of the research agenda of international macroeconomics for quite sometime. One strand of the literature emphasizes that the dynamics of a country's external position results from the optimal savings and investment decisions by households and firms (Obstfeld and Rogoff [1996]). This strand of the literature, the so-called 'intertemporal approach' to the current account, emphasizes that the process of external adjustment takes place through trade flows (Obstfeld and Rogoff [2004, 2005]). This *trade channel*, operates both through changes in real quantities and equilibrium relative prices.

A more recent strand of the literature emphasizes on the role of *valuation effects* (Gourinchas and Rey [2005, 2007], Lane and Milesi-Ferretti [2004, 2006], Obstfeld [2004]). Gourinchas and Rey [2005, 2006, 2007], Lane and Milesi-Ferretti [2004, 2006] and Tille [2003, 2005] 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.

The natural question that arises is the empirical content of the adjustment through trade flows and asset prices. The approach of Lane and Milesi-Ferretti [2004, 2006] and Tille [2003] is essentially descriptive. Gourinchas and Rey [2005, 2007] provide an empirical framework that is used to analyze the importance of each of the two channels. The traditional *trade channel* links current imbalances to future trade surpluses, whereas the *valuation channel* links current imbalances to expected future *NFA* portfolio returns, that can also contribute to the process of adjustment. They find that about 27% of cyclical adjustment is due to valuation adjustments, whereas 64% of the adjustment is due to trade flows. In addition, they argue that the valuation channel operates at horizons less than two years whereas the trade channel operates at longer horizons.

The present study contributes to the existing literature in the following ways. *First*, it examines the relative contribution of the two channels of external adjustment, decom-

posing their contribution also by horizon, thereby providing new insights into the importance of the two channels at different horizons. I find that the *valuation channel* operates at horizons strictly less than a year, whereas the *trade channel* – that bears most of the adjustment burden – operates both at short and medium-term horizons, but strictly less than four years. In total, the process of cyclical external adjustment is much faster than what Gourinchas and Rey [2007] argue. *Second*, the results regarding the horizon at which the two channels operate are sensitive to the definition of the cyclical components. When I define the cyclical components as those between six and thirty-two quarters (using standard filtering techniques), I find the contribution of the trade channel is much stronger and faster. In addition, the whole process of external adjustment could well take place at horizons less than two years.

2 Channels of External Adjustment

Consider the accumulation identity for *NFA* between t and $t + 1$:

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

where $NFA_t \equiv A_t - L_t$ are defined as the difference between gross foreign assets and liabilities, and $NX_t \equiv X_t - M_t$ represents net exports. Gourinchas and Rey [2007] show that under the assumption that (1) holds in trend (i.e. around the trend for each variable) along with a stability condition, we may arrive at a present-value relation:

$$nxa_t \approx - \sum_{h=1}^{+\infty} \rho^h E_t [r_{F,t+h} + \Delta nx_{t+h}]. \quad (2)$$

where

$$nxa_t \equiv |\mu^a| \varepsilon_t^a - |\mu^l| \varepsilon_t^l + |\mu^x| \varepsilon_t^x - |\mu^m| \varepsilon_t^m; \quad (3)$$

$$\Delta nx_{t+1} \equiv |\mu^x| \Delta \varepsilon_{t+1}^x - |\mu^m| \Delta \varepsilon_{t+1}^m - \varepsilon_{t+1}^{\Delta w}; \text{ and} \quad (4)$$

$$r_{F,t+1} \equiv |\mu^a| r_{t+1}^a - |\mu^l| r_{t+1}^l. \quad (5)$$

Specifically, ε_t^z denotes the cyclical component of variable $Z_t \in \{A_t, L_t, X_t, M_t\}$ relative to household wealth, $\varepsilon_t^{\Delta w}$ denotes the cyclical component of household wealth growth rate, and r_t^a and r_t^l denote the real return on gross assets and liabilities, respectively. Furthermore, let μ_t^z denote the trend of each variable Z_t relative to wealth. Then the parameters μ^i and ρ are defined as

$$\begin{aligned}\mu^a &= \frac{\bar{\mu}_t^a}{\bar{\mu}_t^a - \bar{\mu}_t^l}, \mu^l = \mu^a - 1 \\ \mu^x &= \frac{\bar{\mu}_t^x}{\bar{\mu}_t^x - \bar{\mu}_t^m}, \mu^m = \mu^x - 1 \\ \rho &= 1 + \frac{\bar{\mu}_t^x - \bar{\mu}_t^m}{\bar{\mu}_t^a - \bar{\mu}_t^l},\end{aligned}$$

where the trends μ_t^z and cyclical components ε_t^z can be extracted using any filter that isolates the low-frequency components of the series (e.g. the HP filter or the Christiano and Fitzgerald [2003] band-pass filter).

