A Generalized Portfolio View of the Current Account*

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Abstract:

We propose a generalized portfolio view of the current account, in which the current account movement can be decomposed into two parts: the adjustment of a country's portfolio share of net foreign assets, and the growth of a country's portfolio over time. This generalized portfolio view also has a built-in feature that captures valuation effects and capital gains and losses through measuring savings in a more sensible way. Many recent papers on the current account can be considered as special cases of this generalized view. By analyzing data constructed according to this view, we find that the composition effect accounts for most of the current account movement, and previous findings that the growth effect plays a dominant role are subject to severe small-sample bias and therefore misinterpreted. We contend that the generalized portfolio view proposed here may shed light on the understanding of the current account and may have some advantage over the standard intertemporal view of the current account.

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I. Introduction

The recent experience of U.S.'s widening current account deficit and the growing current account imbalances among the major industrialized countries have become a subject of concern for academics, policymakers, and financial practitioners alike. Indeed, the U.S current account deficit has been growing on a steep trajectory since the early 90's ,and has reached 5.1% of GDP in 2003, and a recorded 6% of GDP in 2005. The counterpart of the deficits is the large surpluses in Japan and Europe, and more recently the large surpluses in ex-Japan Asia. Some believe that the magnitude and persistence of these current account imbalances bring the global economy into a risky zone that endangers the stability of the currency, bond, and equity markets. Others predict that the US current account position is unsustainable, and that a sharp decline in the dollar is almost inevitable in the wake of current account adjustments. For example, Obstfeld and Rogoff (2005) believe that the current account position of the U.S points to a requisite depreciation of the dollar of at least another 20% during adjustment, and possibly 40% if the adjustment were to take place quickly.

The attempt to understand the underlying forces driving the large current account imbalances and its sustainability has been manifested in a surge of literature on the topic. A myriad of recent papers have taken various approaches to analyzing the current account, landing on an extensive debate on what are the real factors behind the scene. The evolution of the debate has sifted these different views into, by and large, two positions. One side of the argument, mainly the works of Blanchard et al (2005) and Caballero et al (2005), attribute the U.S current account deficit to an increase in the demand for U.S assets by the rest of the world. This may result from a shift in asset preferences (Blanchard et al 2005), a growth slowdown in Europe which makes the relative returns to the U.S assets higher, or a growth surge in Asia where the supply of investment instruments are limited, events all of which induce in an increase in demand for savings instruments from the U.S. (Caballero et al 2005).

The other side of the debate, Kraay and Ventura (2000, 2002) and Ventura (2001, 2003) as its main representatives, has emphasized enlarging current account deficits (U.S.'s in particular) as the result of an increase in wealth. The U.S. stock market boom in the 1990's and the recent real estate boom led to a spectacular surge in U.S wealth, and therefore an enlargement of the country portfolio, spurring a proportional increase in both assets and liabilities. Henceforth, contrary to the first side of the debate, these deficits do not reflect a change in the composition of the country portfolios toward U.S. assets, but rather the growth of U.S.'s country portfolio.

At the core of these two debates lies a factor that makes any discussion of the current account more sensible than it had ever been before: valuation effects and capital gains and losses, which must be taken into account in evaluating the current account. These effects are important particularly in light of the sharp increase in gross cross-holdings of foreign assets and liabilities that came with the recent wave of financial globalization. The works by Lane et al (2001, 2005) and Gourinchas and Rey (2005a, 2005b) use newly constructed datasets on country gross asset and liability positions to give a theoretically-grounded measure of net foreign assets, the latter work focusing on the U.S. Using these new measures, Gourinchas and Rey (2005a, 2005b) show that current account imbalances may be partly eliminated via changes in asset returns. For example, a decrease in the return on U.S equities, relative to the rest of the world, reduces the current account imbalance of the U.S by reducing the total value of the claims the foreigners have on the U.S. This change of asset returns may be brought about by a depreciation of the dollar. They find that a 10% depreciation of the dollar represents a wealth transfer of 5% of the U.S. GDP from the rest of the world to the U.S. They also find that an astounding 31% of U.S.'s external adjustment is realized through these valuation effects, even for long horizons. Moreover, both Gourinchas and Rey (2005b) and Lane and Milesi-Ferretti (2005) find that the U.S. has consistently earned higher returns on its foreign assets than the return it has to pay on its liabilities. Specifically, the post-Bretton Woods average asset return is 6.82% while the corresponding liability return is only 3.5% (Gourinchas and Rey (2005b)). Gourinchas and Rey (2005b) have also emphasized that the composition of U.S.'s foreign investment has shifted towards high-yield assets such as equities and FDI rather than bonds. These patterns of changes to the rates of return to each asset categories have proven to be relevant in documenting current account imbalances.

There is reason to believe that both sides of the debate may be important for understanding the dynamics of the current account. In this paper, we propose a unified framework of the current account that incorporates both effects while taking into account valuation effects and capital gains and losses. We show that by a new accounting framework the current account may be decomposed into two parts: a portfolio composition component and a portfolio growth component. The composition effect reflects either shifts towards or away from foreign assets in the country portfolio; the growth effect illustrates that a change in the absolute size of the portfolio leads to a corresponding proportional change in both assets and liabilities. Therefore, an increase in the demand for U.S. assets by the rest of world leads to a current account deficit in the U.S. that is manifested by this composition effect. This is essentially the side of the debate taken up by Blanchard et al (2005) and Caballero et al (2005). On the other hand, an increase in the U.S. wealth due to a stock market or property market boom leading to a proportionate increase in its foreign liabilities and therefore a current account deficit is manifested by this growth effect. This is the side of the debate taken up by Kraay and Ventura (2000, 2002) and Ventura (2001, 2003). To what extent does the composition effect or the growth effect matter relatively more? Our paper attempts to address this question in our proposed framework. Also, our framework has built-in features of valuation effects and capital gains and losses that have been at the center stage of the recent current account literature. Specifically, we redefine national savings to capture valuation effects and capital gains and losses, important factors which have been ignored by the conventional definition of savings in the national account. Gourinchas and Rey (2005a, 2005b) and Lane et al (2003, 2005) have shown the quantitative importance of these effects for the dynamics of the current account, and hence a framework that does not capture these features misses a substantial component of the current account.

Given that our framework incorporates all of these features, our portfolio view of the current account is a generalized one, one which synthesizes many recent developments on the issue of the current account. Based on this generalized framework, we take data from 22 OECD countries for the period of 1973 to 1998 and find that first, the composition effect is not negligible as argued by Kraay and Ventura (2000, 2002) and Ventura (2001,2003), and is in fact, extremely important in explaining the current account. Second, this portfolio composition variable (the share of net foreign assets in total assets) follows a very persistent process, its unit root not being able to be rejected for any of the countries, with some countries displaying a secular trend. Third, the most important empirical result in Kraay and Ventura (2000) is subject to a severe small-sample bias (due to short time series) and therefore misinterpreted. These findings can potentially shed light on the understanding of the process of the current account from a new and generalized perspective.

The paper is organized as follows. In section II we derive our framework, and explain more in detail the composition and growth effects and how the different views in the literature are nested into this framework. Section III gives the empirical analysis and section IV concludes.

SECTION II Generalized Portfolio View of the Current Account

The standard view of the current account takes an intertemporal approach that views the current account balance as the result of forward-looking intertemporal decisions made by the household and investment decisions made by the firm (Sachs 1981, 1982). Obstfeld and Rogoff (1996) have taken this framework as the workhorse of studying the current account in their graduate-level textbook. Equation (1) is what they coin the "fundamental equation of the current account", where $\tilde{Y}_t$, $\tilde{C}_t$, $\tilde{I}_t$ and $\tilde{G}_t$ are the permanent levels of income, consumption, investment and government expenditure. This fundamental equation captures the notion that people can save abroad to smooth consumption over future periods. They may accumulate foreign assets to cushion unexpected shocks to income, investment or government spending. In many respects, this view has been insightful, particularly in providing a framework for thinking about external balances, external sustainability, and the equilibrium real exchange rate (Obstfeld 2001).

$$(1)\quad CA_t = (Y_t - \widetilde{Y}_t) - (C_t - \widetilde{C}_t) - (I_t - \widetilde{I}_t) - (G_t - \widetilde{G}_t)$$

According to this standard view of the current account, the enlarging U.S. current account deficit could be explained by the fact that the U.S. productivity grew relatively fast starting from the early 90's as compared to EU and Japan (for example, Caballero et al (2005), among others). What is automatically implied by the standard view is that the deficit should not be a matter of concern. However, the recent attention put onto the consequences of large and persistent deficits allude to the belief that there may be potential dangers involved. Many such concerns stem from the implicit assumption that the fundamentals of the U.S. economy may not be strong enough to support such a huge deficit. Indeed, a deficit caused by a temporary surge in investment owing to unusually rapid productivity growth and high profitability have different consequences from a deficit caused by a temporary surge in consumption, the latter being the more relevant case for the recent experience of the U.S. This discrepancy actually points to a profound weakness of the intertemporal view of the current account: shocks to the economy must be correctly identified in order to make accurate predictions about the current account. Obstfeld and Rogoff (1996) have shown that its response to shocks largely hinges on the type of the shock and the nature of the shock. For instance, a positive temporary income shock leads to a current account surplus while a positive permanent income shock leads to no current account changes. On the other hand, a positive permanent productivity shock generates a current account deficit. The recent work of Aguiar and Gopinath (2004) argues that it is shocks to trend that generate the observed countercyclical current account pattern in emerging market countries. As it is a well-known difficulty to distinguish among the types of shocks and their processes, it is by nature difficult to make accurate predictions of the current account in face of shocks in the economy. In addition, the standard view puts more emphasis on the net flow of assets while by and large ignoring the composition of such flows, a factor which turns out to be very important as would be explained next.

