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What Determines the Current Account? A Cross-Sectional and Panel Approach

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Abstract

This paper uses cross-section and panel data to examine the determinants of the current account. The empirics find a significant impact of the stage of development and demographic factors in the cross section. Estimating partial-adjustment and error-correction models using panel data, the paper finds a short- and long-run impact of fiscal policy on the current account in the time series. The real exchange rate, the business cycle and the terms of trade are also shown to have short-run effects on the current account, while the stage of development and demographics have longer-run effects.

JEL Classification Numbers:

C33, F32, F41

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Summary

Persistent external imbalances among industrial and developing countries in recent years continue to provide impetus for examining issues surrounding the determination and sustainability of current account positions. Why do some countries experience chronic current account deficits, and why are some imbalances a cause for greater concern than others?

The purpose of this paper is to explore the factors that may affect the long-run determination of the current account in a broad cross section of countries. From a policy perspective, a better understanding of the factors underlying longer-term developments in the current account is central to assessing whether policies aimed at attaining domestic economic objectives are compatible with a sustainable external position.

The empirical analysis examines to what extent a common set of underlying determinants has been relevant historically in explaining current account balances across countries and over time. Using economic theories of saving and investment as a guide, the analysis investigates the role of the stage of development, demographics, macroeconomic policies, and other considerations in underpinning sustained current account positions.

The paper uses two approaches to estimate the determinants of current account positions. The first approach uses cross-sectional data, whereby each country's average current account position is assumed to approximately reflect a long-run equilibrium outcome. The second approach uses panel data on a sample of industrial countries. Short-run variables are used to find that current account positions are not necessarily in long-run equilibrium in each time period. Within the panel approach we estimate a partial adjustment model of the current account and an error-correction model of net foreign assets.

Using the cross-sectional approach, we find that the stage of development and demographics have a significant impact (in most cases) on current account positions. When we turn to the more dynamic approach of the partial adjustment or error-correction model, we find that fiscal policy has a large impact on the current account. Deteriorations in the fiscal position are associated with deteriorations in the current account or net foreign assets (although not one-for-one). We also find a significant impact of short-run variables such as real exchange rate changes, the stage of the cycle, and terms of trade changes, in addition to the long-run impact of stage of development and demographics (in general). The error-correction specification suggests that the half life of a shock to the equilibrium net foreign asset position is about six or seven years.

I. Introduction

Persistent external imbalances among industrial and developing countries in recent years continue to provide impetus for examining issues surrounding the determination and sustainability of current account positions. Why do some countries experience chronic current account deficits, and why are some imbalances a cause for greater consternation than others? In developing countries, for example, recent turbulence in emerging markets has raised some concerns about the potential adverse impact of prevailing deficits on market sentiment and external financing. Meanwhile, in many advanced economies, the outlook regarding aging populations has raised general concerns about the adequacy of domestic savings and the level of the current account balance.

From a policy perspective, a better understanding of the factors underlying longer-term developments in the current account is central for assessing whether policies aimed at domestic objectives are compatible with a sustainable external position. Experience has clearly demonstrated that in those instances where an inconsistency has emerged, market pressures, particularly through the exchange rate, 1/ can act to swiftly undermine existing policies, while restoring external viability at considerable cost.

To determine the extent to which a given current account balance may be sustainable (if not desirable) for a particular economy, one needs to consider the context in which external developments have taken place as well as prospects for the future. In turn, if the actual current account were to diverge from a position implied by its long-run determinants, the ultimate sustainability of the external position could come into question.

The purpose of this paper is to explore the factors which may affect the long-run determination of the current account in a broad cross section of countries. Using cross-sectional and panel data, the empirical analysis examines to what extent a common set of underlying determinants has been relevant historically in explaining current account balances across countries and over time. Using economic theories of saving and investment as a guide, the analysis investigates the role of the stage of development, demographics, macroeconomic policies and other considerations in underpinning sustained current account positions.

The findings can be summarized as follows. In the cross section, we find a significant effect of stage of development on the current account. The general effect is that the more advanced the economy, the more likely it is to run a smaller deficit/larger surplus. We also find an effect of

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1/ The nexus between exchange rates and external (and internal) balance was originally developed by Meade (1951) and Swan (1963). More recently, this basic framework has been applied to the analysis of fundamental or desired equilibrium exchange rates. See Clark et al (1994), Williamson (1994), and the references therein.

demographics on the long-run current account position. A country that has an above average dependency ratio (ratio of dependents to the working age population) tends to have a larger current account deficit. In the cross section, we find little impact of the budget position. However, when turning to a more dynamic specification, we find that the fiscal position has a significant effect on the current account and the net foreign asset position, in addition to the effects of the stage of development and demographics. In the dynamic model, we also identify short-run effects of the exchange rate, the terms of trade and the cyclical position on the current account.

The rest of the paper is structured as follows. Section II provides a brief review of standard theories of current account determination to motivate the choice of explanatory variables in the empirics that follow. Section III discusses the methodology and data-set used in obtaining the results. Section IV presents the results from the cross-sectional and panel regressions. Section V offers some concluding remarks.

II. Theories of Current Account Determination

A commonly-used approach to examining current account developments has relied on the standard trade model, based on the elasticities approach to the balance of payments. 1/ This approach has the benefit of straightforward empirical predictions, which were often found to be helpful in examining the short-run implications of exchange rate changes on the trade balance. However, due to its partial-equilibrium nature and static context, this approach was inherently limited in its ability to explain longer-term developments in the saving-investment balance without a further reconciliation with the absorption approach and without greater attention to general equilibrium dynamics.

Turning to dynamic optimizing models, modern theories of current account determination have focused on its role as a buffer against transitory disturbances to output and demand. Indeed, the basic insight of the intertemporal approach to the balance of payments is that the current account can act as a shock absorber to temporary changes in national cash flow or net output (i.e., output less investment and government spending) in order to smooth consumption and maximize welfare. 2/

As illustrated by the small open economy version of the Ramsey model, 3/ under dynamic optimization, transitory disturbances should

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1/ See Goldstein and Khan (1985) for a review.

2/ See Sachs (1981) for a discussion of the intertemporal optimizing approach and current account developments following the oil shocks in the 1970s. See Obstfeld and Rogoff (1995) and Razin (1995) for recent surveys of the theory and evidence for the intertemporal approach to the current account.

3/ See Blanchard and Fischer (1989) for a review of the Ramsey model.

affect saving rather than consumption. Hence, at the national level, country-specific shocks 1/ should affect domestic saving and the current account. So for example, in response to (say) a temporary adverse terms of trade or productivity shock, an open economy would prefer to run a current account deficit and borrow from abroad rather than allow consumption to fall.

While the intertemporal approach has been fruitful in explaining current account movements at business-cycle frequencies, the consumption smoothing model has generally had less to say on *sustained* current account imbalances and trend developments. 2/ Nevertheless, the model can be used to analyze longer-term variation in current account balances, as illustrated by the relation between the current account, investment and the stage of economic development in the permanent income model.

In particular, a small open economy which is initially capital (and income) poor, provided it has access to international capital markets, will run current account (and trade) deficits for a sustained period of time in order to build its capital stock while maintaining its long-run rate of consumption. During the adjustment process, a relatively high marginal product of capital domestically will attract capital inflows and raise external indebtedness. Eventually, as output grows toward its long-run level and the return on capital converges to its value abroad, the current account will improve toward (zero) balance as net exports move sufficiently into surplus to pay the interest obligations on the accumulated external debt.