Equation (2) 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 net exports $E_t \Delta nx_{t+h} > 0$ (the *trade channel*); or it may come from high expected net portfolio returns $E_t r_{F,t+h} > 0$ (the *valuation channel*).

Our suggestion is to write (2) for H periods ahead, obtaining:

$$nxa_t = - \sum_{h=1}^H \rho^h E_t r_{F,t+h} - \sum_{h=1}^H \rho^h E_t \Delta nx_{t+h} + \rho^{H+1} E_t nxa_{t+H+1}. \quad (6)$$

The first term in (6) captures the predictability of NFA portfolio returns up to a horizon of H periods ahead; the second term, similarly captures predictability of net export growth; and the last term, is a ‘residual item’ that captures predictability of both future returns and net export growth at horizons beyond H periods.

It then follows that we can decompose the unconditional variance of nxa_t as:¹

¹Pre-multiplying both sides of (6) by $[nxa_t - E(nxa_t)]$ and taking unconditional expectations of the resulting expression, gives the result.

$$\begin{aligned} \text{Var}(nxa_t) \approx & - \sum_{h=1}^H \rho^h \text{Cov}(r_{F,t+h}, nxa_t) - \sum_{h=1}^H \rho^h \text{Cov}(\Delta n x_{t+h}, nxa_t) \\ & + \rho^{H+1} \text{Cov}(nxa_{t+H}, nxa_t). \end{aligned} \quad (7)$$

Equation (7) decomposes the variance of nxa into three parts: predictability of NFA portfolio returns, net exports growth, and the last term of (7) which captures predictability of NFA portfolio returns and net exports growth beyond horizon H (autocorrelation in nxa).

3 Data and Empirical Findings

For the empirical implementation of the above proposed decomposition, I employ the dataset put together by Gourinchas and Rey [2007].²

Table 1 presents the (unconditional) variance–decomposition results in which we have chosen $H = 20$, and the estimation is performed by the generalized method of moments (GMM).³ The percentages in Table 1 are obtained by dividing (7) by the estimated variance of nxa . The last column of the table shows the variance component associated with each variable. Panels A and B report results with parameters and cyclical components obtained using the HP filter with smoothing parameters $\lambda_1 = 2400000$ (as in Gourinchas

²Data are available at http://socrates.berkeley.edu/~pog/academic/IFA_data.xls

³The alternative would be to use the VAR approach advocated by Campbell and Shiller [1988]. In particular, the GMM estimator takes the form:

$$\begin{aligned} \frac{1}{T} \sum_{i=1}^T (nxa_i^d)^2 = & - \frac{1}{T} \sum_{i=1}^T \left(nxa_i^d \sum_{h=1}^4 \rho^h r_{F,i+h}^d \right) - \frac{1}{T} \sum_{i=1}^T \left(nxa_i^d \sum_{h=1}^4 \rho^h \Delta n x_{i+h}^d \right) \\ & - \frac{1}{T} \sum_{i=1}^T \left(nxa_i^d \sum_{h=5}^8 \rho^h r_{F,i+h}^d \right) - \frac{1}{T} \sum_{i=1}^T \left(nxa_i^d \sum_{h=5}^8 \rho^h \Delta n x_{i+h}^d \right) \\ & - \dots - \frac{1}{T} \sum_{i=1}^T \left(nxa_i^d \sum_{h=17}^{20} \rho^h r_{F,i+h}^d \right) - \frac{1}{T} \sum_{i=1}^T \left(nxa_i^d \sum_{h=17}^{20} \rho^h \Delta n x_{i+h}^d \right) + \frac{1}{T} \sum_{i=1}^T (nxa_i^d \rho^{21} nxa_{i+21}^d), \end{aligned}$$

where y^d denotes de-measured variables. In this instance, using GMM is just using sample variances and covariances.

and Rey [2007]) and $\lambda_2 = 1600$ respectively. Panels C and D report results employing the asymmetric band-pass filter of Christiano and Fitzgerald [2003] extracting components between 2 and 200 quarters (Panel C) and components between 6 and 32 quarters (Panel D) respectively.

