CURRENT ACCOUNTS IN DEBTOR AND CREDITOR COUNTRIES*

Aart Kraay and Jaume Ventura

August 1999

Abstract: What is the current account response to transitory income shocks such as temporary changes in the terms of trade, transfers from abroad, or fluctuations in production? We propose this new rule: the current account response equals the saving generated by the shock times the country's share of foreign assets in total assets. This rule implies that favourable shocks lead to deficits (surpluses) in debtor (creditor) countries. This rule is a natural implication of the intertemporal approach to the current account if investment risk is high and diminishing returns are weak. Evidence from industrial countries broadly supports this rule.

---

* We are grateful to Rudiger Dornbusch for discussing these ideas with us. We also thank Daron Acemoglu, Ricardo Caballero, Xavier Gabaix and Jakob Svensson for their useful comments. The views expressed herein are the authors', and do not necessarily reflect those of The World Bank.

What is the current account response to transitory income shocks such as temporary changes in the terms of trade, transfers from abroad, or fluctuations in production? We propose this new rule: the current account response is equal to the saving generated by the shock times the country's share of foreign assets in total assets. This rule implies that favourable income shocks lead to current account deficits in debtor countries and current account surpluses in creditor countries. This rule is a natural implication of the intertemporal approach to the current account if investment risk is important and diminishing returns are weak. Evidence from thirteen industrial countries broadly supports its empirical validity.

A simple thought experiment reveals how natural the new rule is. Consider a small country that receives a favourable transitory income shock and saves a part of it. To the extent that this shock does not affect the expected return to future investments at home and abroad, a reasonable guess is that investors allocate the marginal unit of wealth (the income shock) among assets in the same proportions as the average unit of wealth. Consider first a country with negative foreign assets, that is, with a foreign debt that exceeds its holdings of foreign equity. Since by definition the share of this country's wealth invested in domestic capital exceeds one, an increase in wealth (saving) results in a greater increase in domestic capital (investment), leading to a deficit on the current account (saving minus investment). Conversely, in a country with positive foreign assets the saving generated by the shock exceeds investment at home, as a portion of it is invested abroad. This produces a current account surplus.

The sharp result that comes out of this simple example follows from our assumptions on how countries save and invest an income shock. First, we assumed that the income shock is partly saved. This is a basic result of forward-looking models of saving, and applies whenever consumption-smoothing operates as a saving motive. As is customary in intertemporal models of the current account, we assume throughout that this is the case. Second, we assume that the country invests the marginal unit of wealth as the average one. Here we depart from traditional practice.

In existing intertemporal models of the current account, countries invest the marginal unit of wealth in foreign assets. As a result, these models predict that favourable transitory income shocks generate current account responses that are equal to the saving generated by the shock. We refer to this idea as the traditional rule, and note that it implies that all countries respond to transitory income shocks with surpluses in the current account.[1]

Why should countries invest income shocks in the same proportions as their current portfolios rather than invest them only in foreign assets? In other words, why should we prefer the new rule over the traditional rule to predict current account behavior? The main theme of this paper is that the effects of transitory income shocks on investment depend on the relative importance of investment risk and diminishing returns. If investment risk is high, investors have a strong desire for diversification that makes them reluctant to shift their portfolios towards any single asset. If diminishing returns are strong, an increase in domestic capital generates a substantial reduction in its expected return that encourages investors to shift their portfolios towards foreign assets. The traditional rule applies if investment risk is low and diminishing returns are strong, since investors are willing to change their portfolios and income shocks offer them strong incentives to do so. The new rule applies if investment risk is high and diminishing returns are weak, since investors are reluctant to change their portfolios and income shocks provide them with weak incentives to do so. Thus, one can interpret these two rules as alternative benchmarks (or limiting cases) from which to think about current account issues.

Which one of these benchmark rules, if either, is more consistent with the data? The traditional rule states that changes in saving rates lead to equal changes in the current account. The top panel of Figure I plots the current account against saving using a panel of thirteen industrial countries for the period 1973-1995. The

[1] The intertemporal approach to the current account has a distinguished tradition that includes Sachs [1981,1982], Obstfeld [1982], Dornbusch [1983], Svensson and Razin [1983], Persson and Svensson [1985] and Matsuyama [1987], among others. Obstfeld and Rogoff [1995] survey this research.

traditional rule predicts that the slope coefficient of a regression of the current account on saving is positive and equal to one. Although the current account and saving exhibit a positive correlation of around 40 percent, the estimated slope coefficient is only 0.24. The null hypothesis that this coefficient is one is easily rejected at conventional significance levels. We shall show later that this finding is robust to a variety of specifications, and also to the inclusion of a number of control variables. This negative evidence should not be surprising however. Since the current account is saving minus investment, the top panel of Figure I is just the well-known finding of Feldstein and Horioka [1980] that saving and investment move almost one-to-one across countries and over time.[2]

The new rule states that changes in saving rates lead to changes in the current account that are proportional to the share of foreign assets in total assets. The bottom panel of Figure I plots the current account against an interaction term: the share of foreign assets in total assets times the saving rate. The new rule predicts that the slope coefficient of a regression of the current account on this variable should be one. Not only does the current account exhibit a correlation of 61 percent with this interaction variable, but also the estimated slope coefficient is 0.95. The null hypothesis that this coefficient is one cannot be rejected at conventional significance levels. We shall show later that this finding is robust to a variety of alternative specifications and also to the inclusion of a number of control variables. This evidence seems to be consistent with the new rule.

Going beyond statistical performance, there is an additional reason to prefer the new rule over the traditional rule as a benchmark from which to think about current account issues. Figure II shows another well-known fact: there is a strong

[2] Although their initial study focused on cross-sectional comparisons of savings and investment, later studies confirmed the same results for time-series comparisons. Feldstein and Bachetta [1991], Tesar [1991] and Obstfeld and Rogoff [1995] review the facts and survey alternative explanations. Feldstein and Horioka and others after them interpreted the slope coefficient of a regression of investment on savings as a measure of international capital mobility. The finding that this coefficient is large (in our sample is 0.76) led them to conclude that the evidence is "(…) quite incompatible with the assumption of complete arbitrage in world capital markets." We do not think these coefficients can be interpreted in this manner and do not share their conclusion.

home bias in the portfolios of OECD countries. In fact, some countries are long in domestic capital and short in foreign assets.[3] Many believe this bias reflects a variety of costs associated with international financial transactions. The traditional rule suggests that despite these costs, at the margin countries use only foreign assets to smooth income shocks. By insisting on the validity of this rule, one is placed in the uncomfortable position of having to explain why countries behave on average as if the costs of holding foreign assets were high, while at the margin countries behave as if these costs were low. The new rule provides a way out of this intellectual pirouette. Since countries smooth income shocks using a combination of domestic and foreign investment that resembles their existing portfolios, there is no discrepancy between average and marginal behavior. If one adopts this view, the Feldstein-Horioka finding that saving and investment move almost one-to-one turns out to be nothing but the flow version of the home bias in country portfolios.[4]

The paper is organized as follows: Section I develops a stylized intertemporal model of the current account that emphasizes the interplay of investment risk and diminishing returns. Section II uses this model to study how saving, investment and the current account respond to transitory income shocks. Section III discusses further channels through which income shocks can affect the current account. Sections IV and V interpret the data from the perspectives of the traditional and new rules.

---

[3] The home bias in country portfolios has been documented by French and Poterba [1991] and Tesar and Werner [1992]. Lewis [1999] surveys alternative explanations.

[4] Feldstein and Bachetta [1991, p. 203] were clearly aware of this explanation when they wrote that a mean-variance "(…) investor who has a high degree of risk aversion or who attributes a large subjective variance to long-term investments in foreign assets may want to invest a large share of his portfolio in domestic assets (depending on asset yield covariances) even when a substantial expected yield difference exists in favor of the foreign assets. Since the mean-variance investor's optimal proportional allocation of the assets is independent of the total value, an increase in saving that raises the total pool of funds will be invested primarily in the domestic economy." With hindsight, it is somewhat surprising that Feldstein and Bachetta did not pursue this idea. Instead, they argued that the evidence in the 1980s supports the conclusions of the original Feldstein-Horioka paper.

I. A Stylized Intertemporal Model of the Current Account

Consider a small country populated by a continuum of identical consumers.[5] There is a single good which can be used for consumption and investment. There are three assets: foreign loans, foreign capital, and domestic capital. Foreign loans are denominated in terms of the single good and pay a risk-free interest rate ρ. To produce one unit of foreign or domestic capital, one unit of the final good is required. For simplicity, assume that capital does not depreciate. As a result both types of capital have a constant price of one and deliver a return that is equal to the flow of production. Foreign capital generates a flow of production that is normally distributed with mean $\pi^* \cdot dt$ and variance $\sigma^{*2} \cdot dt$; where π^* and σ^* are non-negative constants. Domestic capital generates a flow of production that is also normally distributed with mean $\pi \cdot dt$ and variance $\sigma^2 \cdot dt$; where σ is a non-negative constant and π is a continuous, twice differentiable and non-increasing function of the country's stock of capital. The correlation between returns to domestic and foreign capital is $\eta \cdot dt$, where $\eta \in (-1,1)$ is constant. We motivate diminishing returns bluntly as the result of congestion effects or negative externalities.[6] Since the representative consumer is infinitesimal, he/she understands that his/her actions have no influence on the aggregate stock of capital.