Long-run growth somewhat complicates the analysis by allowing for the possibility of nonzero current account balances in steady state. Assuming that the stock of net foreign assets does not outpace growth in the overall economy indefinitely, the level of the current account (as a share of GDP) required to stabilize net external indebtedness can be determined. 3/ Hence, structural determinants of the current account could be viewed in terms of the factors that underpin the desired net foreign asset position in the long run. Equivalently, one could view this stock-flow equilibrium

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1/ See Glick and Rogoff (1995) for analysis of the impact of global versus country-specific, and permanent versus transitory shocks on the current account.

2/ In the permanent income model, longer term developments are generally limited to consumption tilting effects resulting from changes in the rate of time preference (which are difficult to measure). Consequently, tests of the (present-value) model have examined *detrended* current account series. See for example Ghosh and Ostry (1995).

3/ Given that the current account CA equals the change in net foreign assets NFA, a stable NFA to GDP ratio $\Delta(NFA/Y)=0$ implies that $CA/Y=gNFA/Y$ in steady state where the factor of proportionality is the long-run growth rate $g = \Delta Y/Y$. If there are real exchange rate trends, the proportional factor g would also take account of the long-run rate of appreciation to account for differing valuation effects on NFA and Y.

relationship in terms of the underlying determinants of saving and investment behavior.

Extending the basic intertemporal approach beyond the representative agent model to an overlapping generations framework, one could introduce life-cycle considerations into the analysis. 1/ With some heterogeneity across age groups, demographic trends through their life-cycle implications become relevant as a source of long-run variation in the current account. 2/ According to the life-cycle model, consumption and saving behavior are directly tied to the stage in the life cycle. Hence, systematic changes in the age structure of the population will affect national saving behavior. To the extent that capital-labor ratios are also affected (via the number of available workers), changes in demographics may affect investment as well.

Similarly, the life-cycle framework could also be used to examine the real effects of fiscal policy on the current account, through its intergenerational consequences. 3/ In the absence of Ricardian equivalence, for example, tax policies will have implications (through net wealth effects) for national saving. In particular, changes in public saving and debt (i.e., the timing of taxes) will not be fully offset by changes in private saving, leading to changes in the current account balance. 4/ Government spending will have a further impact on the current account, even in the permanent income model, through its direct effect on absorption given income. Consequently, the stance of fiscal policy may have important long-run implications for net foreign assets and the current account. 5/

Examining the components of the current account, one could also focus on factors affecting the service and trade accounts. For example, longer-term variation in interest rates might affect the current account through their implications for interest payments (receipts) on net external debt (assets). Similarly, secular trends in the terms of trade may have

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1/ Extending the Blanchard (1985) model to include age-dependent income (e.g., Faruqee, Laxton and Symansky (1995)) or labor supply (e.g., St.Paul (1992)) would generate life-cycle (OLG) type implications. The seminal paper on OLG analysis in an open economy is Diamond (1965).

2/ Masson, Bayoumi, and Samiei (1995) find evidence of demographic factors (and fiscal variables) explaining the cross-country variation in saving rates.

3/ See Frenkel and Razin (1992) for a comprehensive analysis of the role of fiscal policies in an open economy.

4/ In a large open economy, changes in the real interest rate (cost of capital) and its effects on investment should also be taken into account.

5/ See Masson, Kremers, and Horne (1994) for evidence of a long-run impact of public debt and demographics on net foreign assets in the United States, Japan, and Germany.

persistent effects on the current account (via the trade balance) also through their implications for the level of national income. 1/

Extending the permanent income model to include the impact of uncertainty and risk aversion, one could also examine the effects of variability in national income and precautionary savings on the level of the current account. Without certainty (or certainty equivalence), economies facing variable income streams due to (say) terms of trade volatility may find it desirable (without full insurance) to have additional saving as a buffer. Consequently, systematic changes in variability and uncertainty in the relevant income measures could possibly affect the current account balance. 2/

Finally, relaxing the assumption of freely mobile capital, one could approach current account determination by focusing on developments in its counterpart: the capital account. From this flow of funds perspective, the impact of capital controls on the international flow of saving and the current account becomes more apparent. Countries that maintain a relatively closed capital account through barriers and controls, or countries with limited access to foreign borrowing due to country risk, are likely to have smaller current account imbalances than otherwise. 3/ Correspondingly, financial liberalization and changes in capital mobility may have important long-run implications for overall current account positions. 4/

III. Data and Estimation Issues

The above discussion suggests a number of factors which might be important in determining the current account: fiscal policy, the stage of development, including the marginal product of capital, demographics, capital controls, and the terms of trade. This section outlines the

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1/ There will also be an effect on the ratio of the current account to GDP because of the differing impact of the real exchange rate on the numerator and denominator.

2/ See Ghosh and Ostry (1994) for some empirical evidence on the effects of income uncertainty on precautionary saving and the current account.

3/ In a well-known paper, Feldstein and Horioka (1980) implicated low capital mobility as the explanation for the high correlation between saving and investment across countries. See Montiel (1994) for a recent review of measurement issues surrounding capital mobility, and also Obstfeld and Rogoff (1995) for a critical review of the Feldstein-Horioka results and its implications for the intertemporal approach.

4/ A related issue (not addressed here) is the composition of the capital account (i.e., the nature of financing in connection with a given current account deficit). Whether capital inflows predominantly reflect short-term borrowing and portfolio flows or longer-term foreign direct investment has also received significant attention recently in the context of current account sustainability.

methodology adopted in estimating the determinants of current account deficits and discusses the different data samples used.

The sample we use to examine the determinants of the current account deficit uses data over the period 1971-93 for 21 industrial countries. In the Appendix, we use an expanded cross-sectional data set which includes an additional 34 industrial and developing countries. Some of the data are drawn from the savings study by Masson, Bayoumi, and Samiei (1995), while some additional variables are from the IMF and OECD databases and the Summers and Heston database. The list of countries used and the data documentation are given in Appendix 1.

Scatter plots of the current account and the explanatory variables are shown in Charts 1-6 for the sample of industrial countries. The graphs are only suggestive of the relationship between the current account and its various explanators that we will focus on in the next section, as they reflect only partial correlations.

The dependent variable in most of the regressions is the ratio of the current account to GDP. In the panel estimation, the change in the NFA to GDP ratio is also used in an error-correction specification. The stance of fiscal policy is captured in various forms: the general government budget surplus (including interest payments on government debt), government current expenditure and government investment expenditure, all expressed as ratios to GDP.

Stage-of-development effects were measured by real GDP per capita, 1/ calculated relative to that in the United States. As a proxy for the marginal productivity of capital, we use two measures the ratio of the capital stock to GDP, and the capital stock to labor ratio in the larger sample results shown in the Appendix. 2/ These ratios will also capture stage-of-development effects to some extent which may give rise to a problem of multicolinearity in the estimation. Both linear and quadratic terms were included in the regression, so as to capture any potential nonlinearities in the effect of the stage of development, reflecting the need to first borrow and then repay capital. We also estimate a specification that allows for an exponential relation between the capital stock and the current account, which accords more closely with the theory in Section II.

Demographic effects were measured by the dependency ratio--the ratio of the nonworking age population to the working age population. 3/ We also split the dependency ratio into its two components: the ratio of the old

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1/ Real GDP per capita is converted to 1990 real U.S. dollars using purchasing power parity adjustment.

2/ With a Cobb-Douglas production function, the marginal productivity of capital is proportional to either of these two ratios.