It is only until recently that the literature on the current account has begun to emphasize the role of portfolio choice of country assets, and the attendant differential returns to the country portfolio. This is what we call the "portfolio view of the current account", a terminology coined by Ventura (2001), although we will show later that Ventura (2001) is just a special case of our more generalized portfolio-view framework. Many recent papers on the current account fall into our classification of the portfolio view, albeit not explicitly spelled out by the authors.

One of these papers is Blanchard, Giavazzi and Sa (2005), who attribute the large U.S. current account deficit to an exogenous increase in the foreign demand for U.S. assets, beginning with a large foreign demand for U.S. equities in the second half of the 1990's and a subsequent shift to a demand for U.S. bonds in the 2000's. The central assumption in their paper is the imperfect substitutability between U.S. and foreign assets. Based on this assumption, a shock to asset preferences--for instance, an unexpected and permanent increase in the foreign demand for U.S. assets--would increase the share of U.S. assets in the portfolio of foreign countries. For the U.S., this amounts to an increase in foreign liabilities in the portfolio. Effectively, a shock to asset preferences alters the composition of the portfolio and generates a larger current account deficit in the U.S.

Another is Caballero, Farhi, and Gourinchas (2005b), who take a different point of view. In their model, there are three regions of analysis: the U.S. where there are deep financial markets and good growth conditions; Europe where there are deep financial markets but not-so-good growth conditions; and Asia where there are no deep financial markets but where growth conditions are exceptional. Their model shows how a depressed growth condition in Europe and depressed financial markets in Asia can generate large and persistent capital flows to the U.S. Specifically, a decline in Europe's rate of growth makes assets from the U.S. look relatively attractive, occasioning the flow of Europe's savings into the U.S, and thereby resulting in a persistent U.S current account deficit. If on the other hand, Asia's growth rises and consequently its demand for financial assets, the lack of ability to generate financial assets in the region induces an increase in the demand for assets produced in the U.S. and Europe. However, a difference in the growth rates between the two means that on average, a larger share of assets from Asia is allocated to the U.S. A corresponding increase in capital flows finances the large current account deficit in the U.S.

Both of these arguments imply a change in the portfolio composition as the source of large current account movements. Both claim that the large current account deficit in the U.S. is a consequence of an increase in the demand for U.S. assets from the rest of the world, albeit for different underlying reasons. In stark contrast to this view, Kraay and Ventura (2000, 2002) and Ventura(2001, 2003) argue that the U.S. current account deficit arises from an increase in wealth due to the stock market boom in the 1990's. At the center of their analysis is the claim that countries maintain a constant portfolio composition as their portfolio enlarges, or in other words, keeping a constant share of net foreign assets in the portfolio. The intuition they give is that countries should "invest the marginal unit of wealth in the same way as the average unit". By this argument, they arrive at a simple rule to predict the current account response to changes in wealth: the current account response is simply equal to this constant share of net foreign assets multiplied by the additional wealth. This seemingly simple equation nevertheless yields surprising implications that are absent in the standard view of the current account. An increase in savings will lead to a current account deficit in debtor countries but a current account surplus in creditor countries. For this reason, Kraay and Ventura's explanation of the huge current account deficit in the U.S. is not a reflection of shifts towards U.S. assets and away from foreign assets by foreign countries, but of the large increase in its wealth and the fact that U.S. had been a debtor.

These two views stand in diametric opposition to each other. Before putting them to test in the data, it is hard to judge which one is correct. It could be the case that neither depicts a complete picture of the dynamics of the current account nor fully explains the current account phenomenon among the industrialized countries. It is even more possible that the truth lies somewhere in between. Moreover, these models have not consistently taken into account the role of valuation effects, (with the exception of Blanchard et al (2005)), which have been the center of recent empirical research on gross financial flows and have taken to play an important role particularly in the context of U.S. current account deficits. Against this background, we propose a generalized portfolio view of the current account with built-in features capturing valuation effects and capital gains and losses.

The point of departure of our portfolio view from the standard view lies in our emphasis on the current account as a behavior of the country portfolio. By country portfolio, we mean the sum of the country's domestic capital stock and net foreign assets. Changes in the current account may be the result of two effects: a change in the portfolio composition, and a change in the size of the portfolio. Portfolio composition is the share of net foreign assets in the portfolio, and the size of the portfolio is the absolute amount of wealth put into it. To this end, we can fit the abovementioned literature on current account imbalances into our framework, and show that the myriad of opinions and their seeming complexity may be reduced in this context to two effects of the portfolio: the composition and the growth effect. We limit our discussion to understanding the sources of current account imbalances and refrain from talking about its connection with exchange rates and interest rates and the impact of current account reversals, which have also been a focal point of these recent papers. Our goal is simply to first and foremost, understand the driving force behind the patterns of the current account phenomenon.

In providing a new framework, we begin first by deriving an accounting equation which proves to be useful in separating out the different components driving the current account. Define wealth, W=K+NFA, where K is the domestic capital stock and NFA is the net foreign asset position. Define NFAA as the share of net foreign assets in total wealth. Therefore,

(2) $NFA = NFAA \cdot Wealth$

Taking a total differentiation of this equation yields the following:

(3) $\Delta NFA = \Delta NFAA \cdot Wealth + NFAA \cdot \Delta Wealth$

Here, ΔNFA is by definition the current account CA. $\Delta NFAA$ is the change in the portfolio share of net foreign assets, and $\Delta Wealth$ is the change in the total wealth, which we will call savings. This gives us the following equation:

(4) $CA = \Delta NFAA \cdot W + NFAA \cdot S$

Equation(4) leads to a new accounting framework of the current account that says that the current account balance is the sum of two effects: the effect of a change in the portfolio share, NFAA, which is the first term on the right hand side of equation(4), from hereon the “composition effect”, and the effect of a change in wealth, which is the second term on the right hand side which we call the “growth effect”.

An important point is that valuation effects and capital gains and losses are embedded in the savings term, S, because it is measured as the sum of gross domestic investment and the current account, which we take from the dataset constructed by Lane et al (2001) that consistently incorporates valuation effects and capital gains and losses. Our measure of savings is more sensible than the conventional one especially in recent times as gross holdings of foreign assets have largely increased, and changes in the returns to different asset categories and volatile exchange rate movements have made valuation effects and capital gains and losses an indispensable component of national savings.

In the context of the present literature, Caballero et al (2005) and Blanchard et al (2005) argue that the current account changes reflect changes in NFAA, the composition effect, and Kraay and Ventura (2000,2002) argue that it reflects changes in wealth, the growth effect. Both of them are special cases of our generalized formulation. Take Kraay and Ventura’s theory for instance, they argue that countries maintain constant portfolio shares over time, or in other words, $\Delta NFAA = 0$, which implies that the current account is equal to the product of the share of net foreign assets times savings. Namely, only the growth effect remains:

$$CA = NFAA \cdot S$$

From this equation, it is easily seen that debtors (NFAA<0) experience a current account deficit when there is an increase in savings, and creditors (NFAA>0) experience a current account surplus. This simple rule seems to lead to clear and sharp predictions of the current account.

Which side of the debate, composition or growth effects, more accurately accounts for the dynamics of the current account? In the next section, we rely on this generalized framework of the current account to empirically assess the relative importance of these two effects. At the same time, we will show that the process of NFAA, the portfolio share, is such that we cannot reject that it is a unit root process, with some countries displaying a time trend. These findings depict a clearer picture of the debate on the causes of the huge U.S. current account deficit. Moreover, they show that a better understanding of the process of NFAA can potentially serve to better understand the process of the current account.

SECTION III Empirical Analysis

3.1 Basic Results in the Literature

Whether the portfolio effect or the growth effect has been more historically important in explaining the current account is subject to careful empirical analysis. Although many theories of the current account have emerged from the recent wave of interest on the subject, there has been very little lucid empirical analysis on these theories. Furthermore, no existing empirical work has specifically aimed at exploring the relative importance of composition effects and growth effects in explaining the current account. The work by Clarida, Goretti, and Taylor (2005) empirically investigates the dynamic adjustment of the current account. They find evidence for a threshold behavior in the current account adjustment for the G7 countries. In addition, they cannot reject the null hypothesis of a random walk for the current account imbalance in each country when the ratio current-account/net output is within the country-specific surplus and deficit thresholds. Yet, the variable of interest in their paper is the current account over net output, which does not capture the adjustment of stock variable emphasized in our framework. Other works by Lane and Milesi-Ferretti (2001, 2003, 2005) and Gourinchas and Rey (2005a, 2005b) have made an impact on the way people discuss current account adjustments, by putting valuation effects and capital gains and losses at center stage of their empirical framework. They use newly constructed datasets of gross foreign positions to find that valuation effects substantially contribute to current account adjustments, with Gourinchas and Rey (2005a, 2005b)focusing solely on the U.S. Our empirical analyses take the valuation effect and capital gains and losses into account by using the dataset constructed by Lane and Milsei-Ferretti (2001).