Each period, the representative consumer decides how much to save and consume and how to distribute the stock of wealth among alternative assets. Let c be the consumption rate. Consumption sequences are valued as follows:

[5] The use of the small country assumption implies that the shocks we analyze have to be interpreted as country-specific or idiosyncratic since they do not affect the variables that describe the rest of the world. For the same reason, comparative statics exercises apply only to changes in the country's appropriate parameter, holding the rest of the world constant.

[6] At the cost of further notation, we could generate this dependence by assuming that there is a factor of production that is not priced or that the country faces a downward sloping demand curve for its exports. Since this is well known, we dispense with the formalities. Consistent with the small country assumption, we assume that the returns to foreign capital are unaffected by the country's investment policy.

(1) $$E\int_0^{\infty} \ln(c)\cdot e^{-\delta\cdot t}\cdot dt \qquad (\delta>0).$$

Let a, k and k* be the representative consumer's stock of wealth and holdings of domestic and foreign capital. Then, his/her budget constraint is:

(2) $$da = \left[\pi\cdot k + \pi^*\cdot k^* + \rho\cdot(a - k - k^*) - c\right]\cdot dt + k\cdot\sigma\cdot d\omega + k^*\cdot\sigma^*\cdot d\omega^* \ ,$$

where ω and ω^* are Wiener processes with increments that are normally distributed with $E[d\omega]= E[d\omega^*]=0$, $E[d\omega^2]= E[d\omega^{*2}]=dt$ and $E[d\omega\cdot d\omega^*]=\eta\cdot dt$. This budget constraint illustrates the standard risk-return trade-off underlying investment decisions. Each extra unit of wealth invested in domestic (foreign) capital affects both the expected return to wealth and the volatility of this return. Throughout, we impose the usual transversality condition to rule out equilibria with bubbles. We also assume that the country's holdings of both types of capital are non-negative. We interpret this assumption as a restriction on the shape of the function π and the set of permissible values for π^*, σ^*, σ and η.

The problem of the representative consumer was solved by Merton [1971], who showed that the first-order conditions imply these equations (see Appendix I):

(3) $$c = \delta\cdot a$$

(4) $$\pi - \rho = \sigma^2\cdot\frac{k}{a} + \sigma\cdot\sigma^*\cdot\eta\cdot\frac{k^*}{a}$$

(5) $$\pi^* - \rho = \sigma^{*2}\cdot\frac{k^*}{a} + \sigma\cdot\sigma^*\cdot\eta\cdot\frac{k}{a}.$$

When deciding the consumption profile, the representative consumer acts as a permanent-income consumer à la Friedman. Equation (3) states that consumption is a fixed fraction of wealth and is independent of the expected return and volatility of available assets. This is the well-known result that income and substitution effects of changes in asset characteristics cancel for logarithmic consumers.

When deciding how to invest his/her wealth, the representative consumer acts as a mean-variance investor à la Markowitz-Tobin. Equations (4)-(5) state that the expected excess returns to domestic and foreign capital must equal the appropriate risk or equity premium. With logarithmic investors, the coefficient of risk-aversion is one and the risk premium is nothing but the covariance between the return to the appropriate capital and the return to wealth. The larger is the share of domestic (foreign) capital in consumers' wealth, the larger is this covariance and the larger is the risk premium that is required to hold the marginal unit of domestic (foreign) capital. The sign of η determines whether domestic and foreign capital are substitutes or complements. For instance, if η is positive the risk premium of domestic (foreign) capital increases with the holdings of foreign (domestic) capital.

Equations (2)-(5) and the initial condition for wealth provide a complete description of how the country evolves over time. This country is a stochastic version of the convex growth model of Jones and Manuelli [1990]. If δ is low enough, the stock of wealth drifts towards infinity. Otherwise, the stock of wealth has a tendency to revert towards a finite value. The linear model arises in two important special cases: (i) if diminishing returns are weak, $\frac{\partial \pi}{\partial k} \to 0$; and (ii) if investment risk is low, $\sigma \to 0$. In any case, the country is continuously subject to shocks that move it away from its expected path.

What happens to the share of domestic capital in the country portfolio as wealth increases? Using Equation (5) to eliminate k* from Equation (4), we find this arbitrage condition:

(6) $$\pi - \rho = (\pi^* - \rho) \cdot \frac{\sigma \cdot \eta}{\sigma^*} + \sigma^2 \cdot \left(1 - \eta^2\right) \cdot \frac{k}{a}$$

and, applying the implicit function theorem, we find that:

(7) $$\frac{\partial k}{\partial a} = \frac{(1-\eta^2)\cdot\sigma^2}{(1-\eta^2)\cdot\sigma^2 - \frac{\partial \pi}{\partial k}\cdot a}\cdot\frac{k}{a}$$

That is, k is weakly increasing in wealth but the share of capital in the country portfolio is weakly decreasing in wealth. Figure III plots the expected excess return to domestic capital and the risk premium against the capital stock, under alternative assumptions. The top panel and the steep regions of the bottom panel show cases in which investment risk is negligible relative to the strength of diminishing returns, $\frac{\sigma^2}{\partial\pi/\partial k} \to 0$. In this limiting case, the marginal unit of wealth is invested in foreign loans, $\frac{\partial k}{\partial a} = 0$, and the composition of the country's portfolio shifts towards foreign assets. The middle panel and the flat regions of the bottom panel show cases in which diminishing returns are negligible relative to the level of investment, $\frac{\sigma^2}{\partial\pi/\partial k} \to \infty$. In this limiting case, the marginal unit of wealth is invested as the average one, $\frac{\partial k}{\partial a} = \frac{k}{a}$, and the composition of the country's portfolio remains unchanged. These results provide a rigorous theoretical underpinning to the investment hypotheses discussed in the introduction.[7]

[7] In keeping with the small country assumption, we have implicitly assumed that foreign holdings of domestic capital are constant. Increases in inward foreign investment would shift the excess-returns function (the left-hand-side of Equation (6)) as diminishing returns set in. If inward foreign investment responds systematically to the same type of incentives as domestic investment, the excess-returns function would be flatter, since inward foreign investment would decline whenever diminishing returns set in and therefore act as a moderating force.

II. Saving, Investment and the Current Account During Booms

Next we examine the joint behavior of saving, investment and the current account during a temporary economic boom. Let T_1 and T_2 be two dates with $T_2>T_1$. We consider the following path of shocks:

$$(8) \qquad d\omega = \begin{cases} 0 & t \in [0, T_1) \cup [T_2, \infty) \\ \frac{\varepsilon}{\sigma} \cdot dt & t \in [T_1, T_2) \end{cases}.$$

Equation (8) describes a sample path in which the country receives a sequence of unexpected shocks that are $\varepsilon \cdot dt$ times the capital stock during the period $[T_1,T_2)$, and zero afterwards. We refer to the period $[T_1,T_2)$ as an economic boom.

Figure IV plots the paths of per capita saving (S=da), investment (I=dk) and the current account (CA=da-dk) before, during and after the economic boom under alternative assumptions. In all cases, the permanent-income consumers who populate this country save the income shocks in order to smooth their consumption over time. This is true regardless of our assumptions on investment risk and diminishing returns, and applies equally to debtor and creditor countries. Having decided to save the shock, consumers must then decide how to allocate the additional savings between domestic capital and foreign assets. We depart from previous intertemporal models of the current account in how we model the investment decision.

The top panel of Figure IV shows the case in which investment risk is not very important and diminishing returns are strong, i.e. $\frac{\sigma^2}{\partial\pi/\partial k} \to 0$. This limiting case delivers the traditional rule. Despite the increase in saving that results from the boom, investment is not affected. Strong diminishing returns make new investment unattractive and encourage investors to shift their portfolios towards foreign assets. Since investment risk is low, consumers have a weak desire to diversify and easily accommodate a change in portfolio composition. In the limit, all the savings generated by the shock are allocated to foreign assets and, as a result, the current account goes into a surplus in both debtor and creditor countries.[8]

The middle panel of Figure IV depicts the opposite case in which investment risk is important and diminishing returns are weak, i.e. $\frac{\sigma^2}{\partial\pi/\partial k} \to \infty$. This limiting case delivers the new rule. As before, the saving rate jumps up during the boom and falls back to its original level afterwards. Weak diminishing returns ensure that new investment remains as attractive as existing investment and so there is no incentive to change the portfolio composition. In addition, high investment risk makes investors reluctant to change the composition of their portfolios. In the limit, the shock is invested so as to keep the share of domestic capital in the consumers' portfolios constant. This leads to an increase in domestic investment that is more (less) than the increase in saving if these portfolios are short (long) in foreign assets. This implies that the current account exhibits a deficit in debtor countries and a surplus in creditor countries.