3/ More precisely, the dependency ratio is the ratio of the population aged 19 and under and 65 and over, to the population aged between 19 and 65.

Chart 1. Current Account and Dependency Ratio

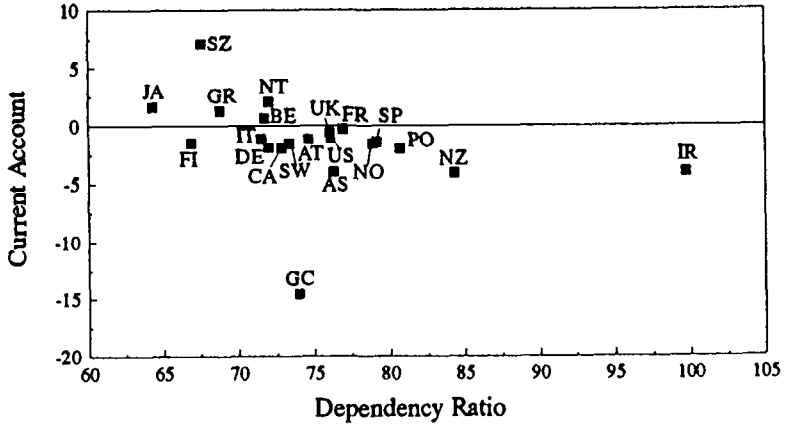


Chart 2. Current Account and Fiscal Position

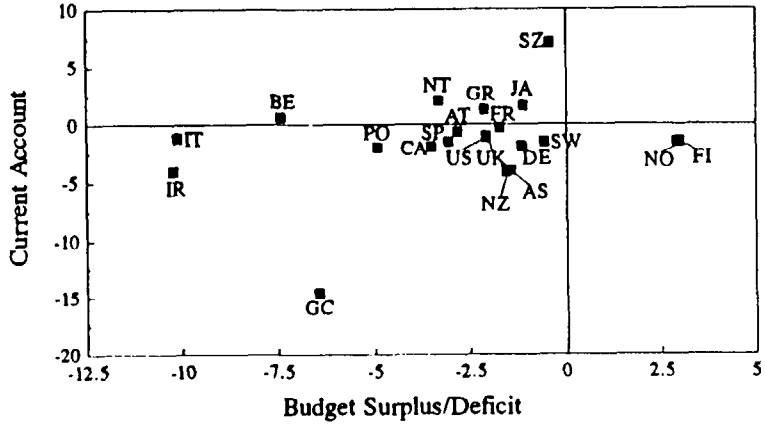


Chart 3. Current Account and Relative Size

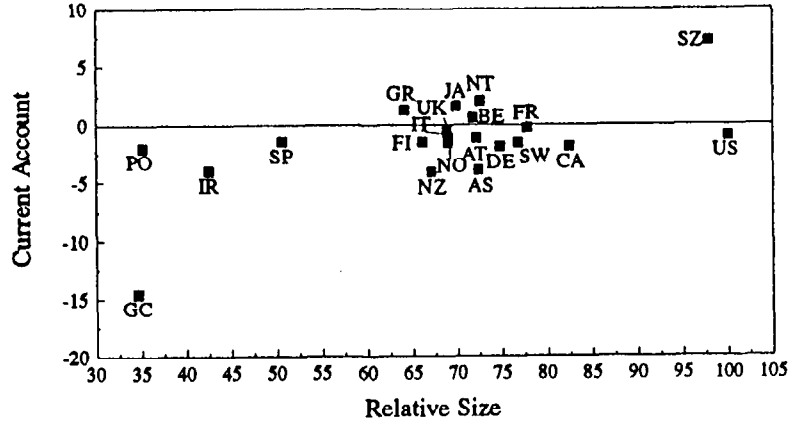


Chart 4. Current Account and Capital/Output Ratio

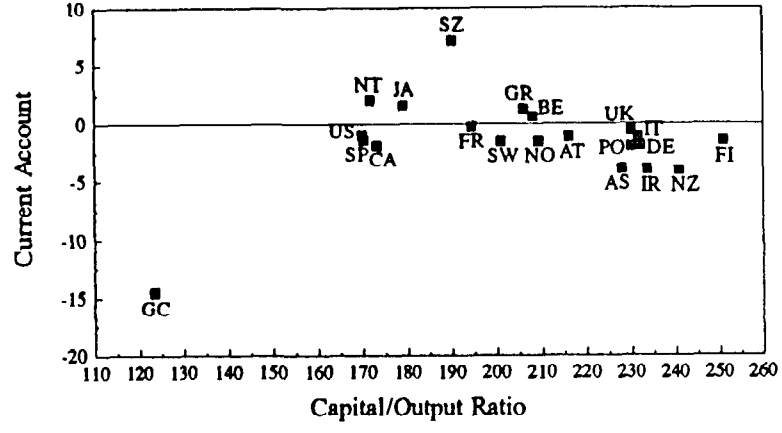


Chart 5. Current Account and Terms of Trade

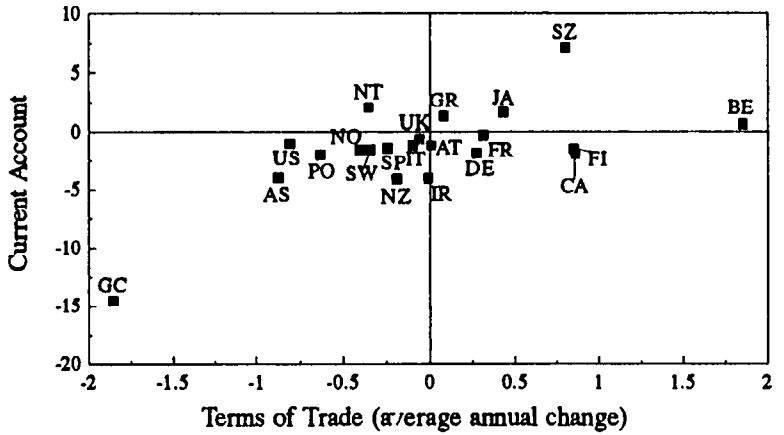
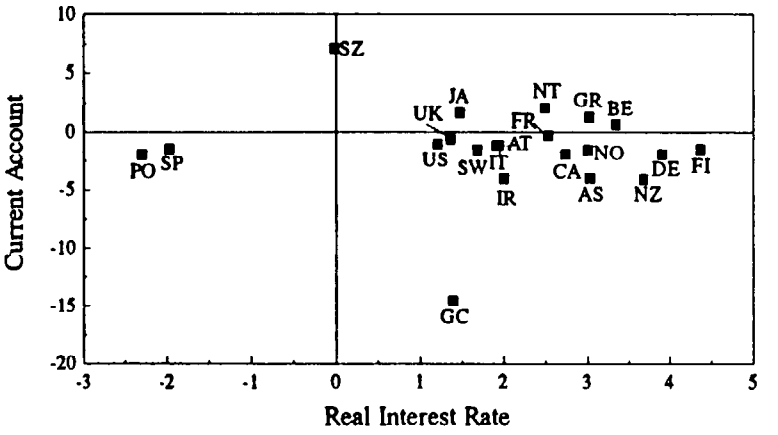


Chart 6. Current Account and Real Interest Rates



(over 65) to the working age population, and the ratio of the young (under 19) to the working age population.