The most relevant empirical work to ours is the work done by Kraay and Ventura (2000) and a series of subsequent papers, to which we pay particular attention in our paper. Their theory of the current account states that $CA = NFAA \cdot S$, and to test this notion they directly run the following regression

$$\frac{CA_{it}}{Y_{it}} = \beta_0 + \beta_1 (NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}) + \eta_{it}$$

$\frac{CA_{it}}{Y_{it}}$ and $\frac{S_{it}}{Y_{it}}$ denote the current account and savings as a share of GNP in country i in year t; $NFAA_{it}$ is the share of net foreign assets in total assets; and η_{it} is the error term. Their theory of the current account predicts that β_1 should be 1. They run both the pooled regression that includes all country/year observations of 13 OECD countries over the time frame of 1973-1998 and the between regression that uses country-averages of all variables, i.e. $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$. They find that the estimated β_1 is 0.955 in the pooled regression and 0.996 in the between regression, and cannot reject the null that β_1 is equal to 1 in either case. We rerun both the pooled regression and the between regression using our newly constructed dataset (which we describe in section 3.2) of 22 OCED countries over the same period, based on more accurate and consistent measures of the current account and net foreign asset positions taken from the Lane et al (2001) dataset. The results are reported in Table 1. We obtain essentially the same results as in Kraay and Ventura (2000), notwithstanding using an enlarged dataset and a different measure of the current account and savings. Specifically, we are still not able to reject the result that $\beta_1 = 1$. This finding is the key evidence that supports Kraay and Ventura's theory. And the results seem quite robust.

[INSERT TBALE 1 HERE]

From here on, we focus on the between regression since the cross-section variation is the driving variation of the empirical results in Kraay and Ventura (2000). Their 2002 paper, on the other hand, is entirely on why the time series variation within a country may deviate from their theory in the short-run. Figure 1 displays the empirical result of the between regression using our data of 22 countries. This beautiful result seemingly confirms the notion that the current account is largely explained by growth effects rather than composition effects. But this would imply that the composition effect, on which one side of the debate rests, specifically Blanchard et al (2005) and Caballero et al (2005), has been historically rejected. In section 3.3, we will dispel this notion and re-establish the significance of the composition effect in explaining the current account, drawing on our empirical findings based on the newly constructed dataset.

[INSERT FIGURE 1 HERE]

3.2 Data Description

We construct a new dataset of 22 OECD countries over the period of 1973-1998 to expand on Kraay and Ventura (2000)'s original dataset of 13 countries over the same period. Our countries include Austria, Australia, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, Great Britain, Ireland, Israel, Italy, Japan, Korea, Mexico, Netherlands, Norway, New Zealand, Portugal, Sweden, and the U.S. [1]We select post-1973 data, the years after Bretton Woods collapsed.

For measures of the net foreign asset position, we use the Lane-Milesi-Ferretti (2001) estimates, which provide alternative IIP data using a consistent methodology that covers country/time periods for which stock data are not available. Their methodological contribution in estimating the net foreign asset position is based on an accounting framework that highlights the link between balance of payments flows and the underlying

[1] We omit the following countries from the Lane dataset: Belgium, Greece, Hungary, and Luxemburg, for the reason that Greece and Hungary do not have full time series of all variables between 1973 and 1998. Belgium and Luxemburg

stocks, while accounting for the impact of unrecorded capital flight, exchange rate fluctuations, debt reduction, and valuation changes not captured in the balance of payments data. For measures of the current account, we take the first difference of the cumulative current account measures provided by the Lane et al dataset. By doing so, we effectively capture the valuation effect and capital gains and losses.

To measure the gross domestic capital stock, we use the perpetual inventory method following Kraay and Ventura (2000): we cumulate gross domestic investment in current U.S. dollars taken from the World Bank's Global Development Indicators, assuming a depreciation rate of 4 percent a year, and in each year revaluing the previous year's stock using the U.S. GDP deflator. We take 1965 as the starting year. The capital stock in 1965 is estimated using the average capital-output ratio over the period 1960-1965 in Nehru and Dhareshwar (1993), multiplied by GDP in 1965.

We measure gross national saving as the sum of the current account from the Lane et al dataset plus gross domestic investment taken from the World Development Indicators dataset. All variables are denoted in current U.S dollars.

3.3 Direct Empirical Analysis of NFAA

Using this new dataset, we first directly examine whether Kraay and Ventura's conjecture that the portfolio share, NFAA, is constant is correct, and whether we can thereby rightfully ignore the first component in equation (4):

$$CA = \Delta NFAA \cdot W + NFAA \cdot S$$

A first glance at the graphs (Figure 2) of the portfolio share over time for each of the 22 countries seems to suggest that NFAA is unlikely constant, but rather changing over time,

are often reported as one in some datasets while reported separately in others.

with some countries seeming to display a secular trend. To be more concrete, we run some econometric tests to examine the process of NFAA. Consider first the simplest possible case of NFAA following an AR(1) process. Thus the specification of this regression is $NFAA_t = \alpha_0 + \alpha_1 NFAA_{t-1} + \varepsilon_t$. We run the above regression for each individual country, and the results are reported in Table 2. It is clear that α_1 is very close to 1 (within 2 standard deviations) or even slightly greater than 1, for most countries in our sample. This leads to the suspicion that NFAA may actually follow a unit-root process, in which case we proceed to conduct a Dickey-Fuller test for unit root for each individual country. The result is that the unit root cannot be rejected at the 10% significance level for any of the countries in the sample. In addition, NFAA for some countries also seems to have secular trends. For instance, the U.S has a statistically significant negative α_0, which reflects the continuing deterioration of the net foreign asset position of U.S. as a result of the huge current account deficits.

[INSERT FIGURE 2 HERE]

These results notwithstanding, it is a well known fact that the Dickey-Fuller test has very low power for small samples, as it does not easily reject the null hypothesis of a unit root. Given that there are only 26 observations (1973-1998) for each country, the above results cannot be conclusive.

[INSERT TABLE 2 HERE]

One way to increase the power of the unit root test for short time series is to utilize the panel data, substantially increasing the number of observations. Here, we use the methods developed by Levin, Lin and Chu (2002) to test for unit roots in a panel data setting. A similar test has been applied by Frankel and Rose (1996) in finding that the real exchange rate between country pairs is a mean-reversion process rather than a unit-root process, which partially solved the embarrassing finding that the real exchange rate is drifting over time in the previous literature. We use the "Model 2" specification in the Levin, Lin and Chu (2002) paper that takes the following form:

$$NFAA_{it} - NFAA_{i,t-1} = \alpha_{i0} + \alpha_{i1} NFAA_{t-1} + \varepsilon_{it} ,$$

where α_{i0} is the individual deterministic trend of country i. α_{i1} should be 0 if the process is nonstationary and less than 0 if stationary. We find that the p-value of the Levin-Lin-Chu test is as high as 0.99. So at any conventional significance levels, the unit root hypothesis cannot be rejected. According to the simulation result in Levin, Lin and Chu (2003), with 26 years and 22 countries in our sample, the test yields a power of 0.6, which, albeit not large, is nevertheless a great improvement over the Dickey-Fuller test. We argue that this is the best we can do with available data.

The results of these simple econometric tests are consistent with NFAA being a highly persistent AR (1) process or a unit root process, with some countries displaying a time trend. Interestingly, these results stand in direct opposition to the predictions of Kraay and Ventura's theory, which supposes that NFAA is nearly a constant. This discrepancy leads two important puzzles which we will explore in the next part of this section: first, according to equation (4), $CA = \Delta NFAA \cdot W + NFAA \cdot S$, the regression specification predicts $\beta_1 = 1$ if and only if $\Delta NFAA = 0$. So why is $\beta_1 = 1$ in the Kraay and Ventura (2000) specification never rejected when the above econometric evidence has shown the unlikelihood of $\Delta NFAA$ being 0? The second puzzle is that when instead of running the shares regression, $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$, where current account is taken to be a share of GNP, CA/Y, and savings is taken to be the savings rate, S/Y, we instead use the levels regression, $\overline{CA_{it}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot S_{it}} + \eta_i$, we obtain the surprising result that β_1 is close to 2. Table 3 shows the regression result for both the pooled and between regressions. The null hypothesis $\beta_1 = 2$ cannot be rejected for either of the specifications. However, according to Kraay and Ventura's theory, these two different specifications should be identical in terms of predicting $\beta_1 = 1$. In fact, the levels regression is an even more direct way of assessing their theory that $CA = NFAA \cdot S$.

In resolving these two puzzles, we will show that the empirical result that seems to validate Kraay and Ventura's theory actually suffers from a severe small sample bias due to the short time series of the data. We will prove that the second puzzle, that $\beta_1 = 1$ in the shares regression and $\beta_1 = 2$ in the levels regression, is actually consistent with NFAA being a highly persistent AR (1) process or a unit root process, with some countries displaying a time trend. This result reaffirms the direct evidence we have provided for NFAA.

[INSERT TABLE 3 HERE]

3.4 Resolving the puzzles

The way we proceed to prove this is to theoretically derive the explicit expression for the β_1 coefficient of the Kraay and Ventura (2000) specification for four different data generate processes of NFAA, and we do this for both the shares and levels regression. To begin, we first derive a very important accounting identity of the portfolio share NFAA that we will use as the true model of the current account in deriving the regression coefficient.