Finally, the bottom panel of Figure IV shows an intermediate case, i.e. $0 < \frac{\sigma^2}{\partial\pi/\partial k} < \infty$. As in the top panel, both saving and investment jump up during the boom and fall afterwards. In this case however, saving and investment decline during the boom and are lower after the boom than before it. This is due to a reduction in the expected rate of return that lowers saving directly and lowers investment both

8 While this result depends only on the assumption that $\frac{\sigma^2}{\partial\pi/\partial k} \to 0$, the effects of an economic boom on expected returns and the risk-premium depend crucially on whether σ is "small" or $\frac{\partial\pi}{\partial k}$ is "large". In the first case, expected returns and the risk premium remain roughly constant throughout the boom. In the second case, these two variables fall dramatically during the boom.

because saving is lower and also because foreign assets are relatively more attractive. In this case, the effects of the boom on investment and the current account reflect the trade-off between two forces. On the one hand, diminishing returns encourage consumers to change the composition of their portfolios towards foreign assets. On the other hand, their desire to diversify risk discourages consumers from changing too much the composition of their portfolios. The result is that the fraction of the marginal unit of wealth that is invested in domestic capital is positive but smaller than the average one. In creditor countries, this necessarily implies that the current account goes into a surplus. In debtor countries however, it is possible that an increase in the share of foreign assets can be achieved by simply running a small current account deficit.

As this last example shows, one should not expect strong general results linking income shocks to current account responses. Even in such a stylized model as the one presented here, this response can take many forms depending on a variety of factors. Moreover, we shall show next that simple and realistic extensions of the theory lead to an even wider set of possibilities.

III. Other Effects of Income Shocks

Income shocks are changes in the wealth of a country. The new rule applies if these changes in wealth do not affect the composition of the country portfolio. In the simple model developed above, changes in wealth can only affect the composition of the country portfolio through changes in expected returns. But there are reasons to believe that changes in wealth can affect the composition of country portfolios even in the absence of changes in expected returns. This could be due to psychological reasons. Many believe, for instance, that risk aversion declines with the level of wealth and, ceteris paribus, increases in wealth should lead investors to pursue more aggressive investment strategies. This could also reflect the investor’s optimal response to changes in the composition of his/her total wealth (human plus financial).

If labour income is less risky than financial income, increases in financial wealth raise the overall risk faced by investors and, ceteris paribus, should lead them to adopt more prudent investment strategies. The risk premium should take all these considerations into account.[9]

To explore these issues, we extend the model in two directions. First, we generalize the utility function as follows:

$$(9) \qquad E\int_0^{\infty} \ln(c-\gamma)\cdot e^{-\delta \cdot t}\cdot dt .$$

Consumers now exhibit decreasing (increasing) relative risk-aversion in wealth if $\gamma>0$ ($\gamma<0$). Second, we assume there is an additional technology that uses labour to create a flow of production equal to $\lambda \cdot dt$.[10] Appendix I shows that these assumptions lead to this generalization of the arbitrage Equation (6):

$$(10) \qquad \pi-\rho=(\pi^*-\rho)\cdot\frac{\sigma\cdot\eta}{\sigma^*}+\sigma^2\cdot\left(1-\eta^2\right)\cdot\frac{k}{a+\dfrac{\lambda-\gamma}{\rho}}$$

and, applying the implicit function theorem, we find that:

---

[9] There exists a rather sophisticated literature that analyzes how optimal investment strategies depend on attitudes towards risk, the size and stochastic properties of labour income and the correlation between asset returns and some aspects of the consumer's environment. See Merton [1995] for an overview of this research, and Bodie, Merton and Samuelson [1992] for an example with risky labour income. An important result that we do not explore here is that, if actual returns are correlated with changes in expected returns, there is a hedging component in asset demands. This hedging component is positive or negative depending of the degree of risk-aversion and, in the magical case of log preferences, turns out to be zero.

[10] The assumption of an aggregate linear technology between labour and capital is less restrictive that it might seem at first glance. It arises naturally in models where some form of factor-price-equalization theorem holds. See Ventura [1997]. This theorem also justifies the assumption that diminishing returns are weak at the country level, even if diminishing returns are strong at the industry level.

(11) $$\frac{\partial k}{\partial a} = \frac{(1-\eta^2)\cdot\sigma^2}{(1-\eta^2)\cdot\sigma^2 - \frac{\partial\pi}{\partial k}\cdot\left(a+\frac{\lambda-\gamma}{\rho}\right)}\cdot\frac{k}{a+\frac{\lambda-\gamma}{\rho}}.$$

Note first that the simple model of Section I obtains if $\lambda=\gamma$. Unlike the previous model it is now possible that the share of domestic capital in the country portfolio increases with wealth. That is, the fraction of the marginal unit of wealth that is invested in domestic capital could be larger than the average one, i.e. $\frac{\partial k}{\partial a} > \frac{k}{a}$. Thus, positive shocks could lead to current account deficits even in creditor countries.

Not surprisingly, variable risk-aversion and labour income do not affect the conditions under which the traditional rule applies. If $\frac{\sigma^2}{\partial\pi/\partial k} \to 0$, the marginal unit of wealth is invested in foreign loans, and $\frac{\partial k}{\partial a} = 0$. Since the additional effects of wealth on investment work through the risk premium (i.e. how investors manage risk) they do not operate if investment risk is negligible relative to diminishing returns. As a result, investor strategies continue to be the same as before, namely to allocate all of wealth to the assets that pays the highest return.

Variable risk-aversion and labour income affect however the conditions under which the new rule applies. In particular, it is no longer necessary or sufficient to assume $\frac{\sigma^2}{\partial\pi/\partial k} \to \infty$ to obtain the new rule, since this condition eliminates only one effect of changes in wealth on the country's portfolio: the effect through changes in expected returns. Now there are two additional effects of changes in wealth. First, there is a risk-aversion effect measured by γ. Ceteris paribus, in the realistic case where $\gamma>0$, increases in wealth reduce the risk-aversion of investors inducing them to increase the share of domestic capital in the country portfolio. Second, there is a wealth-composition effect measured by λ. Ceteris paribus, increases in wealth raise the share of financial wealth in total investor's wealth (financial plus human) inducing them to reduce the share of domestic capital in the country portfolio. The new rule applies whenever these three effects cancel each other. For instance, in the simple model of Sections II and III, we assumed implicitly that $\lambda=\gamma=0$ so that the risk-aversion and wealth-composition effects are nil (so that our sophisticated investors act as simple mean-variance ones). Consequently, the new rule applies if and only if we shut down the effect that income shocks have on country portfolios through changes in expected returns. This, of course, requires that $\frac{\sigma^2}{\partial\pi/\partial k} \rightarrow \infty$.

Should we be discouraged by this myriad of possible current account responses to a simple income shock? We think that this should not be the case. First, this is not an "almost anything goes" type of result. The theory tightly links current account responses to measurable parameters, such as the volatility of production, the curvature of the aggregate production function, the degree of risk aversion and the share of labour in income. This should eventually permit other researchers to calibrate models and perform quantitative analyses of current account movements generated by specific events such as a temporary improvement in the terms of trade or a transitory drop in production. Second, and perhaps more important, the generalization of the intertemporal approach to the current account developed here moves us away from what we think is an impasse in current research. We make this point next.

IV. Traditional Interpretations of the Data

The traditional rule states that countries use only foreign assets to smooth income shocks. According to this rule, changes in saving rates lead to equal changes in the current account. The natural way to test this implication is to estimate the following regression:

(12) $$CA_{ct} = \alpha + \beta \cdot S_{ct} + u_{ct}$$

where c and t index countries and years; and CA is the current account; S is saving; and u is an error term that captures other sources of variation in the current account that are not considered by the theory and are assumed to be orthogonal to saving. Under the null that the traditional rule is true, we should find that β is one. We estimate Equation (12) by ordinary least squares (OLS), using data on current accounts and saving for an unbalanced panel of 13 industrial countries during the 1973-1995 period.[11] Since the saving variable is a residual, i.e. the sum of direct measures of the current account and domestic investment, it is likely to contain substantial measurement error. Therefore, we also present instrumental variables (IV) estimates that mitigate the attenuation bias in the OLS estimates.[12]

Table I presents the results. There is little difference between the OLS and the IV estimates, perhaps indicating that errors in the measurement of saving in this sample are not so serious as one might think a priori. The first two columns show the OLS and IV estimates of β in a regression that pools all country/year observations. The point estimates are 0.236 and 0.229, and we can comfortably reject that β is equal to one. The estimate obtained from the pooled regression uses all the available variation in saving and current accounts. To determine whether this estimate is driven by persistent (between-country variation) or transitory (within-country variation) differences in saving and current accounts, we estimate a cross-sectional regression using time-averages of all variables, and a fixed-effects panel regression to obtain two additional estimates of β. The estimates in columns (3) and (4) use only the between-country variation, while the estimates in columns (5) and (6) use only the

[11] Although data on current accounts and saving is available for many more countries and years, we restrict the sample to those countries for which data on stocks of foreign assets are also available, in order to ensure that our tests of the traditional rule and the new rule are comparable. Appendix II provides a detailed description of our data sources.