The dependency ratio variable for each country is expressed as the deviation from the average dependency ratio for all the countries in the sample, rather than the level of the dependency ratio. For example, as the populations of all the industrial countries age in the coming decades, the effect on country's current account positions is determined by whether their populations age relatively faster or slower than average, rather than by the absolute demographic position. 1/

The annual change in the terms of trade was used to capture the effects of export and import price movements on the current account. In the cross section, the average annual change should capture the effect of persistent movements or trends in the terms of trade. However, the mean annual change in the terms of trade was not significantly different from zero for any of the countries in the sample suggesting that terms of trade movements should generally be viewed as temporary rather than permanent.

To represent the effects of precautionary savings on the current account, the variability of the terms of trade and inflation were also included. Price variability was measured by the variability of the annual (consumer price) inflation rate over the sample period, and similarly for the variability of the terms of trade. Other variables used include exports and imports of oil (as a percentage of GDP), the short term ex-post real interest rate, and the rate of inflation.

To measure the effects of financial liberalization we use an index of the level of capital control variables developed by Milesi-Ferretti (1995). This measure varies between zero and six depending on whether various restrictions on capital or current account transactions were present in a particular country in a given year. An increase in the index suggests a more closed capital account.

Table 1 decomposes the variation in the dependent and the explanatory variables. It shows the proportion of the total variation in a given variable that is explained by the variation across countries in the time average of that variable. The table shows that variation in the current account is about evenly split between cross-country and within-country variation in the industrial country sample, suggesting that there is information to be gained in analyzing its determinants along both dimensions.

The cross-section regressions in the first part of the next section seek to explain the cross-country variation in current account positions

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1/ Note that specifying variables in this fashion will not alter the coefficient of the variable but only the size of the constant term in the cross-sectional regression. See Glick and Rogoff (1995) for further discussion on global versus country specific shocks.

Table 1. Variance Decomposition: Time Series v. Cross Section

(Percentage of total variance explained by cross-country variation)

Variable	Percent
Current Account/GDP	54.2
Net Foreign Assets/GDP	70.7
Government Debt/GDP	59.9
Budget Surplus/GDP	57.0
Government Current Expenditure/GDP	67.3
Percent change in Terms of Trade	1.7
Per capita GDP Relative to US	94.7
Dependency Ratio	62.3
Capital/Output ratio	73.6
Capital Controls Index	64.8
Inflation	25.4
Real Interest rates	13.9
Capital Per Worker	82.4

(averaged over time). The panel regressions seek to combine an explanation of the cross-country variation with an explanation of the time series variation assuming that the explanatory variables have the same impact on the current account across countries.

In estimating the cross-sectional regressions, we assume that time averaging allows us to capture equilibrium relationships between the current account and its long-run determinants. The time averaging should net out the transition effects as countries adjust to shocks to the determinants of the current account.

Note that in estimating the cross-sectional regressions, the constant term in part captures the world discrepancy in the current account. 1/ In the industrial country cross-section regression, it also captures the nonimposition of the adding-up constraint within the industrial countries. For example, it is not possible for all the industrial countries to run long-run current account surpluses simultaneously (unless the developing countries are also running offsetting current account deficits). However, that constraint is not imposed in the estimation.

In the panel regressions, the choice of model in part depends on an assumption about the stationarity of the current account to GDP ratio, the net foreign assets to GDP ratio and the explanatory variables. In steady state the current account to GDP ratio is linked to the NFA to GDP ratio by the following, where g is the steady state rate of growth of nominal output ($\Delta y/y$): $CA/Y = g*NFA/Y$. 2/

Conceptually, this implies that whether the current account (as a share of GDP) is stationary (mean-reverting) depends on the long-run impact of shocks on the equilibrium net foreign asset position. If changes to the underlying determinants of saving and investment have only level effects on the stock of NFA, but not on the ratio of NFA to GDP, the effects of shocks on the current account to GDP ratio will tend to die out over time. If, however, certain shocks alter the entire path for NFA, the ratio of NFA and the current account to GDP would be permanently affected (absence of mean reversion).

Dickey Fuller tests country-by-country are generally unable to reject the null of difference stationarity for the ratio of net foreign assets to

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1/ In this context, we do not have complete country coverage, and current accounts are expressed as a share of GDP which further affects the global current account discrepancy. The global current account discrepancy was around $90 billion in 1995.

2/ See the discussion in footnote 3 on p. 3.

GDP and the current account to GDP ratio. 1/ However, it is well known that these tests have low power against stationary alternatives, and that trend stationary and difference stationary representations may be observationally equivalent in finite samples. 2/ Similar considerations apply to the budget surplus and the government debt to GDP ratio. Consequently, we estimate dynamic specifications that allow for the current account being either stationary or nonstationary. In particular, we estimate a partial adjustment model for the current account to GDP ratio as well as an error-correction model for the NFA to GDP ratio with possibly (co-)integrated variables.

There are a number of other specification issues that arise in panel data estimation. 3/ OLS estimates which ignore the potential for country-specific effects will provide biased estimates. Two estimation approaches that address this problem are the fixed effects and the random effects models. The following general model of the panel specification we estimate below will help illustrate the issues.

$$y_{it} = \gamma y_{it-1} + \beta X_{it} + e_{it} \qquad i = 1,\ldots,N \quad t = 1,\ldots,T$$

where y is the dependent variable, X is a matrix of explanatory variable, N is the number of countries and T is the number of time periods. The error term ϵ can be decomposed as:

$$e_{it}=\mu_i+u_{it}$$

where μ_i represents country-specific effects (fixed or random) and u_{it} is a residual error term.

The random effects estimates assumes that the country-specific effects μ_i are distributed randomly across countries. Thus, it makes the assumption, as in OLS, that the country random effects are uncorrelated with the included exogenous variables, in which case, both estimates will be consistent, but OLS will be inefficient for not taking into account the variation in μ_i. However, this exogeneity assumption may not be an

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1/ On the other hand, panel unit root tests (following Im, Pesaran and Shin (1995)) suggest that in the case of the current account, the null of difference stationarity may possibly be rejected (the p-value is 0.12).

2/ See Campbell and Perron (1991).

3/ See Hsiao (1995) for a complete discussion of these issues. Cashin and Loayza (1995) and Islam (1995) discuss similar issues in the context of cross-country growth regressions using panel data. Keane and Runkle (1992) discuss the pitfalls of fixed effects estimates.

appropriate assumption in our model, especially when we include the lagged dependent variable. 1/

Assume for the moment that $\gamma=0$, so that the lagged dependent variable is excluded from the specification. Applying OLS to equation (1) will result in biased estimates if the error term has the form of equation (2), and if the country specific component μ is correlated with regressors in X, which is likely to be true in our model. For example, the fixed effects estimates may capture the influence of initial conditions. That is, countries which have a large current account deficit at the beginning of the sample period, may be more likely to continue to run large current account deficits over the sample. However, some of the influence of the initial current account position should be captured by the other right hand side variables. The fixed effects estimator assumes that differences across countries can be captured by allowing for different constant terms, by including country specific dummy variables. That is, fixed effects will estimate the country specific μ_i, which is equivalent to demeaning the data.