By definition, the portfolio share NFAA of country i at time T is equal to the initial net foreign asset position, NFA_{i0}, plus the sum of subsequent current account balances in every period, divided by the initial total asset position, A_{i0}, plus the sum of savings in every subsequent period. Therefore we have the following accounting identity:

$$(5) \quad NFAA_{iT} = \frac{NFA_{i0} + CA_{i1} + CA_{i2} + \ldots + CA_{iT}}{A_{i0} + S_{i1} + S_{i2} + \ldots + S_{iT}}$$

Once again, we want to stress that savings here is the sum of gross domestic investment and the current account, which takes into account the valuation effect and capital gains and losses. Thus savings measures the change in the country's net wealth. If the initial net foreign asset position NFA_{i0} and assets A_{i0} are quantitatively small compared to the incremental net foreign assets and wealth over subsequent periods, we can ignore these initial values. As such, the following equation will be approximately true:

$$(6) \quad NFAA_{iT} = \frac{NFA_{i0} + CA_{i1} + CA_{i2} + \ldots + CA_{iT}}{A_{i0} + S_{i1} + S_{i2} + \ldots + S_{iT}} \approx \frac{\sum_{t=1}^{T} CA_{it}}{\sum_{t=1}^{T} S_{it}} = \frac{\overline{CA_{it}}}{\overline{S_{it}}}$$

The end-of-period portfolio share $NFAA_{iT}$ is roughly equal to the sum of all current account balances in each period divided by the sum of savings in each period. Consequently, $NFAA_{iT}$ is simply equal to the average current account over the average savings. Note that this approximation is valid in our sample period from 1973 to 1998, but is not necessarily true in general. The reason is that the financial globalization that had taken place over the past three decades has served to reduce the quantitative importance of initial net foreign asset positions compared to the subsequent flow variables. Furthermore, in a growing economy, the importance of initial assets is also dwarfed by subsequent increase in wealth. Looking at our sample, the initial assets A_{i0} represent on average 10% of the sum in the denominator, and the initial net foreign asset position represents about 5% of the total sum in the numerator. This validates our approximation. Rearranging equation (6), we get

(7) $\overline{CA_{it}} = NFAA_{iT} \times \overline{S_{it}}$,

which says that the average current account of country i over the sample period is simply equal to the end of period share of net foreign assets times the average savings over the same period.

We will henceforward take equation (7) as our true model of the current account on which the subsequent derivations of the expressions for the β_1 coefficients are based.

Now, consider the following four possible data generating processes of NFAA:

(a) NFAA is stationary without trend following Kraay and Ventura (2000), i.e. $NFAA_{it} = NFAA_i + \varepsilon_{it}$

(b) NFAA is nonstationary without trend, i.e. $NFAA_{it} = NFAA_{it-1} + \varepsilon_{it}$

(c) NFAA is nonstationry with trend, i.e. $NFAA_{it} = \alpha_i + NFAA_{it-1} + \varepsilon_{it}$

(d) NFAA is a trend-stationary process, i.e. $NFAA_{it} = NFAA_{i0} + \alpha_i t + \sum_{j=1}^{t} \varepsilon_{ij}$

Where subscripts i and t represent country i and year t, respectively. We next attempt to solve out the exact value of β_1 for all four cases by plugging the true model (equation (7)) into the regression.

Case (a): The Krray-Ventura specification $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$ yields

$$(8) \quad \beta_1 = \frac{\mathrm{var}(NFAA_{i0} \cdot \overline{\frac{S_{it}}{Y_{it}}})}{\mathrm{var}(NFAA_{i0} \cdot \overline{\frac{S_{it}}{Y_{it}}})} = 1$$

Proof: See appendix

The intuition is the following: If $NFAA_{iT} = NFAA_i + \varepsilon_{iT}$, it is roughly the case that $NFAA_{iT} = \overline{NFAA_{it}} + \varepsilon_{iT}$, due to the law of large numbers. Namely, the end of period portfolio share $NFAA_{iT}$ is equal to the average portfolio share plus an error term. Since our true model is $\overline{CA_{it}} = NFAA_{iT} \times \overline{S_{it}}$, by running the regression $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$, Kraay and Ventura are essentially running an accounting equation that automatically yields $\beta_1 = 1$ when NFAA follows a stationary process in the form of case (a).[2] So even if their conjecture that NFAA is roughly constant over time is correct, these results carry no empirical content, and consequently do not serve as a validation to their theory.

[2] There may be an issue of possible correlation between NFAA and the saving rate. The empirical correlation between these two variables is on average very small. Therefore, we can neglect it here. Even if the correlation is not quantitatively negligible, the correlation will serve as a classic measurement error which generates a downward bias of

Case (b), The Krray-Ventura specification $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$ yields

$$(9) \quad \beta_1 = \frac{\mathrm{var}(NFAA_{i0} \cdot \overline{\frac{S_{it}}{Y_{it}}}) + \frac{T+1}{2}\mathrm{var}(\varepsilon_{it})E(\overline{\frac{S_{it}}{Y_{it}}}^2)}{\mathrm{var}(NFAA_{i0} \cdot \overline{\frac{S_{it}}{Y_{it}}}) + \frac{(2T+1)(T+1)}{6T}\mathrm{var}(\varepsilon_{it})E(\overline{\frac{S_{it}}{Y_{it}}}^2)}$$

Proof: See appendix

Daunting at first, the expression is actually quite simple when broken into pieces. The first term of both the numerator and denominator are identical and is a "cross-section variation" involving the initial net foreign asset share and average savings rate. The second terms of the numerator and denominator differ only by a coefficient and contain the variance of the random-walk part of NFAA which we will call the "white noise variation". In this expression, if we ignore the second terms of both denominator and numerator, β_1 is just equal to 1. This actually returns to case (a) when we eliminate the random-walk part of the NFAA. Likewise, if we ignore the first terms and just look at the second terms, β_1 is equal to 1.5 as long as T is not too small. Therefore, β_1 is a weighted average of 1 and 1.5, the weights depending on the magnitude of the "cross-section variation", the "white noise variation", and time T. If the cross-section variance is large and T is small in the sample, more weight is put onto 1, and we could see β_1 close to 1. If on the other hand, the cross-section variation is small, and the "white noise variation" and/or T is large, we could actually see β_1 close to 1.5. The

the estimated coefficient. This will strengthen our result.

important point is that if NFAA follows a nonstationary process of case (b), contrary to Kraay and Ventura's theory, we could still not be able to reject $\beta_1 = 1$ when the "cross section variance" dominates, which would be the case particularly when the time series is short. The result that β_1 is 1 could possibly suffer from a small sample bias.

Case (c), The Kraay-Ventura specification $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$ yields

(10)

$$\beta_1 = \frac{\operatorname{var}(NFAA_{io} \cdot \overline{\frac{S_{it}}{Y_{it}}}) + \frac{(T+1)}{2} A + \frac{T(T+1)}{2} B + E(NFAA_{io}) \operatorname{var}(\overline{\frac{S_{it}}{Y_{it}}}) E(\frac{\alpha_i (T+1)}{2})}{\operatorname{var}(NFAA_{io} \cdot \overline{\frac{S_{it}}{Y_{it}}}) + \frac{(2T+1)(T+1)}{6T} A + \frac{(T+1)^2}{4} B + E(NFAA_{io}) \operatorname{var}(\overline{\frac{S_{it}}{Y_{it}}}) E(\frac{\alpha_i (T+1)}{2})}$$

Where $A = \operatorname{var}(\varepsilon_{it}) E(\overline{\frac{S_{it}}{Y_{it}}}^2)$ and $B = \operatorname{var}(\alpha_i) E(\overline{\frac{S_{it}}{Y_{it}}}^2) + (E\alpha_i)^2 \operatorname{var}(\overline{\frac{S_{it}}{Y_{it}}})$

Proof: See appendix

We can again break the expression into a few terms for analytical convenience. Note that this expression differs from the previous expression (equation (9)) only with the additional terms introduced by the trend α_i. The first terms and second terms of the numerator and denominator are exactly identical to the previous expression and are the "cross-section variance" and the "white noise variance". If there were no trends, we return to case (b). The last two terms are related to the trend: the third terms represent the " trend variation" and their ratio converges to 2 when T is large. The fourth terms are exactly the same and their ratio is therefore 1. We group this term also into the cross-section variation term. Consequently, β_1 is again a weighted average, now of 1, 1.5 and 2, the weights depending on the "cross section variation" (terms 1 and 4), the "white noise variation" (term 2), the "trend variation" (term 3) and time T. If the "cross-section variation" is large and T is small, more weight is put on 1, and we could again see the result $\beta_1 = 1$. If however, the "trend variation" is large and/or T is very big, we could now see that β_1 is equal to 2. However, because of the small sample due to a short time series, it becomes the case that the cross-section variation dominates both the trend variation and the white noise variation. To illustrate the order of magnitude of each of the four terms in the coefficient, we substitute in the sample variances and covariances into equation (4) and obtain β_1 roughly equal to:

$$\frac{10^{-4} + \frac{T+1}{2}10^{-6} + \frac{T(T+1)}{2}\cdot 10^{-7} + 10^{-6}}{10^{-4} + \frac{(2T+1)(T+1)}{6T}10^{-6} + \frac{(T+1)^2}{4}\cdot 10^{-7} + 10^{-6}}$$

Clearly, with T=25, the cross-section variance dominates the rest of the terms, as it is on orders of magnitude larger than the others. This shows that it is difficult to see anything but β_1 equal to 1 because of the small sample bias. How large does T have to be to see $\beta_1 = 2$? The answer is never, and we would always see $\beta_1 = 1$, if we use available data. According to the above magnitudes, with 50 years of data, the coefficient will be only 1.25. With 100 years of data, the coefficient can reach 1.5. And it will take more than four centuries for the coefficient to reach 1.9! Again, the reason is that the cross-section variance is so dominant. This means that even if we rerun the Kraay and Ventura cross-country regression in 25 years, we should not see β_1 being too far away from 1.