[12] To correct the attenuation bias due to measurement error, we use the rank of the dependent variable as the instrumental variable, as suggested by Greene [1990, Chapter 9]. This variable satisfies the requirement that it be correlated with saving. In the first-stage regressions this variable was highly significant . Moreover, if measurement errors are small relative to the size of saving, they are unlikely to scramble the ranking of saving and, as a result, the ranking should not be correlated with these errors.

within-country variation. Although the estimates vary across specifications and range from 0.182 to 0.269, we always overwhelmingly reject the null that β is equal to one. Overall, these results are quite negative for the view that the traditional rule provides a good description of the data. This should come as no surprise, since we have simply confirmed that the Feldstein-Horioka finding also applies in our sample.

The traditional rule follows from a view of the world in which there are no arbitrage opportunities to be exploited and financial markets play an important role in eliminating them. These assumptions are formally embedded in the arbitrage Equation (11) which, in the absence of investment risk, states that returns are equalized across countries, i.e. $\pi=\rho$. Provided this equation holds, income shocks cannot affect the domestic capital stock and therefore investment. A first set of explanations of the Feldstein-Horioka finding are based on the notion that the arbitrage equation is a poor description of international financial markets, and we should drop it from our models. A second set of explanations try instead to modify the arbitrage equation so as to reconcile the theory with the data.[13]

Why would the arbitrage equation fail? Perhaps financial markets are not well integrated in the sense that there are unexploited arbitrage opportunities. For example, due to asymmetric information problems and/or the existence of sovereign risk, debtor countries might face binding constraints on how much they can borrow, as creditor countries might find it in their interest to restrain themselves from lending too much. To the extent that income shocks have little or no effects on these constraints, countries would invest these shocks at home despite the ensuing fall in expected returns. The arbitrage equation would also fail if financial markets were not needed to eliminate arbitrage opportunities. A central idea of the Heckscher-Ohlin theory is that commodity trade can equalize factor returns across countries even in the absence of capital flows. This is Samuelson's factor-price-equalization theorem. If

[13] Once again, see Feldstein and Bachetta [1991], Tesar [1991] and Obstfeld and Rogoff [1995] who survey proposed explanations for the Feldstein-Horioka finding.

commodity trade already eliminates return differentials, small costs of international financial transactions would induce countries to invest income shocks at home.

While the notion that asymmetric information, sovereign risk and commodity trade might play an important role in shaping existing patterns of capital flows is appealing, this line of research has not yet generated strong empirical predictions that can be brought to the data. The question, of course, is not whether the world exhibits these features (it certainly does!) but whether they preclude arbitrage from taking place through financial markets. This we do not know. In any case, the finding that changes in wealth lead to changes in the current account that are proportional to the share of foreign assets in total assets (See Figure IV and Section V) poses a new challenge to this set of explanations. It is not immediate to see why we should observe this regularity in a world in which arbitrage is either not achieved or, alternatively, it is achieved without the help of financial markets.

How might we rescue the arbitrage equation? Perhaps the theory is not wrong, but instead we are just trying to test an overly-simplistic version of it in which countries receive only idiosyncratic or country-specific income shocks. Consider the possibility that countries receive common or global income shocks. Since the world is a closed economy, these shocks would raise savings and investment in all countries. Consider also the possibility that countries receive persistent shocks to their rates of population and productivity growth. Standard growth models show how these shocks raise the investment rate that is required to keep the marginal product of capital constant. Modigliani's life-cycle theory of saving predicts that these shocks also raise aggregate saving, as the savings of younger generations increase relative to the dissavings of the older ones. Since common income shocks and/or shocks to the rates of population and productivity growth simultaneously affect saving and investment, the error term in a regression such as (12) is negatively correlated with saving and the estimate of β is biased towards zero. A low estimate of this coefficient therefore does not warrant the conclusion that we should abandon the idea that arbitrage is achieved by financial markets. It just means that we should treat the traditional rule as a conditional result.

This line of argument has been popular among economists because, besides being plausible, it generates a strong empirical prediction: if we control for these additional shocks in Equation (12) we should find that $\beta=1$. Following many other researchers, we test this prediction by re-estimating β using time dummies and measures of population and productivity growth as control variables. Columns (7) to (12) of Table I show the results. Consistent with the results of other researchers, we find that the estimates of β are still much lower than one. Perhaps there are other missing variables that are responsible for the Feldstein-Horioka finding, but they have not been found yet. We agree with Feldstein and Bachetta [1991, p. 319] that the results obtained so far place "(…) on the defenders of that hypothesis the burden of identifying such common causal factors." [14]

V. A New Interpretation of the Data

We propose an alternative empirical strategy which rescues the arbitrage by placing the risk premium at center stage. If investment risk is not negligible, the arbitrage equation no longer reduces to the simple statement that expected returns are equalized across countries, and a whole new range of theoretical possibilities arises. In particular, Equation (11) shows that the current account response to a simple income shock can be positive or negative and depends on a number of

[14] There are also papers that assume the traditional rule is correct, and then use the current account to indirectly test the permanent-income theory of consumption. Sheffrin and Woo [1990], Otto [1992], Ghosh [1995], Ghosh and Ostry [1995] assume that investment follows an exogenously given process and compute "permanent" or net present values of income *net of investment*. They use these series to test whether the current account tends to be positive (negative) when income *net of investment* is above its net present value using the technique developed by Campbell [1987] to test the permanent-income theory of consumption. An innovation in this line of research is Glick and Rogoff [1995]. This paper uses a model with adjustment costs to capital and persistent shocks to productivity to derive the "permanent" or net present value of income *net of investment*, and also distinguishes between global and country-specific shocks. Remember the theory is only concerned with the latter (see footnote 5).

country characteristics including the expected returns and volatility of production (π,σ), the size of labour income (λ), the attitudes towards risk (γ), and the level of wealth (a). Recognizing that investors demand a risk premium therefore shows how special the traditional rule is. More important, recognizing that investors demand a risk premium also suggests another special case that turns out to be more relevant empirically: the new rule.

The new rule states that changes in saving lead to changes in the current account that are proportional to the share of foreign assets in total assets. To test this prediction, let X_{ct} be the share of foreign assets in total assets and consider this regression:

$$(13) \qquad CA_{ct} = \alpha + \beta \cdot X_{ct} \cdot S_{ct} + u_{ct}$$

Under the null that the new rule is true, we should find that the estimate of β is one. To estimate this equation, we use additional data on foreign asset positions of countries (see Appendix II for details on how we construct this variable). Since stocks of foreign assets are measured with substantial error, there is now an additional reason to use an instrumental variable procedure to estimate β.

The results are presented in Table II. The different specifications correspond to those used in Table I for the traditional rule. The OLS estimates are generally smaller than the IV estimates, suggesting that the former are contaminated by attenuation bias due to measurement error in foreign assets, and so we focus on the latter. The pooled regression generates an estimate of β equal to 1.034. Columns (4) and (6) show that the between and within estimators are also very close to one, indicating that the pooled estimate is driven by both cross-country and within-country variation simultaneously. Columns (8), (10) and (12) confirm that these results hold after controlling for year effects, population and productivity growth. In none of the specifications (including both the OLS and IV estimates) we can reject the null that β

is equal to one at the five-percent significance level. Overall, this evidence supports the view that the new rule provides a good description of the data.

This conclusion is reinforced if we directly examine country portfolios. After all, the new rule describes conditions under which country portfolios should be very stable over time. Figure V shows that this is the case, by plotting the current portfolio share against its one year, five year and ten year lag. The first panel shows that the year-to-year variation in portfolio shares is negligible. Over longer periods, however, there is a tendency for the share of foreign assets to increase in absolute value over time, as shown by the gradual counterclockwise rotation of the regression line as the lag length increases. Figure V also shows why the new rule is consistent with the Feldstein-Horioka finding: there is a strong home bias in country portfolios. In our sample, the mean absolute value for the share of foreign assets in total assets is 5.5. percent. Under the new rule, the fact that all countries have such low shares in absolute value implies that they invest most of their income shocks at home.