Keane and Runkle (1992) point out that the fixed effects estimator may not be consistent unless there is a further strong assumption of strict exogeneity, that is, that the error terms u_{it} are not correlated with the regressors X at any time horizon. This assumption is unlikely to hold in our model, where shocks to the current account in period t are likely to induce policy reactions or exchange rate adjustments in future periods. Keane and Runkle suggest first differencing as a solution to this problem since first differencing only requires that the explanatory variables be pre-determined. 2/

In a number of the specifications below, we include the lagged dependent variable, that is γ in equation (1) is nonzero. In this case, by definition, μ_i is a fixed effect and OLS and random effects will result in biased estimates. However fixed effect estimation will also result in inconsistent estimates because the error term will be correlated with the lagged dependent variable by construction. One solution is to first difference the data and use lags of the explanatory variables as instruments, with appropriate correction for the induced serial correlation.

However, Islam (1995) shows that while fixed effects with a lagged dependent variable is inconsistent as $N\to\infty$ (here N represents the number of

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1/ One solution to this problem is to use a technique such as Chamberlain's Π estimator. Cashin and Loayza (1995) and Islam (1995) provide examples of the application of this technique. Cashin and Loayza argue that this approach is especially appropriate if there are problems of measurement error.

2/ When the first differencing procedure is adopted below, an instrumental variables approach is applied. The instruments are the lagged levels of the explanatory variables. The standard errors are corrected for the first order serial correlation which results from the first differencing.

countries) given T, as T→∞ (the number of time periods), given N, fixed effects is consistent and asymptotically equivalent to MLE. In our sample, with a fixed N and a large T, then, fixed effects should result in consistent estimates.

To address these concerns we report fixed effect, OLS and first differenced estimates of the parameters. We also often report the random effect estimates, although in nearly every specification, they will be inconsistent.

As in the cross section, the constant will in part capture the current account discrepancy. We assume that movements in the discrepancy across time in a particular country are not correlated with the right-hand side variables. The random effects estimation could be interpreted as capturing the discrepancy more directly, by allowing for a country-specific component of the error term.

IV. Results

1. Industrial countries cross section

Table 2 reports the results from a number of different specifications of the cross-sectional estimates using the sample of 21 industrial countries. Column 1 shows a basic specification which captures fiscal, demographic and stage of development effects in a linear fashion. Columns 2 and 3 include a nonlinear specification for the stage of development. Columns 4 and 5 re-estimate the specifications in columns 1 and 2 including the initial net foreign assets to GDP ratio.

The demographic variable (the ratio of the nonworking age population to the working age population) enters significantly with the expected negative sign in the nonlinear specifications (columns 2, 3, and 5): countries which have an above average number of dependents tended to have larger current account deficits. The coefficient suggests that a country which has a dependency ratio that is 5 percentage points above the average will run a current account deficit that is around one percentage point of GDP larger. Over the sample period, dependency ratios varied from 64.3 percent in Japan to 99.7 percent in Ireland, while the average ratio was 75.1 percent. Hence, demographics imply a larger surplus for Japan and a larger deficit for Ireland.

The budget surplus was insignificant and had the wrong sign in the first three columns, suggesting that changes in governments' fiscal policies have no impact on the current account in this cross section of countries. 1/ The lack of any fiscal effects in the cross section can be compared with the results from the savings regression in Masson, Bayoumi, and Samiei (1995). Their results identify a partial offset of

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1/ Milesi-Ferretti and Razin (1996) also conclude that the fiscal balance is not a good indicator of current account sustainability.

Table 2. Cross-Sectional Regression Results: Industrial Countries

Variable	(1)	(2)	(3)	(4)	(5)
Constant	-17.7**	-90.4**	-94.8**	-16.6**	-81.2**
	(6.1)	(15.6)	(14.8)	(4.8)	(11.3)
Budget surplus	-0.066	-0.014	-0.01	0.13	0.13
	(0.240)	(0.155)	(0.15)	(0.20)	(0.12)
Dependency ratio (normalized)	-0.11	-0.20**	-0.18**	-0.15	-0.20**
	(0.11)	(0.08)	(0.07)	(0.09)	(0.05)
Relative income	0.13**	-0.28		0.10**	
	(0.05)	(0.20)		(0.04)	
Relative income squared		0.0023			
		(0.0014)			
Capital stock	0.035	0.97**	0.95**	0.039**	0.80**
	(0.024)	(0.19)	(0.15)	(0.019)	(0.12)
Capital stock squared		-0.0024**	-0.0024**		-0.0020**
		(0.0005)	(0.0004)		(0.0003)
Initial net foreign assets/GDP				0.049**	0.037**
				(0.015)	(0.009)
Adj R^2	0.33	0.73	0.70	0.59	0.84

Notes: **(*) denotes significance at the 5 percent (10 percent) level.
Number of observations: 21
Mean of dependent variable (current account): -1.42
Standard error of dependent variable: 3.18

private savings to an increase in government savings (an increase in the fiscal surplus). Our results may reflect the fact that investment may also respond positively to an increase in the fiscal surplus so that the net effect on the current account is close to zero. 1/

When the initial stock of net foreign assets is included, fiscal consolidation has a positive but still insignificant effect on the current account. The initial stock of NFA had a positive effect on the average current account position. That is, countries which had large net foreign asset positions in 1971, tended to run larger current account surpluses on average over the period 1971-93.

We also investigated whether the effect of fiscal policy on the current account varied in high debt versus low debt countries, distinguished by public debt above or below 50 percent of GDP. When the initial stock of NFA is also included in the specification, we found that in low public debt countries, the effect of the fiscal surplus on the current account was significantly positive (otherwise insignificantly positive). The effect in high public debt countries was close to zero. This is consistent with the idea that high public debt countries are "more Ricardian" than low public debt countries because there is an expectation of imminent fiscal adjustment. 2/

The results in Table 2 show that a quadratic specification captures the effect of the stage of development reasonably well. The coefficient on relative income is significant in the linear specification in columns 1 and 4 although the quadratic terms are not significant in column 2. This latter result may be caused by the multi-collinearity between the relative income variable and the capital output ratio. The positive coefficient on the squared terms in column 2 supports a U-shaped relation between the current account and the stage of development. The turning point in this quadratic specification occurs at an economy with per capita GDP that is around 66 percent of the level of the United States (slightly less than that of New Zealand in the data-set). Prior to this level, increases in relative income are associated with a deterioration in the current account, while after this point they are associated with improvements.

The U-shape supports the hypothesis that as countries develop they initially import capital in increasing amounts at lesser stages of development but then at higher stages of development they become increasingly large capital exporters. The smaller current account deficits for countries that are relatively very poor may reflect liquidity constraints.

1/ When we estimated separate savings and investment equations similar to the partial adjustment model of the current account below, we did indeed find a positive impact of fiscal policy on investment.

2/ See Sutherland (1995).

The quadratic specification is significant in capturing the effect of the capital stock to GDP ratio. The negative coefficient on the squared capital stock term suggests that as the ratio of the capital stock to GDP increases from a low level, the current account deficit improves until the capital output ratio reaches around 2, after which time the current account worsens (an inverted U shape).

The worsening of the current account when the capital stock reaches higher levels does not directly accord with the theory described earlier. The result appears to be driven by the Scandinavian and Australasian countries (Finland in particular), which have relatively large capital output ratios but have also tended to run current account deficits over the sample period. These countries are in general relatively well-endowed with raw materials, the extraction of which is relatively capital intensive. Consequently, the results for the capital stock may reflect the fact that we have not controlled for this aspect of these economies. The United States and Japan on the other hand have capital output ratios around 1.75.

A nonlinear relationship which more directly reflects the implications of the theory is an exponential one in which increases in the capital stock to GDP ratio are associated with an improvement in the current account but at a declining rate. We estimated such a nonlinear specification with mixed results. The coefficients on the other variables were generally unaffected by the choice of functional form. The coefficient on the exponential term and the exponent itself had the expected negative sign, but these results were very sensitive to the choice of the starting values used in the nonlinear estimation.