[Insert Table 1 about here]

Table 1 reports the variance by variable (row) and by horizon: predictability corresponding to a period one to five years and beyond. This provides us with insights about the horizon that matters most for $nx a$. We find that most of the action in $nx a_t$ is due to events between one and two years ahead, while depending on the method used to isolate the cyclical components of the series, even four years ahead might be important. Furthermore, we find that NFA returns cause a significant fraction of $\text{Var}(nx a)$ for horizons less than a year, regardless of the detrending method employed, with variance share ranging between 16% and 29%. For horizons beyond one year the contribution of returns is statistically insignificant and in many cases negative.⁴ As such, we may interpret the contribution of valuation effects on the adjustment process to be extremely short-lived. Instead, most of the adjustment of cyclical imbalances takes place through net export growth, both at short (a year) and medium-term horizons (2–4 years). Additionally, based on these results, one may argue that – allowing for sampling error – that the whole process of cyclical adjustment takes place at horizons less than four years. In fact, if the cyclical components used are the standard ones (6-32 quarters), then one may well argue that the process of external adjustment is much faster and takes place even within two years.

To further examine the contribution of each component to the process of external adjustment, we have calculated the share of $\text{Var}(nx a)$ that is attributed to r_F and Δnx for horizons $H = 1, 2, \dots, 20$.⁵ Results are displayed in Figure 1. The picture that emerges is similar to that from Table 1: NFA returns account for an increasing portion of $\text{Var}(nx a)$

⁴The negative fraction of the $nx a_t$ variance can be interpreted as follows: when the current $nx a_t$ is high, future NFA portfolio returns at this particular horizon are expected to be higher than on average.

⁵To avoid confusion of readers familiar with time series techniques: here I calculate the share of the

for horizons up to five quarters, whereas for longer horizons their contribution remains the same or is reduced (depending on the detrending method employed), and in three out of the four cases it remains statistically significant. On the other hand, the contribution of net export growth is either increasing with the horizon considered or remains level for horizons beyond three years. Remarkably enough, using cyclical components between 6 and 32 quarters, it could well be the case that the process of cyclical external adjustment is much more short-lived, taking place even within a year, with net exports bearing the total burden of adjustment.

[Insert Figure 1 about here.]

To examine the robustness of my results I have performed a series of robustness checks. These mostly constituted changing the discount factor, ρ , in the neighborhood it has been estimated, and adjusting appropriately the weight on gross assets μ^a . In all cases examined, the results are virtually identical to the one I report in this paper, regardless of the de-trending method employed.⁶ Hence, the finding that the contribution of returns to the process of cyclical external adjustment is extremely short-lived, is a feature of the US data.

4 Conclusion

The results in this paper demonstrate the relative importance of the valuation and trade channels in the process of external adjustment and their relative contribution at different horizons. Specifically, we find the process of cyclical external adjustment takes place within horizons less than four years. In addition, depending on the definition of the cyclical components of the series, we find that the correction of cyclical external imbalances could take place even at shorter horizons between one and two years.

unconditional variance (not the variance at a particular horizon) of a variable that can be attributed to other *observable variables* (not to some fundamental shocks).

⁶Results are available upon request.

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Figure 1. The relative contribution of NFA portfolio returns and net exports to the process of external adjustment, by horizon

Table 1: Unconditional Variance Decomposition by Horizon – Different Detrending Methods