Case (d): The Krray-Ventura specification $\overline{\frac{CA_{it}}{Y_{it}}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot \frac{S_{it}}{Y_{it}}} + \eta_i$ yields

(11)

$$\beta_1 = \frac{\operatorname{var}(NFAA_{io} \cdot \overline{\frac{S_{it}}{Y_{it}}}) + E(\frac{1-\rho_i^T - \rho_i^{T+1} + \rho_i^{2T+1}}{T(1-\rho_i)^2(1+\rho_i)}) \cdot A + \frac{T(T+1)}{2} B + E(NFAA_{io}) \operatorname{var}(\overline{\frac{S_{it}}{Y_{it}}}) E(\frac{\alpha_i (T+1)}{2})}{\operatorname{var}(NFAA_{io} \cdot \overline{\frac{S_{it}}{Y_{it}}}) + E(\frac{T(1-\rho_i^2) - 2\rho_i - \rho_i^2 + 2\rho_i^{T+1} + 2\rho_i^{T+2} - \rho_i^{2T+2}}{T^2(1-\rho_i^2)(1-\rho_i)^2}) \cdot A + \frac{(T+1)^2}{4} B + E(NFAA_{io}) \operatorname{var}(\overline{\frac{S_{it}}{Y_{it}}}) E(\frac{\alpha_i (T+1)}{2})}$$

Where $A = \operatorname{var}(\varepsilon_{it}) E(\overline{\frac{S_{it}}{Y_{it}}}^2)$ and $B = \operatorname{var}(\alpha_i) E(\overline{\frac{S_{it}}{Y_{it}}}^2) + (E\alpha_i)^2 \operatorname{var}(\overline{\frac{S_{it}}{Y_{it}}})$

Proof: See appendix

The only change to this formula from the preceding case (equation (10) is the coefficients of the second term of both the numerator and denominator. In the numerator, the original second term is $\frac{(T+1)}{2} A$ and is now $E(\frac{1-\rho_i^T - \rho_i^{T+1} + \rho_i^{2T+1}}{T(1-\rho_i)^2(1+\rho_i)}) \cdot A$. And the corresponding denominator is now $E(\frac{T(1-\rho_i^2) - 2\rho_i - \rho_i^2 + 2\rho_i^{T+1} + 2\rho_i^{T+2} - \rho_i^{2T+2}}{T^2(1-\rho_i^2)(1-\rho_i)^2}) \cdot A$.

Note that if ρ_i and α_i are both equal to 0 for all i, we are back at the stationary case (a). If $\rho_i = 1$ and $\alpha_i = 0$ for all i, then we return to the unit root case without trend (case (b)). If $\rho_i = 1$ and α_i is not 0 for all i, we return to the unit root case with trend (case (c)). So all the cases (a) and (b), (c) are encompassed in this specification in the limit. The more interesting case is when ρ_i is between 0 and 1. In this case the ratio of the second terms will be less than 1 and β_1, a weighted average of 1, a value less than 1, and 2. Again, if the magnitude of the cross-section variation is large and the time series is short, more weight will be put on 1 and we can possibly still obtain $\beta_1 = 1$. However, it is possible to have β_1 being slightly below 1 if the magnitude of second terms is larger than the magnitude of the third terms in a small sample. But when T gets large, β_1 will gradually converge to 2 as in case (c).

To summarize the theoretical predictions of β_1 for the Kraay and Ventura specification:

Case (a): $\beta_1 = 1$ with certainty

Case (b): β_1 is a weighted average of 1 and 1.5, the weights depending on the magnitude of the cross-section variance, the white noise variance, and T. With short time series and sizeable cross-section variation, we are able to see $\beta_1 = 1$.

Case (c): β_1 is a weighted average of 1, 1.5, and 2, the weights depending on the magnitude of the cross-section variance, the white noise variance, the trend variance and T. If the cross-section variance is big and time T is small, we can see $\beta_1 = 1$; if the trend variance and/or T is large, we can see $\beta_1 = 2$.

Case (d): when ρ_i is between 0 and 1, β_1 is a weighted average of 1, a value less than 1, and 2. If the cross-section variance is large and T is small, β_1 is equal to 1; if the trend variance is large and/or T is big, β_1 is equal to 2.

Clearly, the result $\beta_1 = 1$ should not be considered as a verification of Kraay and Ventura's theory, case (a), since it is consistent with all four cases. However, at this point, no conclusions can be drawn about the underlying DGP of NFAA. With 25 years of data, we are stuck with a short time-series that make all of these cases a possibility.

The way to get around this difficulty is by running the levels regression,

$\overline{CA_{it}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot S_{it}} + \eta_i$, which relates to our second puzzle: the coefficient for this regression is actually close to 2, even though Kraay and Ventura's theory deems the two specifications equivalent in predicting $\beta_1 = 1$. We can again derive the explicit formula of β_1 in this specification for all of the four cases. The expressions are identical except that now the level of savings replaces the savings rate for each of the terms. So we have the following results for β_1:

Case (a):

$$\beta_1 = \frac{\operatorname{var}(NFAA_{i0} \cdot \overline{S_{it}})}{\operatorname{var}(NFAA_{i0} \cdot \overline{S_{it}})} = 1$$

Case (b):

$$\beta_1 = \frac{\operatorname{var}(NFAA_{i0} \cdot \overline{S_{it}}) + \frac{T+1}{2}\operatorname{var}(\varepsilon_{it})E(\overline{S_{it}}^2)}{\operatorname{var}(NFAA_{i0} \cdot \overline{S_{it}}) + \frac{(2T+1)(T+1)}{6T}\operatorname{var}(\varepsilon_{it})E(\overline{S_{it}}^2)}$$

Case (c):

$$\beta_1 = \frac{\operatorname{var}(NFAA_{io} \cdot \overline{S_{it}}) + \frac{(T+1)}{2}C + \frac{T(T+1)}{2}D + E(NFAA_{io})\operatorname{var}(\overline{S_{it}})E(\frac{\alpha_i(T+1)}{2})}{\operatorname{var}(NFAA_{io} \cdot \overline{S_{it}}) + \frac{(2T+1)(T+1)}{6T}C + \frac{(T+1)^2}{4}D + E(NFAA_{io})\operatorname{var}(\overline{S_{it}})E(\frac{\alpha_i(T+1)}{2})}$$

Where $C = \operatorname{var}(\varepsilon_{it})E(\overline{S_{it}}^2)$ and $D = \operatorname{var}(\alpha_i)E(\overline{S_{it}}^2) + (E\alpha_i)^2 \operatorname{var}(\overline{S_{it}})$

Case (d):

$$\beta_1 = \frac{\operatorname{var}(NFAA_{io} \cdot \overline{S_{it}}) + E(\frac{1-\rho_i^T - \rho_i^{T+1} + \rho_i^{2T+1}}{T(1-\rho_i)^2(1+\rho_i)}) \cdot C + \frac{T(T+1)}{2}D + E(NFAA_{io})\operatorname{var}(\overline{S_{it}})E(\frac{\alpha_i(T+1)}{2})}{\operatorname{var}(NFAA_{io} \cdot \overline{S_{it}}) + E(\frac{T(1-\rho_i^2) - 2\rho_i - \rho_i^2 + 2\rho_i^{T+1} + 2\rho_i^{T+2} - \rho_i^{2T+2}}{T^2(1-\rho_i^2)(1-\rho_i)^2}) \cdot C + \frac{(T+1)^2}{4}D + E(NFAA_{io})\operatorname{var}(\overline{S_{it}})E(\frac{\alpha_i(T+1)}{2})}$$

Where $C = \mathrm{var}(\varepsilon_{it})E(\overline{S_{it}}^2)$ and $D = \mathrm{var}(\alpha_i)E(\overline{S_{it}}^2) + (E\alpha_i)^2 \mathrm{var}(\overline{S_{it}})$

The only change here is that all terms associated with variations of the saving rate are now associated with variations of savings. As we know, saving rates differ little across countries while the levels of savings vary drastically across countries, the sizes of economies being so different. Hence, by switching to the levels regression, we effectively put more weight on the trend variation term. This is tantamount to increasing the length of the time series. What this achieves is to reduce the small-sample bias by effectively magnifying the "trend variance term", putting enough weight on 2 so that even with a short time series, we may still observe 2 if the true DGP were case (c) or case (d). To illustrate the magnitude of each of the weights, we substitute in the sample variances in case (c) and find that

$$\beta_1 = \frac{10^{19} + \frac{T+1}{2}10^{19} + \frac{T(T+1)}{2}\cdot 10^{18} + 10^{19}}{10^{19} + \frac{(2T+1)(T+1)}{6T}10^{19} + \frac{(T+1)^2}{4}\cdot 10^{18} + 10^{19}}$$

With T=26, it is clear that the third term dominates, and pushes β_1 towards 2. In this case, the result that $\beta_1 = 2$ in the levels regression is not consistent with case (a) and (b), but with case (c) and (d). Recall that in the Kraay-Ventura specification $\beta_1 = 1$ is consistent with all four cases, such that we can conclude that only case (c) and case (d) are the possible true DGP of NFAA. The supporting evidence that Kraay and Ventura used to confirm their theory is actually subject to a severe small sample bias and thereby misinterpreted.

Both the direct evidence from the econometric tests and the indirect evidence from the theoretical derivation of the β_1 coefficients suggest that not only is NFAA not constant, as proposed by Kraay and Ventura, but that NFAA is a highly persistent AR(1) process and the unit root cannot be rejected by either the Dickey-Fuller test or the Levin-Lin-Chu test. Some countries also display a time trend, which is the driving factor of $\beta_1 = 2$ in the levels regression.

The evidence that we cannot reject that NFAA is a unit root process may be in accordance with the empirical findings of Clarida et al (2005), although we do not claim that there is a direct link. Their paper finds that within the country-specific thresholds of current account deficit and surplus, they cannot reject that the current account to net output ratio is a unit root.

In finding that NFAA is not a constant, it does not seem plausible that we can ignore the first component, the composition effect, in our accounting equation (4) $CA = \Delta NFAA \cdot W + NFAA \cdot S$. But to what extent should current account movements be attributed to portfolio composition adjustments and to what extent is the growth effect still quantitatively important? In order to answer this question, we perform a variance decomposition exercise according to the accounting equation we gave.