When using the capital-labor ratio as a proxy for the marginal product of capital, the signs on the quadratic terms were reversed from those above. The relationship between the capital-labor ratio and the current account is a positive quadratic. The turning point in this relation is around the capital-labor ratio of Australia, which is slightly above the average for the industrial country sample. Beyond this point, as the capital-labor ratio increases, the current account deteriorates.

The relationship between relative income and the current account is also inverted when the capital-labor ratio is used. The relationship suggests that as per capita income increases in this sample the current account improves. Only Canada, the United States and Switzerland lie to the right of the turning point where further increases in income lead to a deterioration in the current account. Thus essentially there is a positive relationship between relative income (stage of development) and the current account for this sample. 1/

1/ Again, ideally an exponential specification would capture the fact that the relationship between income and the current account might flatten out. However, while we did obtain such a result, the result was fragile.

We tested the effect of a number of other variables that may also influence the current account, beyond those included in the specification in column 3 of Table 2, such as the real interest rate, inflation, productivity growth differentials, variability measures and the terms of trade. Table 3 reports the marginal significance value of these variables when they were added individually to the quadratic specification reported in column 3.

The terms of trade was generally insignificant when added to any of the specifications in Table 2. As mentioned in Section III, no country exhibited a permanent movement in their terms of trade over the sample, in the sense that the average annual terms of trade movement was significantly different from zero. Consequently, the finding of no long-run influence of the terms of trade on the current account is not surprising.

Neither inflation variability nor terms of trade variability enter significantly, which is contrary to the theory of precautionary savings. Oil exports and (surprisingly) oil imports entered with a positive sign, but both were again insignificant at the 5 percent level, as were average productivity growth differentials.

The capital control variable is also not significant. However, this may be affected by a problem of endogeneity: countries with larger current account deficits may be more likely to impose capital controls. 1/ Alternatively, the imposition of capital controls may force the current account toward zero. Accordingly we interacted the capital control variable with the explanatory variables in the different specifications in Table 2. We found no evidence of a significant effect of capital controls in this sample of countries, although the effect was to bias the coefficients toward zero. There may also be a measurement problem with the capital control variable in that the number of control measures may not be a good proxy for the effectiveness of the controls.

Greece is an outlier in this sample, both in terms of its current account deficit--which averaged 14.6 percent of GDP over the sample period--and in terms of some of the explanatory variables. Consequently, we re-estimated the specifications in Table 2 excluding Greece. The major difference is that the significance level of the capital stock variables declines, while the significance level of the income variable increases. The capital stock quadratic terms are now only jointly significant at the 19 percent level. When Greece and Switzerland are both excluded from the specifications, the dependency ratio is still significant but the stage of development variables are no longer significant.

In the Appendix, we show the results when the sample is extended to include an additional 34 (mainly developing) countries. Those results generally support the findings in this section that the stage of development affects the current account, and that demographics also have some influence.

1/ See Milesi-Ferretti (1995).

Table 3. Marginal Significance Level of Additional Variables

Variable	Coefficient	Marginal Significance
Real interest rate	-0.31	0.52
Growth rate	-0.47	0.55
Current government expenditure	-0.03	0.64
Inflation	-0.24	0.41
Inflation variability	0.06	0.44
Terms of trade variability	-0.01	0.61
Exports of oil/GDP	12.80	0.57
Imports of oil/GDP	51.10	0.06
Terms of Trade	0.21	0.78
Productivity growth differentials	-0.27	0.78
Capital controls	-1.17	0.12

Note: Marginal significance (p-values) of variables when included in the specification in column 3 of Table 2.

We are also unable to find any influence in the larger sample of fiscal policy on the current account position.

In conclusion, for the industrial country sample, we find evidence of an effect of stage of development, measured either by GDP per capita or by capital-output and capital-labor ratios, on the current account. We find some evidence of an effect of demographics on the current account but no effect of fiscal policy in this cross section unless we also control for the initial stock of NFA and the level of public debt.

2. Industrial countries panel

Thus far, we have only exploited the cross-sectional information from our sample. In this section, we utilize the time series information as well. We estimate two types of models here, depending on the assumption about the stationarity of the NFA to GDP ratio and that of the current account: a partial adjustment model of the current account deficit using the panel data, and an error-correction model of the NFA to GDP ratio.

Table 4 shows the results of the panel estimation of the determinants of the current account deficit. The underlying assumption is that the current account and its determinants are stationary variables. The lagged dependent variable captures the partial adjustment effect. The specification captures fiscal effects (the budget surplus), stage of cycle effects (the domestic output gap), 1/ relative price effects (the change in the real exchange rate and the terms of trade), as well as the long-run influences of demographics and relative income. The fourth column reports the fixed effects estimates when the terms of trade is excluded from the specification. The final column excludes the longer run factors of relative income and demographics. 2/

Estimating the equations in Table 4 excluding the lagged dependent variable resulted in a large amount of first order serial correlation. Including the lagged dependent variable mitigated this problem, although the residuals still exhibited some higher order auto-correlation. 3/

1/ Foreign output gaps were also tried but were found to be insignificant. This finding may be caused by the correlation between domestic and foreign output gaps in this sample of industrial countries. The domestic output gap is defined as actual less potential output.

2/ We tested the inclusion of a number of other variables in the specification in column 1. The inflation rate also had a negative but insignificant sign. The real interest rate was positive but insignificant.

3/ The standard errors are not corrected for serial correlation or heteroscedasticity. Correcting for these using the Newey-West procedure did not change the standard errors significantly. However, the standard errors in the first differenced specification are corrected for first order serial correlation.

Table 4. Panel Regression: Industrial Countries

Dependent Variable: Current Account/GDP

Explanatory Variable	Fixed Effects	OLS	IV	Fixed Effects	Fixed Effects
Lagged Current Account	0.67** (0.03)	0.84** (0.03)	0.66** (0.16)	0.64** (0.04)	0.68** (0.03)
Budget Surplus	0.16** (0.04)	0.015 (0.022)	0.30 (0.22)	0.18** (0.04)	0.16** (0.04)
Real Exchange Rate Change	-4.49** (1.68)	-3.35* (1.75)	-2.72 (3.29)	2.13 (1.74)	-4.48** (1.69)
(first lag)	-3.72** (1.60)	-2.99* (1.69)	-3.34* (2.03)	-5.26** (1.78)	-3.77** (1.61)
Domestic Output Gap	-0.24** (0.03)	-0.14** (0.03)	-0.43** (0.16)	-0.32** (0.04)	-0.23** (0.03)
Terms of Trade Change	0.15** (0.01)	0.15** (0.02)	0.15** (0.03)		0.15** (0.01)
Dependency Ratio (normalized)	-0.041 (0.036)	-0.025** (0.013)	-0.37 (0.88)	-0.021 (0.040)	
Relative Income	0.059** (0.023)	0.0009 (0.0064)	-0.06 (0.34)	0.068** (0.026)	
Constant		-0.05 (0.49)			
LM(1)	8.68**	4.03**		17.5**	8.38**
LM(4)	35.4**	9.85**		47.4**	34.4**
Adj R^2	0.82	0.79		0.77	0.81

Notes: **(*) denotes significance at the 5 percent (10 percent) level
Number of countries (N) = 21; Number of time periods (T) = 20
Mean of dependent variable (current account): -1.04
Standard error of dependent variable: 3.72

The Hausman test statistic of whether fixed effects or random effects is appropriate suggests the hypothesis of random effects is rejected at the 1 percent level. This confirms our priors about the nature of our panel data set implying that fixed effects is a preferable specification. The model estimated using first differences with instrumental variables is very similar to that using fixed effects in levels, suggesting that any potential violation of the strict-exogeneity assumption does not significantly affect the results. This conclusion is consistent with the discussion in Section III concerning the presence of the lagged dependent variable in the fixed effects model. The adequate number of observations in the time dimension suggest that the fixed effects estimate should be consistent.