Although the evidence seems to support the new rule, one should view the results in Table II with healthy dose of skepticism. Thus far, we have imposed the restriction that β is the same across countries and over time. In Table III, we relax this restriction and present estimates of β for each cross-section (21 years) and time-series (13 countries) in our sample. The cross-sectional estimates average 1.145 with a relatively low standard deviation of 0.444 and we do not reject the restriction that they are all equal. For only 2 (1,0) out of 21 cross-sectional estimates, can we reject the null that β is one at the 10% (5%,1%) significance level. All of this suggests that the cross-sectional relationship is fairly stable over time and consistent with the new rule. Although the time-series estimates average 1.087, they have a relatively large standard deviation of 1.348 and we do reject that they are equal. For 6 (5,4) out of 13 time-series estimates, we can also reject the null that β is equal to one at the 10% (5%,1%) significance level. Since the time-series estimates reflect the transitory variation in saving and the current account, the discrepancy between cross-sectional and time-series results might indicate short-run departures from the new rule due to various sorts of adjustment costs to investment and/or standard informational problems. Perhaps a future extension of the model that incorporates these elements can help us think with more precision about the source of this discrepancy.

Second, one should keep in mind that our sample includes only thirteen industrial countries. These countries have the most advanced financial markets in the world and the ability of financial markets to perform arbitrage might be considerably less in other samples of countries. For instance, it seems reasonable to predict that a theory of capital flows based on complete arbitrage might be a poor approximation to the functioning of many developing countries that have only rudimentary financial markets. It would be desirable to construct data on foreign assets for a larger set of countries and investigate the extent to which the new rule provides a good characterization of the current account in other samples of countries.

Despite these caveats, we regard the rule that countries smooth income shocks through a combination of assets that resembles their portfolios as an attractive new benchmark from which to think about current account issues. It has a solid theoretical grounding and provides a reasonably good first approximation to the data. Moreover, since it re-interprets the Feldstein-Horioka finding as the flow version of the home bias in country portfolios, it also unifies two central problems in international finance. The next step, of course, is to solve them.

Appendix I: Solution Details

This appendix solves the extended model of Section III with variable-risk aversion and labour income. The simpler model in Section I is just a special case in which $\lambda=\gamma=0$. Consider the problem of a representative consumer that chooses c, k and k* so as to maximize (9) subject to the budget constraint:

$$da = [\pi \cdot k + \pi^* \cdot k^* + \rho \cdot (a - k - k^*) + \lambda - c] \cdot dt + k \cdot \sigma \cdot d\omega + k^* \cdot \sigma^* \cdot d\omega^*$$

and the law of motion of π:

$$d\pi = \mu \cdot dt + \chi \cdot d\omega + \chi^* \cdot d\omega^*$$

In equilibrium, π, μ, χ and χ^* might be functions of the aggregate stocks of domestic capital, but the representative consumer is infinitesimal and does not take into consideration how his/her choices affect aggregates. The Bellman equation of the representative consumer's problem is:

$$\begin{aligned}\delta \cdot V = \max_{<c,k,k^*>} \Big\{ & \ln(c - \gamma) + \frac{\partial V}{\partial a} \cdot [\pi \cdot k + \pi^* \cdot k^* + \rho \cdot (a - k - k^*) + \lambda - c] + \frac{\partial V}{\partial \pi} \cdot \mu + \\ & + \frac{\partial^2 V}{\partial a^2} \cdot \frac{1}{2} \cdot [k^2 \cdot \sigma^2 + k^{*2} \cdot \sigma^{*2} + 2 \cdot k \cdot \sigma \cdot k^* \cdot \sigma^* \cdot \eta] + \frac{\partial^2 V}{\partial \pi^2} \cdot \frac{1}{2} \cdot [\chi^2 + \chi^{*2} + 2 \cdot \chi \cdot \chi^* \cdot \eta] + \\ & + \frac{\partial^2 V}{\partial a \partial \pi} \cdot [(k \cdot \sigma \cdot (\chi + \chi^* \cdot \eta) + k^* \cdot \sigma^* \cdot (\chi \cdot \eta + \chi^*))] \Big\}\end{aligned}$$

and the first-order conditions associated with this Bellman equation are:

$$0 = \frac{1}{c - \gamma} - \frac{\partial V}{\partial a}$$

$$0 = \frac{\partial V}{\partial a} \cdot (\pi - \rho) + \frac{\partial^2 V}{\partial a^2} \cdot \sigma \cdot (k \cdot \sigma + k^* \cdot \sigma^* \cdot \eta) + \frac{\partial^2 V}{\partial a \partial \pi} \cdot \sigma \cdot (\chi + \chi^* \cdot \eta)$$

$$0 = \frac{\partial V}{\partial a} \cdot (\pi^* - \rho) + \frac{\partial^2 V}{\partial a^2} \cdot \sigma^* \cdot (k^* \cdot \sigma^* + k \cdot \sigma \cdot \eta) + \frac{\partial^2 V}{\partial a \partial \pi} \cdot \sigma^* \cdot (\chi \cdot \eta + \chi^*)$$

It is straightforward to verify that $V = \delta^{-1} \cdot \ln\left\{a + \frac{\lambda - \gamma}{\rho}\right\} + f(\pi)$ solves the Bellman equation. Using this value function and the first-order conditions, it is direct to show that all the equations in the paper are special cases of this model.

Appendix II : Variable Definitions and Data Sources

This Appendix describes the data used in this paper.

Data on stocks of foreign assets are drawn from international investment positions (IIPs) reported in the International Monetary Fund's Balance of Payments Statistics Yearbook, Revisions 4 and 5. This source reports annual estimates of stocks of foreign assets and liabilities for most OECD countries, and a few non-OECD countries, in current US dollars. For some countries and for some items, these stocks incorporate various adjustments for changes in valuation and exchange rates, using methodologies that vary across sources. We measure a country's holdings of foreign capital (k*) as direct and portfolio equity investment abroad (Revision 5 lines 8505 and 8610), and its net lending abroad (a-k-k*) as the net IIP balance (line 8995) less net direct investment (line 8505- line 8555) less net portfolio equity investment (line 8610-line 8660). Data on these variables are generally available since the early 1980s under the Revision 5 presentation. For some countries, data for earlier years is available under the Revision 4 presentation of the IIP. For these countries, we extend the Revision 5 data backwards using changes in the Revision 4 stocks to the earliest available year. In particular, we use BOPS4 lines 3L.V4 and 6D1V4 to extend outward direct and portfolio equity investment, line ...V4 to extend the net IIP, and lines 3L.V4-3Y.V4 and 6D1.V4 – (6V1V4+6S1V4) to extend net direct and portfolio equity investment. Due to data revisions undertaken for the Revision 5 and some minor conceptual differences between the Revision 5 financial account and the Revision 4 capital account, there are some small discrepancies between the Revision 4 and Revision 5 figures for some countries in some years where the two sources overlap. We then restrict the sample to the 13 OECD countries for which the most complete data are available. To make the panel somewhat more balanced, we exclude the handful of observations available prior to 1973. The sample of countries and the time series coverage by source are indicated in Appendix Table I.

We measure a country's holdings of domestic capital (k) as the gross domestic capital stock, less inward direct and portfolio equity investment. We construct the gross domestic capital stock in current US dollars by cumulating gross domestic investment in current US dollars from the World Bank World Global Development Indicators (WBGDI) (NY.GDI.MKTP.CD), assuming a depreciation rate of 4 percent per year, and in each year revaluing the previous year's stock using the US gross domestic investment deflator (WBGDI, NY.GDI.MKTP.CD / NY.GDP.MKTP.KD). We estimate the initial capital stock in 1965 using the average capital-output ratio over the period 1960-65 reported in Nehru and Dareshwar [1993], multiplied by GDP in current US dollars (WBGDI, NY.GDP.MKTP.CD).

We use the flow measure of the current account reported in the Balance of Payments Statistics Yearbook in current US dollars (line 4993), and we measure gross national savings residually as the sum of the current account plus gross domestic investment in current US dollars from the WBGDI. Our results are qualitatively very similar if we instead use direct measures of saving from the national income accounts.[15]

The control variables in Tables I and II are constructed as follows. Population growth is the growth in the mid-year population (WBGDI, SP.POP.TOTL). The Solow residual is the annual growth rate of GDP in constant 1995 US dollars (WBGDI, NT.GDP.MKTP.KD), less the share of wages in GDP times the growth rate of total civilian employment (OECD Labour Force Statistics, Table 6), less one minus this share times the growth rate of the gross domestic capital stock in constant US dollars. The share of wages in GDP is measured as the average over 1960-1993 of compensation of employees divided by GDP (OECD National Accounts, M0COM /M0GDPE). We construct the capital stock by cumulating constant 1995 US dollar gross domestic investment flows as above, using the Nehru and Dareshwar [1993]

[15] This is not true as an identity, since all the countries in our sample provide direct estimates of saving in the national income accounts (see Schmidt-Hebbel and Serven [1997, Table A1].

estimate of the capital-output ratio times the GDP in constant 1995 US dollars as a base in 1965.

The dataset used in this paper is available from the authors upon request.