Variance Component	Qrt: 1 – 4	Qrt: 5 – 8	Qrt: 9 – 12	Qrt: 13 – 16	Qrt: 17 – 20	Qrt: 21 –	Total (by Variable)						
Panel A: Using Gourinchas and Rey’s [2007] Parameters $\rho = 0.95, \mu^a = 8.49, \mu^l = 7.49, \mu^x = -9.98, \mu^m = -10.98$													
$r_{F,t+h}$	1.719 [2.994]	15.98% [1.035]	0.457 [1.035]	4.24% [1.035]	-0.0531 [-0.229]	-0.49% [1.035]	-0.0662 [-0.256]	-0.268 [-1.094]	-2.49% [1.035]	1.789 [1.527]	16.63%		
Δnx_{t+h}	4.020 [5.111]	37.37% [3.139]	2.516 [3.139]	23.39% [3.139]	1.547 [1.607]	14.38% [1.607]	1.213 [1.980]	11.28% [0.915]	0.420 [0.915]	9.716 [3.755]	90.31%		
nx_{a_t+H}										-0.747 [-0.982]	-6.94% [-0.982]	-6.94%	
Total (by h)	5.740 [6.307]	53.35% [2.759]	2.972 [2.759]	27.63% [1.445]	1.494 [1.445]	13.89% [1.445]	1.147 [2.127]	10.66% [0.915]	0.420 [0.915]	-0.747 [-0.982]	-6.94% [-0.982]	10.758 [4.079]	100%
Panel B: Using Parameters from Standard HP Detrending $\rho = 0.95, \mu^a = 8.55, \mu^l = 7.55, \mu^x = -9.96, \mu^m = -10.96$													
$r_{F,t+h}$	1.005 [3.503]	26.13% [0.132]	0.027 [0.132]	0.70% [0.132]	-0.256 [-2.727]	-6.67% [0.132]	-0.080 [-0.703]	-2.07% [0.132]	-0.181 [-1.565]	-4.70% [0.132]	0.515 [2.057]	13.40%	
Δnx_{t+h}	2.715 [3.261]	70.59% [2.758]	0.674 [2.758]	17.52% [2.758]	-0.026 [-0.064]	-0.68% [0.132]	0.096 [0.572]	2.48% [0.572]	-0.212 [-0.847]	-5.50% [0.132]	3.247 [4.159]	84.42%	
nx_{a_t+H}										0.084 [0.355]	2.18% [0.355]	2.18%	
Total (by h)	3.720 [4.038]	96.72% [1.908]	0.701 [1.908]	18.22% [1.908]	-0.283 [-0.647]	-7.35% [0.111]	0.016 [0.111]	0.41% [0.111]	-0.392 [-1.424]	-10.19% [0.355]	0.084 [0.355]	3.846 [4.653]	100%
Panel C: Using Parameters from CF Asymmetric Detrending $\rho = 0.94, \mu^a = 8.98, \mu^l = 7.98, \mu^x = -9.84, \mu^m = -10.84$													
$r_{F,t+h}$	1.889 [2.942]	17.04% [1.057]	0.510 [1.057]	4.60% [1.057]	-0.024 [-0.092]	-0.21% [0.132]	-0.048 [-0.178]	-0.43% [0.132]	-0.250 [-1.026]	-2.26% [0.132]	2.077 [1.559]	18.73%	
Δnx_{t+h}	4.024 [4.764]	36.28% [3.043]	2.469 [3.043]	22.26% [3.043]	1.502 [1.613]	13.54% [1.613]	1.151 [2.023]	10.38% [0.974]	0.413 [0.974]	3.72% [0.974]	9.559 [3.816]	86.20%	
nx_{a_t+H}											-0.546 [-0.755]	-4.93% [-0.755]	-4.93%
Total (by h)	5.913 [6.128]	53.32% [2.675]	2.979 [2.675]	26.86% [1.454]	1.478 [1.454]	13.33% [1.454]	1.103 [2.138]	9.95% [0.351]	0.163 [0.351]	1.47% [0.351]	-0.546 [-0.755]	11.090 [4.026]	100%
Panel D: Using Parameters from Standard CF Asymmetric Detrending $\rho = 0.95, \mu^a = 8.64, \mu^l = 7.64, \mu^x = -10.17, \mu^m = -11.17$													
$r_{F,t+h}$	0.772 [3.477]	28.93% [1.035]	-0.138 [-0.760]	-5.16% [0.132]	-0.352 [-2.173]	-13.19% [0.132]	-0.053 [-0.493]	-1.99% [0.132]	-0.085 [-1.124]	-3.20% [0.132]	0.144 [0.615]	5.39%	
Δnx_{t+h}	2.343 [2.859]	87.82% [1.993]	0.490 [1.993]	18.35% [1.993]	-0.149 [-0.411]	-5.60% [0.132]	-0.109 [-0.869]	-4.09% [0.132]	-0.314 [-1.095]	-11.79% [0.132]	2.259 [3.074]	84.70%	
nx_{a_t+H}											0.264 [1.266]	9.91% [1.266]	9.91%
Total (by h)	3.114 [3.278]	116.75% [1.692]	0.352 [1.692]	13.20% [1.692]	-0.501 [-1.305]	-18.79% [0.132]	-0.162 [-1.052]	-6.08% [0.132]	-0.400 [-1.351]	-14.99% [0.132]	0.264 [1.266]	2.667 [3.855]	100%

Notes for Table 1: The table decomposes the variance of xxa_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 xxa (a residual component). Each of the first two components are further decomposed by horizon into five components: Predictability corresponding to a period 1-4, 5-8, 9-12, 13-16, and 17-20 quarters ahead. The third component is a residual term that captures predictability at horizon of 21 quarters (five years) and beyond. The table presents each variance component estimate (multiplied by 1000) and the corresponding t -statistics (in square brackets). Panel A reports results using the parameters employed by Gourinchas and Rey [2007]. Panel B reports results using parameters that are obtained by standard HP filtering of the original series with smoothing parameter $\lambda = 1600$. Panel C reports results with parameters obtained from employing the asymmetric Christiano and Fitzgerald [2003] band-pass filter assuming (i) no unit root; (ii) a linear trend; and (iii) extracting all frequencies between 2 and 200 quarters. Finally, Panel D reports results with parameters obtained from employing the asymmetric Christiano and Fitzgerald [2003] band-pass filter assuming (i) no unit root; (ii) a linear trend; and (iii) extracting all frequencies between 6 and 32 quarters. 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 estimated variance of xxa .