Based on F-tests, the dummy variables are jointly significant in all the fixed effect specifications in Table 4, 1/ and are also significantly different from each other, confirming the relevance of country-specific fixed effects in the current account. These dummy variables capture, in part, the country means that the previous cross-sectional regressions sought to explain. Unfortunately, the hypothesis that all the slope coefficients in the equations in Table 4 are the same is also rejected. 2/ Nevertheless, the regression can be regarded as capturing the effect of the explanatory variables on an average country's current account position. Individual countries may have significantly different coefficients on at least some of the variables.

The panel results identify, in contrast to the cross-sectional results, a large impact of fiscal policy on the current account. The coefficient suggests that an increase in the budget deficit of one percentage point of GDP results in an increase in the current account of around 0.16 percent in the short run and around half a percentage point of GDP in the long run. 3/ The OLS results find a much weaker effect of fiscal policy on the current account which may explain why we found no effect in the cross section. That is, it is necessary to control for the country specific effects to identify the influence of fiscal policy.

As in the cross-sectional regression, we investigated whether the impact of fiscal policy on the current account differed across high government debt and low government debt countries (defined as before). We again found that the effect of fiscal policy on the current account was significantly greater in low public debt countries. The estimated coefficient on the budget surplus was 0.26 for low debt and 0.16 for high debt countries, consistent with the idea that high public debt countries are more Ricardian.

1/ The F-test statistic F(21,396) for the specification in column 1 is 3.56.

2/ The F-test statistic F(159,236) for the specification in the first column in Table 4 is 1.78.

3/ The long-run effect is obtained by dividing the short-run coefficient by one minus the coefficient on the lagged current account.

The pattern of coefficients on the change in the real exchange rate variables in column 4 of Table 4 (when terms of trade are excluded) suggest a J-curve effect. A depreciation (fall) in the real exchange rate has a positive (but insignificant) effect on the current account contemporaneously but this effect subsequently becomes negative. When the terms of trade are included, an increase (appreciation) in the real exchange rate always exerts a negative influence on the current account (consistent with the Marshall-Lerner condition). 1/

Increases in the terms of trade have a positive effect in the short run. This supports the consumption smoothing theory that temporary increases in the terms of trade are reflected in savings rather than consumption, thus leading to improvements in the current account in the short run. 2/

The coefficient on the contemporaneous output gap has a negative sign reflecting the dominance of the accelerator effect of the output gap on investment over the positive effect of the output gap on savings suggested by the permanent income model. 3/ While the first lag had a significant positive effect when it was included in the specification (not shown), the overall effect of the output gap was still negative.

The results also show that the dependency ratio had the expected negative sign but was generally insignificant (with the exception of the OLS specification) in contrast to the results from the cross-section regression. This suggests that demographics matter more for a country's average level of the current account rather than the fluctuations in it, as one might expect. The relative income variable entered significantly with the expected positive sign. In this specification, a linear specification of stage of development effects was superior to a quadratic one (not shown here). The results were unchanged when the capital/output ratio replaced the relative income variable, however when both variables were included, the capital/output ratio was not significant.

3. Error-correction specification

In estimating an error-correction specification, we allow for the possibility that the NFA to GDP ratio and the current account to GDP ratio are nonstationary variables. We first estimate the long-run or levels regression where the dependent variable is the stock of net foreign assets

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1/ The change in the real exchange rate is in log differences. Thus a 1 percent increase in the real exchange rate reduces the current account in the first period by 0.04 in the first specification.

2/ This finding suggests that the income effect outweighs the substitution effect following an innovation to the terms of trade. See the discussion in Ostry and Rheinhart (1992).

3/ This finding is confirmed when separate saving and investment equations (not reported) are estimated.

as a share of GDP. 1/ In the case where the dependent and explanatory variables are difference-stationary, this equation has the interpretation of the long-run cointegrating relationship. 2/ The results from this regression are then subsequently used to estimate an ECM specification. In the case where the variables are stationary, the error-correction framework would have the following interpretation. Stock equilibrium is attained only gradually over time. In the short run, flows reflect both equilibrium adjustment (i.e., error-correction) and disequilibrium fluctuations.

The explanatory variables in the levels specification are basically those from the cross-sectional regression estimated above, namely the dependency ratio, the capital stock and relative income variables and fiscal policy. 3/ Corresponding to our use of the stock of net foreign assets as the dependent variable, we use the stock of government debt to represent fiscal effects. The results from estimating this levels regression are shown in Table 5.

The first column shows the estimates when country specific dummies are included (the fixed effect regression). The second column shows the result of a normal OLS regression with a constant that is common across countries. The third column is the random effects estimate. A Hausman test (critical value 3.46) fails to reject the random effects model in favor of the fixed effects model. The slope coefficients are almost identical across the random and fixed effects specifications. The hypothesis that all the constant terms are the same is however, rejected (critical value 60.1). The model estimated using the first difference estimator (shown in column 5) suggests that the fixed effect specification is still an appropriate specification.

The results again show a much larger impact of fiscal policy in this specification compared to the cross-sectional regression above. An increase in government debt of one percentage point of GDP is associated with a reduction in the NFA to GDP ratio of about 0.6 of a percentage point, 4/ in line with the long-run impact of fiscal policy in the partial adjustment equation. The relationship between the level of government debt and the net foreign asset position is stronger possibly because the government debt variable may be better capturing the long-run impact of fiscal policy.

1/ Since the variability of innovations to the stochastic trend (relative to total variability) is much smaller for the current account than for NFA, estimation of the trend in NFA should be more robust.

2/ See Engle and Granger (1987).

3/ As the time series properties of the squared variables which may be integrated are not obvious, we estimate the levels equation including the income and capital stock variables in linear form.

4/ Masson, Kremers and Horne (1994) find coefficients of 0.3, 0.5 and 0.7 respectively in Germany, Japan and the United States for the effect of government debt on NFA.

Table 5. Panel Regression: Industrial Countries

Dependent Variable: Net Foreign Assets/GDP

Explanatory Variable	Fixed Effects	OLS	Random Effects	Fixed Effects	IV
Govt Debt / GDP	-0.57**	-0.28**	-0.56**	-0.41**	-0.49*
	(0.05)	(0.05)	(0.04)	(0.04)	(0.23)
Dependency Ratio	-0.45	-0.37*	-0.40	-0.16	-1.29**
	(0.33)	(0.20)	(0.30)	(0.30)	(0.56)
Relative Income	0.53**	0.66**	0.53**	0.69**	-0.72
	(0.20)	(0.08)	(0.17)	(0.18)	(0.76)
Capital / Output				-0.37**	
				(0.04)	
Constant		-38.4**	-16.0		
		(6.4)	(12.1)		
DW	0.36	0.26			
Adj R^2	0.78	0.23	0.77	0.82	
Panel Unit Root [*p*-value]	0.14	0.006		0.44	

Notes: **(*) denotes significance at the 5 percent (10 percent) level
The standard errors are indicative only.
Number of countries (N) = 21
Number of time periods (T) = 23
Mean of dependent variable (NFA/GDP): -7.27
Standard error of dependent variable: 32.48

Demographics again have a negative although not significant impact on the NFA ratio in this specification. 1/ Relative income has a positive influence on the current account, while the capital output ratio (included in column 4) has a negative influence. Again, the latter results may be caused either by the Scandinavian countries, or by the collinearity between the capital output ratio and relative income.