The World Bank
Massachusetts Institute of Technology

References

Bodie, Zvi, Robert Merton, and William Samuelson, "Labor Supply Flexibility and Portfolio Choice in a Life Cycle Model," Journal of Economic Dynamics and Control, XVI (1992), 427-449.

Campbell, John, "Does Savings Anticipate Declining Labor Income? An Alternative Test of the Permanent-Income Hypothesis," Econometrica, LV (1987), 1249-73.

Dornbusch, Rudiger, "Real Interest Rates, Home Goods, and Optimal External Borrowing," Journal of Political Economy, XCI (1983), 141-153.

Feldstein, Martin, and Charles Horioka, "Domestic Savings and International Capital Flows," Economic Journal, XC (1980), 314-329.

Feldstein, Martin and Philippe Bachetta, "National Saving and International Investment," in B.D. Bernheim and J.B. Shoven, eds., National Savings and Economic Perfromance, University of Chicago Press, 1991.

French, Kenneth and James Poterba "Investor Diversification and International Equity Markets," American Economic Review, XXXI (1991), 222-226.

Ghosh, Atish, "Capital Mobility Amongst the Major Industrialized Countries: Too Little or Too Much," Economic Journal, CV (1995),107-128.

Ghosh, Atish, and Jonathan Ostry, "The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach". World Bank Economic Review, IX (1995), 305-333.

Glick, R.and K. Rogoff, "Global versus Country-specific Productivity Shocks and the Current Account," Journal of Monetary Economics, XXXV (1995), 159-192.

Greene, William, Econometric Analysis, MacMillan, 1990.

Jones, Larry and Rodolfo Manuelli, "A Convex Model of Equilibrium Growth: Theory and Policy Implications," Journal of Political Economy, XCVIII (1990),1008-1038.

Lewis, Karen, "Trying to Explain Home Bias in Equities and Consumption," Journal of Economic Literature, XXXVII (1999), 571-608.

Matsuyama, Kiminori, "Current Account Dynamics in a Finite Horizon Model," Journal of International Economics, XXIII (1987), 299-313.

Merton, Robert, "Optimum Consumption and Portfolio Rules in a Continuous-Time Model," Journal of Economic Theory, III (1971), 373-413.

Merton, Robert, Continuous-Time Finance, Basil Blackwell, 1995.

Nehru, Vikram, and Ashok Dareshwar, "A New Database on Physical Capital Stock: Sources, Methodology and Results," Revista de Analisis Economico, VIII (1993), 37-59.

Obstfeld, Maurice, "Aggregate Spending and the Terms of Trade: Is There are Laursen-Metzler Effect?," Quarterly Journal of Economics, XC (1982), 251-270.

Obstfeld, Maurice and Kenneth Rogoff, "The Intertemporal Approach to the Current Account," in Gene Grossman and Kenneth Rogoff, eds. Handbook of International Economics. Amsterdam, Elsevier, 1995.

Otto, Glenn, "Testing a Present-Value Model of the Current Account: Evidence from US and Canadian Time Series," Journal of International Money and Finance, XI (1992), 414-430.

Persson, Torsten, and Lars Svensson, "Current Account Dynamics and the Terms of Trade: Harberger-Laursen-Metzler Two Generations Later," Journal of Political Economy, XCIII (1985), 43-65.

Sachs, Jeffrey, "The Current Account and Macroeconomic Adjustment in the 1970s," Brookings Papers on Economic Activity, I (1981), 201-68.

Sachs, Jeffrey, "The Current Account in the Macroeconomic Adjustment Process," Scandinavian Journal of Economics, XXCIV (1982), 147-159.

Schmidt-Hebbel, Klaus, and Luis Servén, "Saving Across The World: Puzzles and Policies," The World Bank, Discussion Paper No. 354, 1997.

Sheffrin, Steven and Wing Thye Woo, "Present Value tests of an Intertemporal Model of the Current Account," Journal of International Economics, XXIX (1990), 237-253.

Svensson, Lars, and Assaf Razin, "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect," Journal of Political Economy, XCI (1983), 97-125.

Tesar, Linda, "Savings, Investment and International Capital Flows," Journal of International Economics, XXXI (1991), 55-78.

Tesar, Linda, and Ingrid Werner, "Home Bias and the Globalization of Securities," National Bureau of Economic Research, Working Paper No. 4218, 1992.

Ventura, Jaume, "Growth and Interdependence," Quarterly Journal of Economics, CXII (1997), 57-84.

Table I: Testing the Traditional Rule

	Pooled Regression		Between Regression		Within Regression		Pooled Regression		Between Regression		Within Regression	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Gross National Saving/GNP	0.236	0.229	0.265	0.269	0.193	0.182	0.264	0.271	0.134	0.176	0.421	0.409
	0.029	0.035	0.073	0.121	0.049	0.053	0.027	0.034	0.080	0.171	0.066	0.065
Solow Residual							0.149	0.209	-1.790	-0.855	0.191	0.231
							0.105	0.100	0.161	1.637	0.070	0.070
Population Growth							-1.355	-1.172	-2.822	-1.682	0.145	0.121
							0.266	0.264	1.032	1.620	0.396	0.392
R-Squared	0.158	0.158	0.251	0.251	0.569	0.569	0.380	0.378	0.495	0.471	0.700	0.700
Number of Observations	247	247	13	13	247	247	247	247	13	13	247	247
P-Value for null hypothesis that coefficient on savings = 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the results of estimating $CA_{ct}=\alpha+\beta\cdot S_{ct}+\gamma' Z_{ct}+u_{ct}$, where CA_{ct} and S_{ct} denote the current account and savings as a share of GNP in country c in year t; Z_{ct} is a vector of control variables; and u_{ct} is a disturbance term. The pooled regressions report the results pooling all country and year observations and including a constant. The between regressions report the results using 13 country-averages of all variables, and including a constant. The within regressions report results using country fixed effects. Columns (7)-(8) and (11)-(12) also include year effects. Constants, country and year effects are not reported. The instrumental variables estimates (IV) use the ranks of each of the non-constant right-hand side variables as instruments. The sample consists of an unbalanced panel of annual observations over the period 1973-1995 for 13 OECD countries. Standard errors are corrected for heteroskedasticity. See Appendix II for variable definitions and data sources.

Table II: Testing the New Rule

	Pooled Regression		Between Regression		Within Regression		Pooled Regression		Between Regression		Within Regression	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV	(9) OLS	(10) IV	(11) OLS	(12) IV
(Gross National Saving/GNP)x	0.955	1.034	0.996	1.046	0.689	1.018	0.885	0.945	0.838	0.833	0.645	0.906
(Foreign Assets/Total Assets)	0.078	0.102	0.145	0.212	0.187	0.243	0.069	0.090	0.196	0.191	0.187	0.227
Solow Residual							0.170	0.182	-0.607	-0.633	0.229	0.231
							0.089	0.090	1.112	1.042	0.075	0.075
Population Growth							-0.948	-0.740	-1.927	-1.641	0.526	0.657
							0.252	0.251	0.749	0.818	0.416	0.421
R-Squared	0.369	0.369	0.684	0.684	0.563	0.558	0.494	0.493	0.803	0.800	0.653	0.651
Number of Observations	247	247	13	13	247	247	247	247	13	13	247	247
P-Value for null hypothesis that coefficient on savings x foreign assets = 1	0.564	0.739	0.978	0.828	0.096	0.941	0.096	0.541	0.409	0.382	0.058	0.679

This table reports the results of estimating $CA_{ct}=\alpha+\beta\cdot X_{ct}\cdot S_{ct}+\gamma Z_{ct}+u_{ct}$, where CA_{ct} and S_{ct} denote the current account and savings as a share of GNP in country c in year t; X_{ct} is the share of foreign assets in total assets; Z_{ct} is a vector of control variables; and u_{ct} is a disturbance term. The between regressions report the results using 13 country-averages of all variables, and including a constant. The within regressions report results using country fixed effects. Columns (7)-(8) and (11)-(12) also include year effects. Constants, country and year effects are not reported. The instrumental variables estimates (IV) use the ranks of each of the non-constant right-hand side variables as instruments. The sample consists of an unbalanced panel of annual observations over the period 1973-1995 for 13 OECD countries. Standard errors are corrected for heteroskedasticity. See Appendix II for variable definitions and data sources.