The results are reported in table 4. There are several points to be made here: 1. The R-square represents how much of the current account variation can be explained by our first-order decomposition of the current account into the composition effect and the growth effect. It is clear that these two components account for most part of the current account movement, as the omitted higher order terms are quantitatively unimportant. 2. The composition effect is much more important in explaining the current account than the growth effect for most countries in our sample. The growth effect is generally quite small.

It thus seems that at this point, the positions taken by Blanchard et al(2005) and Caballero et al (2005), among others, seem to carry more historical relevance than the position taken by Kraay and Ventura. 3. The correlation between the composition effect and the growth effect also accounts for a substantial share of the current account while moving in an opposite direction to it. At the same time, the composition effect is more volatile than the current account itself for the majority of countries. It seems to be the case that the composition effects usually over-adjust, which explains its high volatility. And yet the correlation between the composition effect and the growth effect partially offset the over-adjustment of the composition effect. 4. U.S. and Japan are certainly two special cases. They both have a much smoother composition effects than the rest of OECD countries and the correlation between composition effects and growth effects move in the same direction as the current account, both of which are at odds with the other OECD countries. A complete analysis of what is behind this table is out of the scope of this paper. Nevertheless, it shows us the importance of understanding the portfolio adjustment process in understanding the current account movement. The other interesting patterns in this table also deserve further research.

[INSERT TABLE 4 HERE]

IV Concluding Remarks

The contribution of this paper is to provide a new framework to analyze the current account as well as to synthesize some recent researches on the current account as part of this framework. Although we don't believe that this paper settles the existing debate on the current account imbalances, it at least offers a consistent framework as a starting point for future research. The portfolio view is not necessarily a new theory of the current account, in so far as the underlying driving force that gives rise to any current account at all is probably still the consumption-smoothing motif. In this respect, no fundamental differences characterize the standard intertemporal view and the portfolio view. Yet it is still in our interest to point out some of the advantages the portfolio view may have over the standard view.

First, if we model the current account as a choice of the country's portfolio, this choice may presumably react to some observable variables--contemporaneous, lead or lag--such as return to capital, risks, exchange rates, and so on. Blanchard el al (2005), Caballero et al (2005) and Kraay and Ventura (2000, 2002) are all essentially trying to accomplish this task in one way or another. Although such observable variables are arguably determined by the fundamentals of the economy, they nevertheless saves us the trouble of having to identify the underlying shocks, a process which is essential for the prediction of current account movements apropos the standard view. In this sense, the portfolio view can be regarded as a substitute theory for the standard view that has an easier handle to work with.

Second, the different categorical compositions of and currency denominations of foreign assets held by different countries as well as the increased cross holdings of assets among countries make the portfolio view a useful tool in its own right. The emphasis of the standard view on net flows of assets simply has no explaining power with regard to this matter. In this sense, the portfolio view is a complementary theory to the standard view.

Existing literature has more or less touched upon many important aspects of this generalized portfolio view: growth effects, composition effects, and valuation effects and capital gains and losses. Yet there is no paper, to our knowledge, that attempts to capture all of these aspects in one unified model. This is precisely why we call our portfolio view a "generalized one". On the other hand, some aspects of this generalized view is still missing in the literature, for instance, the correlation between the growth effect and the composition effect, which accounts for a considerable share of the current account for most countries. This is not surprising since none had tried to explicitly decompose the current account in the way it is done in this paper. Therefore, we believe that many will find this paper a useful roadmap for future research on the current account.

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Appendix

Case (a):

Since $NFAA_{it} = NFAA_i + \varepsilon_{it}$, in particular, we have $NFAA_{iT} = NFAA_i + \varepsilon_{iT}$ and

$\overline{NFAA_{it}} = NFAA_i$ according to the law of large numbers. Equation (7)

$\overline{CA_{it}} = NFAA_{iT} \cdot \overline{S_{it}}$ implies that $\overline{CA_{it}} = (NFAA_i + \varepsilon_{iT}) \cdot \overline{S_{it}}$. Plugging these equations into

the regression $\overline{CA_{it}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot S_{it}} + \eta_i$, we then have

$(NFAA_i + \varepsilon_{iT}) \cdot \overline{S_{it}} = \beta_0 + \beta_1 (NFAA_i \cdot \overline{S_{it}}) + \eta_i$

Therefore $\beta_1 = \dfrac{Cov(NFAA_i \cdot \overline{S_{it}}, (NFAA_i + \varepsilon_{iT}) \cdot \overline{S_{it}})}{Var(NFAA_i \cdot \overline{S_{it}})} = \dfrac{Var(NFAA_i \cdot \overline{S_{it}})}{Var(NFAA_i \cdot \overline{S_{it}})} = 1$

For the saving rate case, simply replace $\overline{S_{it}}$ by $\overline{\dfrac{S_{it}}{Y_{it}}}$.

Case (b) and (c):

Since $NFAA_{it} = \alpha_i + NFAA_{it-1} + \varepsilon_{it}$ (When $\alpha_i = 0$ for all i, this degenerate to case (b)),

we have $NFAA_{it} = NFAA_{i0} + \alpha_i t + \sum_{j=1}^{t} \varepsilon_{ij}$. In particular,

$NFAA_{iT} = NFAA_{i0} + \alpha_i T + \sum_{j=1}^{T} \varepsilon_{ij}$ and

$\overline{NFAA_{it}} = NFAA_{i0} + \dfrac{\alpha_i (T+1)}{2} + \dfrac{T\varepsilon_{i1} + (T-1)\varepsilon_{i2} + \ldots \varepsilon_{iT}}{T}$. Again, Equation (7)

$\overline{CA_{it}} = NFAA_{iT} \cdot \overline{S_{it}}$ implies that $\overline{CA_{it}} = (NFAA_{i0} + \alpha_i T + \sum_{j=1}^{T} \varepsilon_{ij}) \cdot \overline{S_{it}}$.

Plugging these equations into the regression $\overline{CA_{it}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot S_{it}} + \eta_i$, we then have

$$\beta_1 = \frac{Cov((NFAA_{i0} + \alpha_i T + \sum_{j=1}^{T} \varepsilon_{ij}) \cdot \overline{S_{it}}, (NFAA_{i0} + \frac{\alpha_i (T+1)}{2} + \frac{T\varepsilon_{i1} + (T-1)\varepsilon_{i2} + ...\varepsilon_{iT}}{T}) \cdot \overline{S_{it}})}{Var((NFAA_{i0} + \frac{\alpha_i (T+1)}{2} + \frac{T\varepsilon_{i1} + (T-1)\varepsilon_{i2} + ...\varepsilon_{iT}}{T}) \cdot \overline{S_{it}})}$$

Deriving variances and covariances term by term, finally we obtain

$$\beta_1 = \frac{\operatorname{var}(NFAA_{io} \cdot \overline{S_{it}}) + \frac{(T+1)}{2} C + \frac{T(T+1)}{2} D + E(NFAA_{io}) \operatorname{var}(\overline{S_{it}}) E(\frac{\alpha_i (T+1)}{2})}{\operatorname{var}(NFAA_{io} \cdot \overline{S_{it}}) + \frac{(2T+1)(T+1)}{6T} C + \frac{(T+1)^2}{4} D + E(NFAA_{io}) \operatorname{var}(\overline{S_{it}}) E(\frac{\alpha_i (T+1)}{2})}$$

Where $C = \operatorname{var}(\varepsilon_{it}) E(\overline{S_{it}}^2)$ and $D = \operatorname{var}(\alpha_i) E(\overline{S_{it}}^2) + (E\alpha_i)^2 \operatorname{var}(\overline{S_{it}})$

For case (b), notice that $\alpha_i = 0$ for all i, so we have

$$\beta_1 = \frac{\operatorname{var}(NFAA_{i0} \cdot \overline{S_{it}}) + \frac{T+1}{2} \operatorname{var}(\varepsilon_{it}) E(\overline{S_{it}}^2)}{\operatorname{var}(NFAA_{i0} \cdot \overline{S_{it}}) + \frac{(2T+1)(T+1)}{6T} \operatorname{var}(\varepsilon_{it}) E(\overline{S_{it}}^2)}$$

For the saving rate case, simply replace $\overline{S_{it}}$ by $\overline{\frac{S_{it}}{Y_{it}}}$.

Case (d):

Since $NFAA_{it} = NFAA_{i0} + \alpha_i t + \sum_{j=1}^{t} \rho_i^{t-j} \varepsilon_{ij}$, in particular, we have

$NFAA_{iT} = NFAA_{i0} + \alpha_i T + \sum_{j=1}^{T} \rho_i^{T-j} \varepsilon_{ij}$ and

$\overline{NFAA_{it}} = NFAA_{i0} + \frac{\alpha_i (T+1)}{2} + \frac{\frac{1}{1-\rho_i} \sum_{j=1}^{T} (1 - \rho_i^{T+1-j}) \varepsilon_{ij}}{T}$. Again, Equation (7)

$\overline{CA_{it}} = NFAA_{iT} \cdot \overline{S_{it}}$ implies that $\overline{CA_{it}} = (NFAA_{i0} + \alpha_i T + \sum_{j=1}^{T} \rho_i^{T-j} \varepsilon_{ij}) \cdot \overline{S_{it}}$.