Table III: Cross-Country and Times Series Evidence for the New Rule

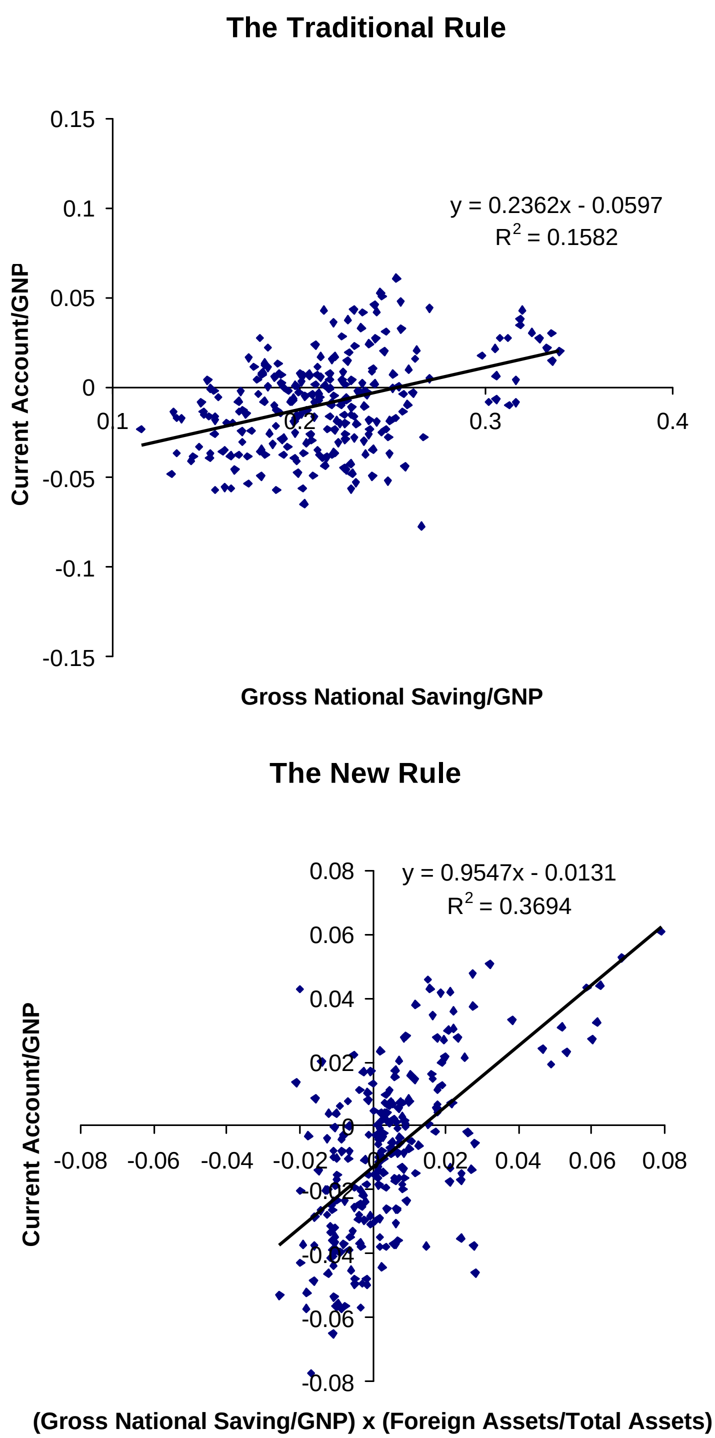
	Coefficient	Std. Error	P-Value for Ho: β=1	Number of Observations
Cross-Sectional Estimates by Year				
1975	2.051	0.694	0.130	9
1976	1.519	0.258	0.045	9
1977	0.866	0.465	0.772	9
1978	0.557	0.641	0.490	9
1979	0.662	0.455	0.458	10
1980	1.193	0.341	0.571	10
1981	2.073	0.598	0.073	10
1982	1.640	0.428	0.135	12
1983	1.457	0.259	0.078	12
1984	1.057	0.461	0.901	12
1985	1.364	0.420	0.386	12
1986	1.167	0.477	0.727	12
1987	0.990	0.371	0.979	12
1988	0.954	0.405	0.910	12
1989	1.285	0.386	0.459	13
1990	0.922	0.240	0.745	12
1991	1.049	0.243	0.839	12
1992	1.265	0.278	0.341	12
1993	0.970	0.265	0.909	12
1994	0.667	0.322	0.302	12
1995	0.338	0.429	0.123	12
Average	1.145			
Standard Deviation	0.444			
Time-Series Estimates by Country				
Australia	2.384	0.690	0.045	23
Austria	3.580	0.900	0.004	23
Canada	0.596	0.641	0.528	23
Germany	2.373	0.352	0.000	15
Spain	0.072	0.509	0.068	23
Finland	1.192	1.470	0.896	21
France	0.582	0.257	0.103	7
United Kingdom	-1.442	0.808	0.003	23
Italy	1.038	1.097	0.972	23
Japan	1.543	0.332	0.102	17
Netherlands	0.204	0.163	0.000	14
Sweden	2.289	1.022	0.207	14
United States	-0.286	1.910	0.501	23
Average	1.087			
Standard Deviation	1.348			

This table reports the results of estimating the second equation in Table II. The upper panel reports the results of cross-country estimates for each year, and the lower panel reports the results of time-series estimates for each country. Standard errors are corrected for heteroskedasticity. See Appendix II for variable definitions and data sources.

Appendix Table I: Coverage of IIP Data

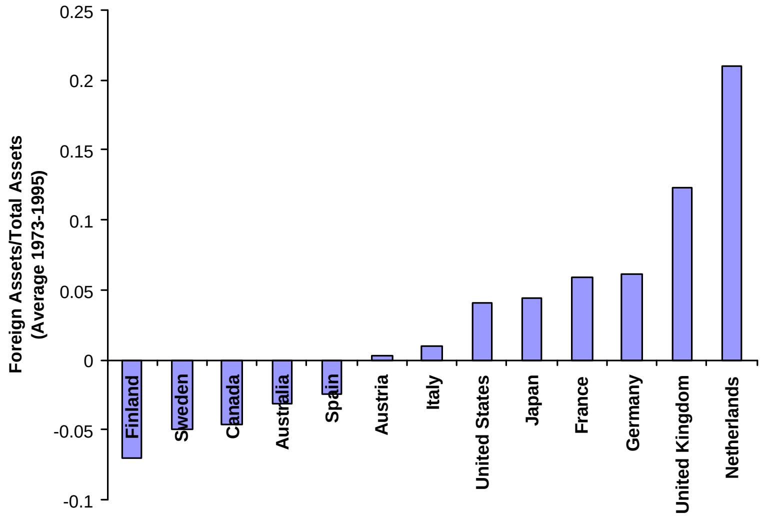
Country	Availability	Data from BOPS4
Australia	1973-97	1973-85
Austria	1973-96	1973-79
Canada	1960-97	
Germany	1975-89	1975-79
Spain	1972-97	1972-80
Finland	1975-97	
France	1989-96	
United Kingdom	1973-97	1973-79
Italy	1972-97	
Japan	1979-97	1979
Netherlands	1982-96	
Sweden	1982-96	
United States	1972-97	1972-79

Figure I: Saving and the Current Account
In 13 OECD Economies, 1973-95



See Appendix II for variable definitions and data sources.

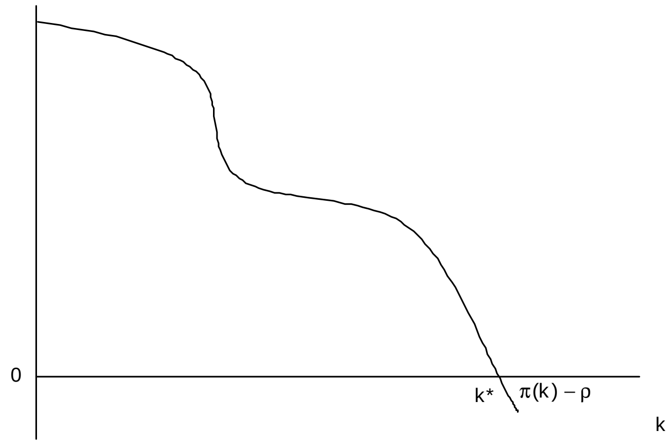
Figure II: Foreign Asset Positions In 13 OECD Economies, 1973-95



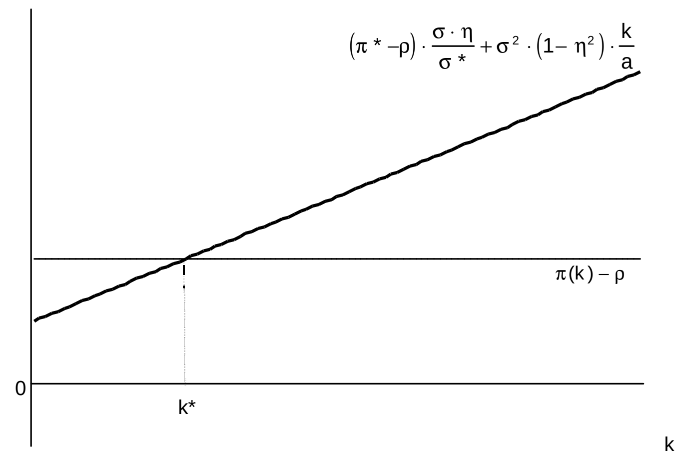
See Appendix II for variable definitions and data sources.

Figure III: Country Portfolios

The Traditional Rule: No Investment Risk, Diminishing Returns



The New Rule: Investment Risk, No Diminishing Returns



The General Case: Investment Risk and Diminishing Returns

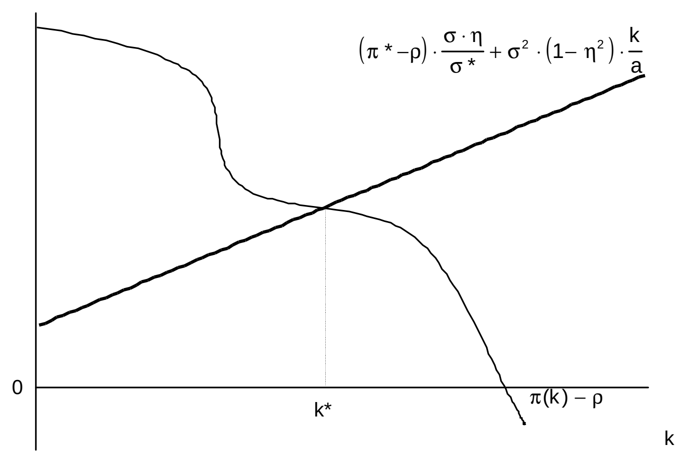
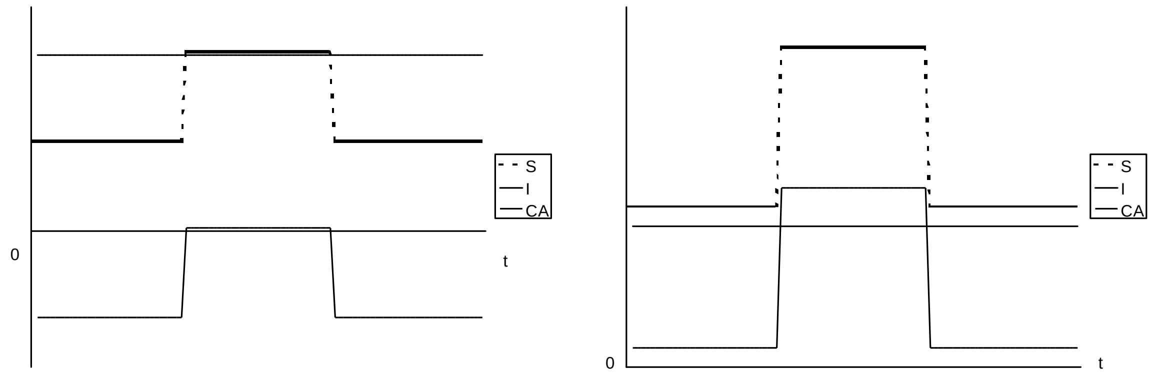


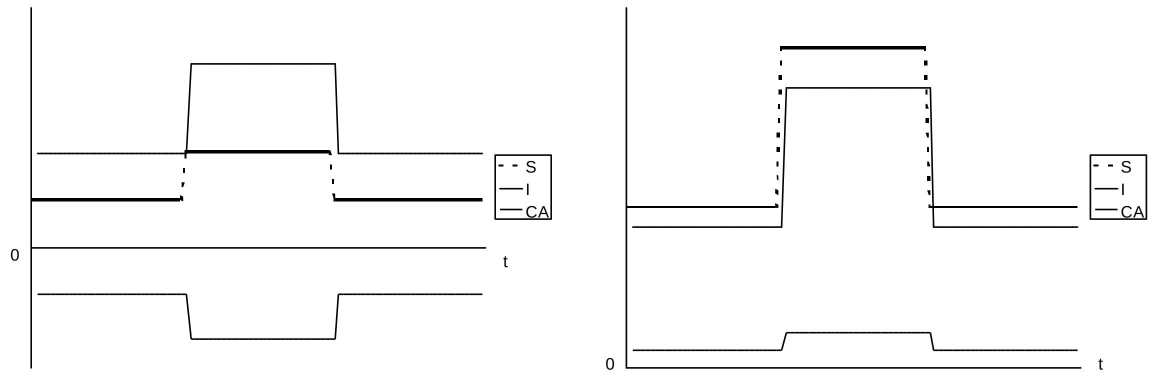
Figure IV: Theoretical Impulse Responses

Debtor Countries | **Creditor Countries**

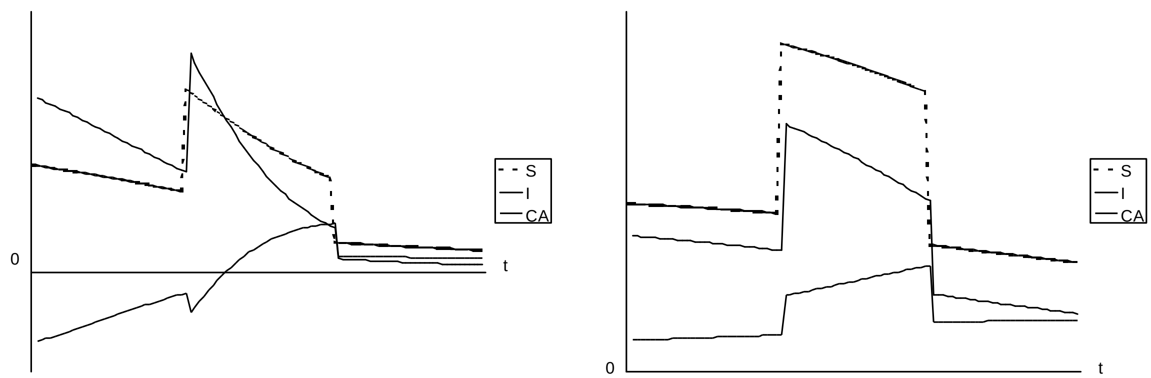
The Traditional Rule: No Investment Risk, Diminishing Returns



The New Rule: Investment Risk, No Diminishing Returns

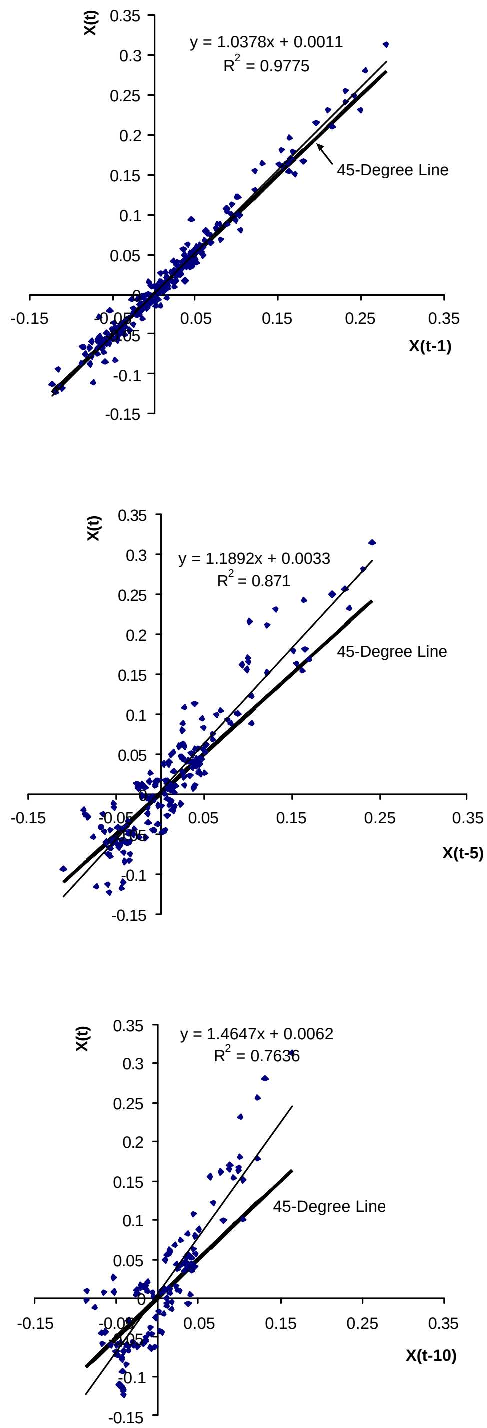


The General Case: Investment Risk and Diminishing Returns



These figures are generated under the following assumptions: (i) no foreign investment, $k^*=0$; (ii) $\pi(k)=\alpha-\beta\cdot k$, with $\alpha=0.04$ and $\beta= 0$ ($\beta= 0.001$) for the case of no diminishing (diminishing returns); (iii) $\sigma=0.10$ ($\sigma=0.15$) for debtor (creditor) countries; (iv) $\rho=\delta=0.02$, (v) initial wealth $a_0=1$, and (vi) the shock $\varepsilon=0.02$.

Figure V: The Persistence of Country Portfolios



This figure plots the share of foreign assets in total assets (X(t)) on the vertical axis, against the share of foreign assets in total assets lagged one year (X(t-1)), five years (X(t-5) and ten years (X(t-10)). See Appendix II for data definitions and sources.