Plugging these equations into the regression $\overline{CA_{it}} = \beta_0 + \beta_1 \overline{NFAA_{it} \cdot S_{it}} + \eta_i$, we then have

$$\beta_1 = \frac{Cov((NFAA_{i0} + \alpha_i T + \sum_{j=1}^{T} \rho_i^{T-j} \varepsilon_{ij}) \cdot \overline{S_{it}}, (NFAA_{i0} + \frac{\alpha_i (T+1)}{2} + \frac{\frac{1}{1-\rho_i} \sum_{j=1}^{T} (1-\rho_i^{T+1-j}) \varepsilon_{ij}}{T}) \cdot \overline{S_{it}})}{Var((NFAA_{i0} + \frac{\alpha_i (T+1)}{2} + \frac{\frac{1}{1-\rho_i} \sum_{j=1}^{T} (1-\rho_i^{T+1-j}) \varepsilon_{ij}}{T}) \cdot \overline{S_{it}})}$$

Deriving variances and covariances term by term, finally we obtain

$$\beta_1 = \frac{\mathrm{var}(NFAA_{io} \cdot \overline{S_{it}}) + E(\frac{1-\rho_i^T - \rho_i^{T+1} + \rho_i^{2T+1}}{T(1-\rho_i)^2 (1+\rho_i)}) \cdot C + \frac{T(T+1)}{2} D + E(NFAA_{io}) \mathrm{var}(\overline{S_{it}}) E(\frac{\alpha_i (T+1)}{2})}{\mathrm{var}(NFAA_{io} \cdot \overline{S_{it}}) + E(\frac{T(1-\rho_i^2) - 2\rho_i - \rho_i^2 + 2\rho_i^{T+1} + 2\rho_i^{T+2} - \rho_i^{2T+2}}{T^2 (1-\rho_i^2)(1-\rho_i)^2}) \cdot C + \frac{(T+1)^2}{4} D + E(NFAA_{io}) \mathrm{var}(\overline{S_{it}}) E(\frac{\alpha_i (T+1)}{2})}$$

Where $C = \mathrm{var}(\varepsilon_{it}) E(\overline{S_{it}}^2)$ and $D = \mathrm{var}(\alpha_i) E(\overline{S_{it}}^2) + (E\alpha_i)^2 \mathrm{var}(\overline{S_{it}})$

For the saving rate case, simply replace $\overline{S_{it}}$ by $\overline{\frac{S_{it}}{Y_{it}}}$.

Table 1 Duplication of Kraay and Venture (2000) Results

	Pooled Regression	Between Regression
(Gross National Saving/GDP)× (Foreign Asset/Total Assets)	0.971	0.934
	(.0824)	(.093)
R^2	0.247	0.835
Number of Observations	572	22
P-value for null hypothesis that coefficient on saving × foreign assets=1	0.7248	0.5178

This table reports the results of estimating $CA_{it}/Y_{it}=\beta_0+\beta_1(NFAA_{it}\cdot S_{it}/Y_{it})+\eta_{it}$ where CA_{it}/Y_{it} and S_{it}/Y_{it} denote the current account and saving as a share of GNP in country i in year t; $NFAA_{it}$ is the share of foreign assets in total assets; and η_{it} is the error term. The between regressions report the results using 22 country-averages of all variables, and including a constant. Standard errors are corrected for heteroskedasticity.

Table 2 First-Order Autocorrelation of NFAA

Country	AUS	AUT	CAN	CHE	DEU	DNK	ESP	FIN
α_1	0.985	0.865	1.027	0.722	0.905	1.011	0.772	0.837
	(0.051)	(0.075)	(0.095)	(0.115)	(0.091)	(0.063)	(0.13)	(0.114)
α_0	-0.005	-0.007	0.006	0.026	0.003	0.002	-0.013	-0.017
	(0.006)	(0.004)	(0.01)	(0.012)	(0.003)	(0.006)	(0.007)	(0.012)
Country	FRA	GBR	IRL	ISL	ITA	JPN	KOR	MEX
α_1	0.79	0.756	1.067	0.786	0.757	1.071	0.966	0.825
	(0.094)	(0.133)	(0.052)	(0.129)	(0.096)	(0.038)	(0.054)	(0.123)
α_0	0	0.005	0.02	-0.027	-0.001	0	0.005	-0.023
	(0.006)	(0.004)	(0.012)	(0.003)	(0.006)	(0.007)	(0.012)	(0.016)
Country	NLD	NOR	NZL	PRT	SWE	USA		
α_1	0.799	1.019	0.847	0.797	0.862	1.057		
	(0.086)	(0.068)	(0.06)	(0.089)	(0.056)	(0.022)		
α_0	0.015	0.004	-0.037	-0.02	-0.007	-0.004		
	(0.007)	(0.004)	(0.012)	(0.008)	(0.003)	(0.001)		

This table reports the results of estimating $NFAA_t=\alpha_0+\alpha_1 NFAA_{t-1}+\varepsilon_t$ for each country in the sample, where $NFAA_{it}$ denotes share of foreign asset in total assets in year t; and ε_t is the error term. Standard errors are in parentheses.

Table 3 Level Regression of Kraay and Ventura (2000) Specification

	Pooled Regression	Between Regression
(Gross National Saving)×(Foreign Asset/Total Assets)	1.853 (0.184)	1.942 (.167)
R^2	0.7346	0.8711
Number of Observations	572	22
P-value for null hypothesis that coefficient on saving × foreign assets=2	.4234	.7321

This table reports the results of estimating $CA_{it}=\beta_0+ \beta_1(NFAA_{it}\cdot S_{it})+ \eta_{it}$ for each country in the sample, where CA_{it} and S_{it} denote the current account and saving in country i in year t; $NFAA_{it}$ is the share of foreign assets in total assets; and η_{it} is the error term. The between regressions report the results using 22 country-averages of all variables, and including a constant. Standard errors are corrected for heteroskedasticity.

Table 4 Variance Decomposition of the Current Account

Country	R-Square	Composition Effect	Growth Effect	2*Cov
AUS	0.9513	1.073	0.293	-0.366
AUT	0.9525	1.104	0.178	-0.282
CAN	0.9583	1.16	0.056	-0.216
CHE	0.9913	0.77	0.075	0.155
DEU	0.9868	1.137	0.122	-0.259
DNK	0.9662	1.422	0.2	-0.622
ESP	0.9833	0.861	0.1177	0.0213
FIN	0.9851	1.091	0.036	-0.127
FRA	0.9981	1.089	0.013	-0.102
GBR	0.9991	1.06	0.014	-0.074
IRL	0.9748	1.316	0.2	-0.516
ISL	0.9493	0.909	0.1801	-0.0891
ITA	0.9978	1.053	0.0291	-0.0821
JPN	0.9959	0.226	0.318	0.456
KOR	0.9866	1.089	0.068	-0.157
MEX	0.972	1.125	0.125	-0.25
NLD	0.9818	0.738	0.105	0.157
NOR	0.9945	0.846	0.0694	0.0846
NZL	0.9417	1.424	0.424	-0.848
PRT	0.9862	0.917	0.0763	0.0067
SWE	0.9839	1.222	0.045	-0.267
USA	0.996	0.537	0.12	0.343

This table reports the variation decomposition of the current account for each country in the sample according to equation 4. The R-Square is the proportion of the variation of current account that can be explained by this equation. The formula for variation decomposition is $Var(\Delta NFAA \bullet W + NFAA \bullet S) = Var(\Delta NFAA \bullet W) + Var(NFAA \bullet S) + 2Cov(\Delta NFAA \bullet W, NFAA \bullet S)$. The three terms on the right correspond to the composition effect, growth effect and 2*Cov in the table respectively. They should add up to 1.

Figure 1: Between Regression of Kraay and Ventura (2000)

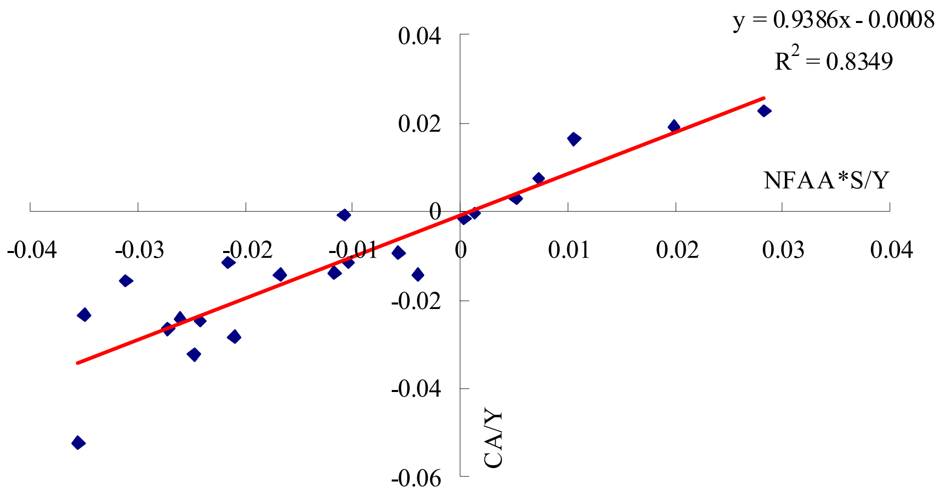
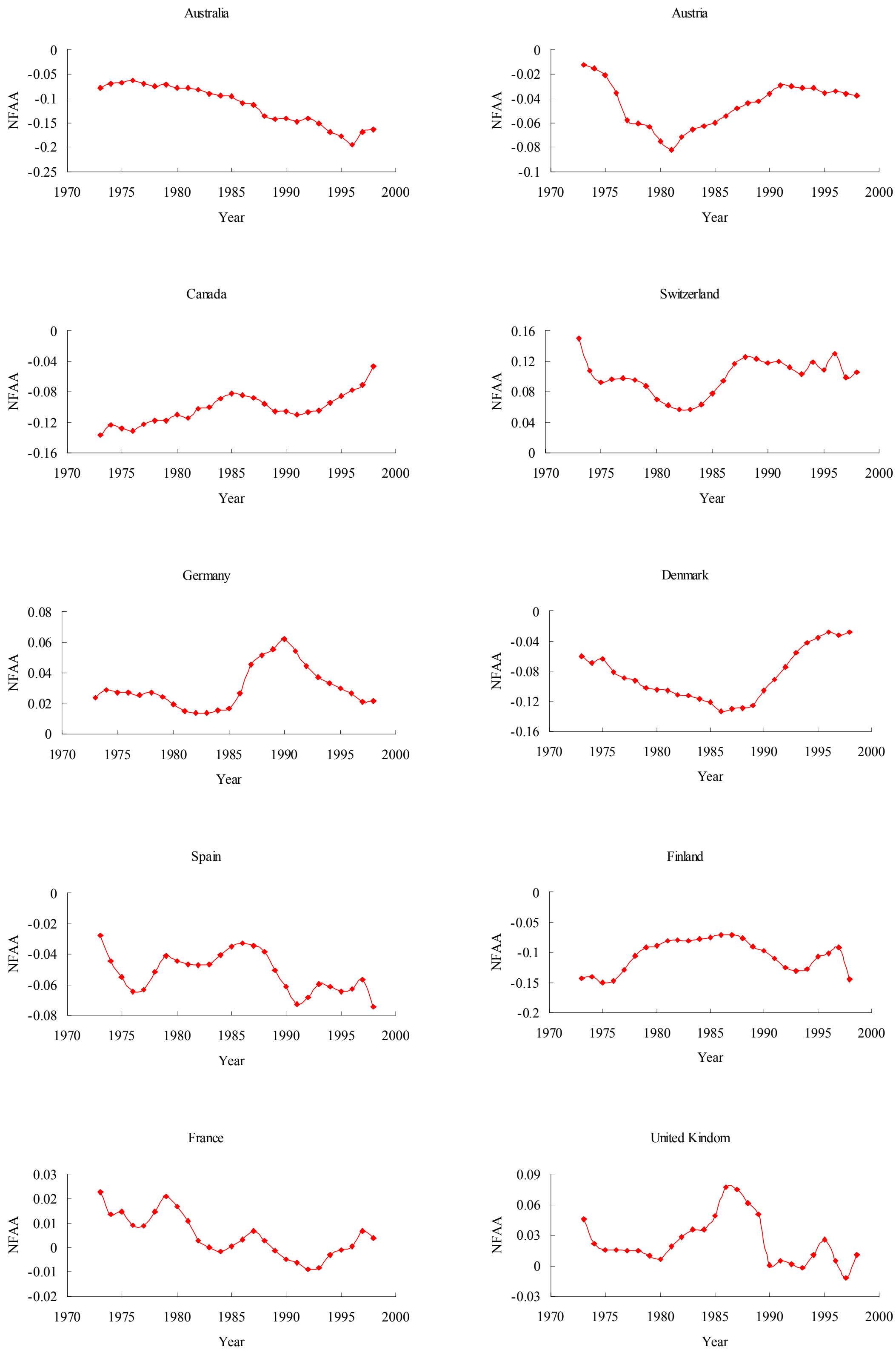
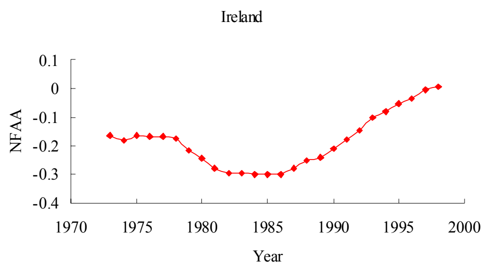
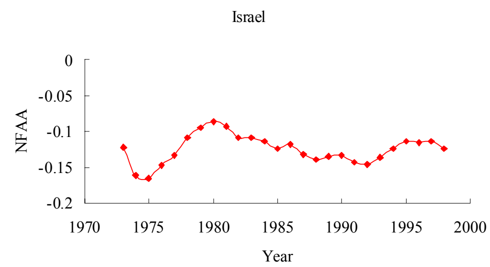
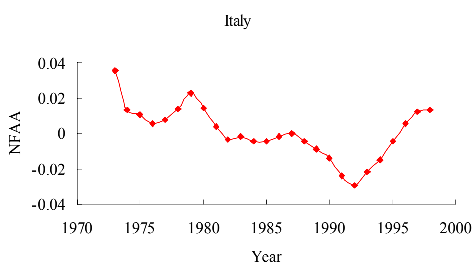


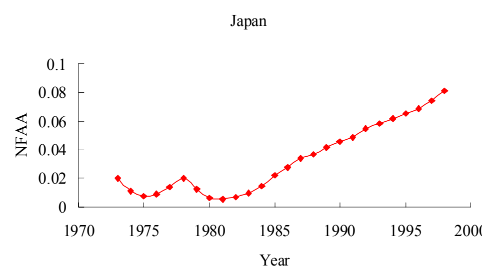
Figure 2 Evolution of NFAA Over Time

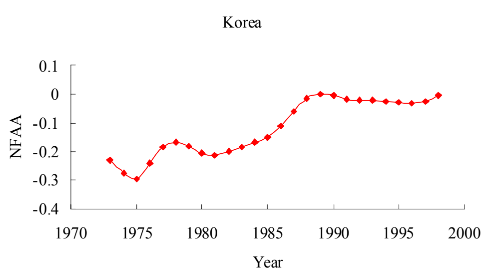


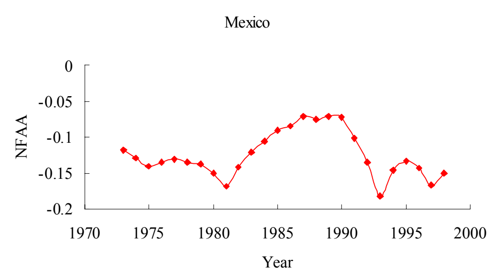

Ireland
NFAA
0.1
0
-0.1
-0.2
-0.3
-0.4
1970 1975 1980 1985 1990 1995 2000
Year

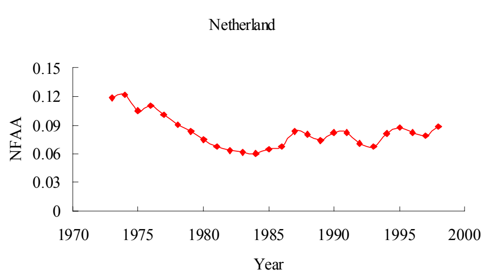

Israel
NFAA
0
-0.05
-0.1
-0.15
-0.2
1970 1975 1980 1985 1990 1995 2000
Year

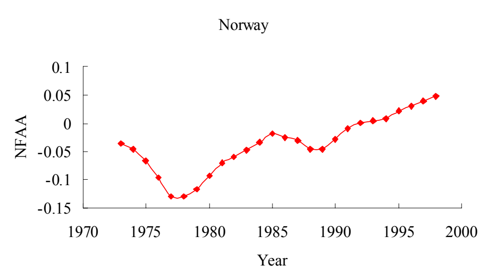

Italy
NFAA
0.04
0.02
0
-0.02
-0.04
1970 1975 1980 1985 1990 1995 2000
Year

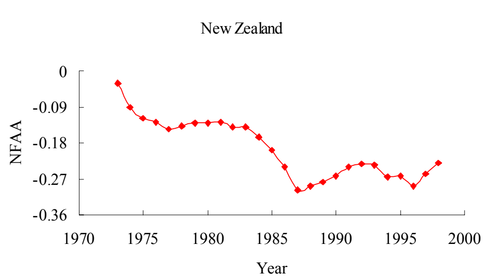

Japan
NFAA
0.1
0.08
0.06
0.04
0.02
0
1970 1975 1980 1985 1990 1995 2000
Year

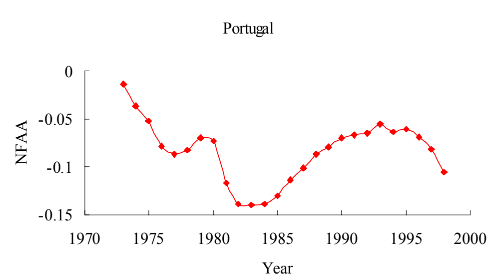

Korea
NFAA
0.1
0
-0.1
-0.2
-0.3
-0.4
1970 1975 1980 1985 1990 1995 2000
Year

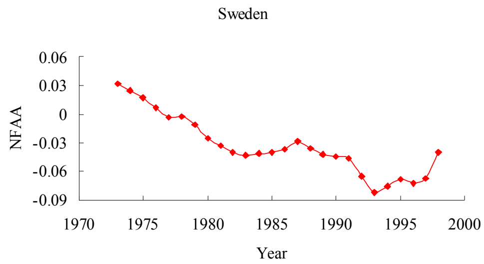

Mexico
NFAA
0
-0.05
-0.1
-0.15
-0.2
1970 1975 1980 1985 1990 1995 2000
Year

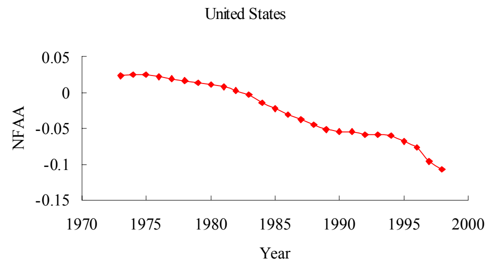

Netherland
NFAA
0.15
0.12
0.09
0.06
0.03
0
1970 1975 1980 1985 1990 1995 2000
Year


Norway
NFAA
0.1
0.05
0
-0.05
-0.1
-0.15
1970 1975 1980 1985 1990 1995 2000
Year


New Zealand
NFAA
0
-0.09
-0.18
-0.27
-0.36
1970 1975 1980 1985 1990 1995 2000
Year


Portugal
NFAA
0
-0.05
-0.1
-0.15
1970 1975 1980 1985 1990 1995 2000
Year





NFAA represents the share of net foreign assets in total assets. The time frame is from 1973 to 1998.