The panel unit root tests reject the null of nonstationary residuals (i.e., no cointegration) in the OLS specification but narrowly fail to reject the null in our preferred fixed effects specification.

The country dummies are jointly significant in the fixed effects specification. However, the hypothesis that the coefficients on the explanatory variables are the same across countries is again rejected (the F statistic is 28.4). Nevertheless, as stated above, the regression we estimate can be regarded as capturing the effect on an average country's net foreign asset position of changes in the explanatory variables.

The short-run error-correction specification then includes the residuals from the levels regression estimated with fixed effects in column (1) of Table 5, and also includes other variables that may have a shorter term impact on the current account that were included in the specification at the beginning of this section.

The dependent variable in the short-run model is the change in the net foreign assets ratio. 2/ The presence of the lagged dependent variable suggests that fixed effects is the appropriate specification. The results of the estimation are shown in Table 6. A Hausman test rejects the random effects assumption at the 5 percent level, supporting the fixed effects specification.

The error-correction term was significant and had the expected negative sign. The coefficient of -0.10 in column 1 suggests that deviations from the equilibrium level of NFA to GDP have a half life of six or seven years.

The other short-run variables generally have the same impact as in the current account estimation in Table 4. The exchange rate again has a J-curve type impact on the change in NFA when terms of trade are excluded in column 4, with the initial effect being positive before turning negative in

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1/ Under a cointegration interpretation, note that the t-statistics from the levels regression have nonstandard distributions and, hence, are only indicative.

2/ While the first difference of the net foreign asset ratio used in the levels is not precisely the current account to GDP ratio, as discussed in Section III, the current account to GDP ratio (ca) maps into the change in the NFA to GDP ratio (Δnfa) through the growth rate of output (g) in steady state. Similarly, the budget surplus maps into changes in the level of government debt.

Table 6. Panel Error-correction Regression

Dependent Variable: Change in NFA/GDP

Explanatory Variable	Fixed Effects	OLS	Random Effects	Fixed Effects
Lagged Change in NFA/GDP	0.40**	0.44**	0.33**	0.40**
	(0.04)	(0.04)	(0.04)	(0.04)
Change in government debt/GDP	-0.47**	-0.38**	-0.36**	-0.50**
	(0.06)	(0.06)	(0.06)	(0.06)
Real Exchange Rate Change	-4.81	-3.23	2.80	0.20
	(4.81)	(4.68)	(4.58)	(4.55)
(first lag)	2.45	3.23	1.01	1.48
	(4.60)	(4.59)	(5.03)	(4.64)
(second lag)	-8.65*	-7.10	-6.99	-9.89**
	(4.58)	(4.51)	(4.65)	(4.60)
Domestic Output Gap	-0.45**	-0.36**	-0.18**	-0.52**
	(0.10)	(0.09)	(0.09)	(0.10)
Error-correction Term	-0.10**	-0.10**	-0.11**	-0.10**
	(0.02)	(0.02)	(0.02)	(0.02)
Terms of Trade Change	0.13**	0.13**	0.07**	
	(0.04)	(0.04)	(0.04)	
Constant		-0.13	0.03	
		(0.25)	(0.26)	
LM(1)	3.21*	1.34	1.35	1.85
LM(4)	32.4**	7.27	11.8**	28.7**
Adj R^2	0.40	0.40	0.37	0.39

Notes: **(*) denotes significance at the 5 percent (10 percent) level
Number of countries (N) = 21; Number of time periods (T) = 20
Mean of dependent variable (Change in NFA/GDP): -0.98
Standard error of dependent variable: 5.70

the second year. This may in part reflect valuation effects on the stock of NFA.

Fiscal policy has a large influence on the change in NFA in the short run. A change in the stock of government debt of 1 percent of GDP will improve the NFA position in the short run by around 0.5 percent of GDP. The domestic gap term enters significantly with the expected negative sign.

The error-correction specification thus unites the findings from the cross-sectional equations in Table 2 and the panel equations in Table 4. In the long run, stage of development, government debt levels and demographics may affect the current account, associated with stock equilibrium, but in the short run, the flow current account is affected by movements in relative prices, the state of the business cycle and changes in fiscal policy.

V. Conclusion

This paper has adopted two estimation approaches to capture the determinants of current account positions that have been suggested in the theoretical literature. The first approach was to use cross-sectional data, where each country's average current account position was assumed to approximately reflect a longer-term equilibrium outcome. The second approach used panel data on a sample of industrial countries. Short-run variables were used to capture the fact that current account positions are not necessarily in long-run equilibrium in each time period. Within the panel approach we estimated a partial adjustment model of the current account and an error-correction model of net foreign assets.

Using the cross-sectional approach, we found a significant impact of stage of development and demographics (in most cases) on current account positions. We found some evidence of a nonlinear effect of stage of development on the current account. Countries at lower stages of development tend to run smaller current account deficits (perhaps reflecting constraints on access to global financial markets). Then as the country develops, the current account deficit grows larger up to a point where the current account deficit starts to decrease until eventually the country runs surpluses and exports capital.

A larger dependency ratio relative to the sample average tended to lead to a larger current account deficit. The ratio of the old population (over 65) to the working age population tended to exert more of a negative influence in industrial countries while the ratio of the young (under 20) was more important for developing countries.

When we turned to the more dynamic approach of the partial adjustment model, we found a large impact of fiscal policy on the current account. Deteriorations in the fiscal position were associated with deteriorations in the current account (although not one-for-one). The impact of fiscal policy varied across countries with high and low public debt levels. We also found a significant impact of short-run variables such as real exchange rate

changes, the stage of the cycle and terms of trade changes, in addition to the long-run impact of stage of development and demographics.

The error-correction specification adopted a stock-flow approach. The two approaches are equivalent in the long run where there is a direct mapping from the current account to the net foreign asset position. The level of government debt, stage of development and demographics (to a lesser extent) were found to influence the stock of net foreign assets in the long run. The error-correction (short run) equation highlighted a significant impact from changes in the real exchange rate and the terms of trade, and the state of the cycle as in the partial adjustment model. The speed of adjustment suggested that the half life of a return to long-run equilibrium in the net foreign asset position is about six or seven years.

Data Sources

Most of the data was sourced from the IMF World Economic Outlook (WEO) and International Financial Statistics (IFS) databases. Additional data was sourced from the OECD database, the Summers and Heston Penn World Tables (PWT).

Current account deficit: WEO
Net foreign assets: WEO
Government debt: WEO
Relative Income: OECD for industrial countries, PWT for developing countries
Capital/Output ratio: OECD
Capital per Worker: PWT
Dependency Ratio: United Nations
Terms of Trade: Terms of trade on all goods and services, IFS
Current Government Spending: IFS
Inflation: IFS
Real Interest Rates: Discount rate less Inflation rate, IFS
Oil Imports: IFS
Oil Exports: IFS
Capital Controls: Milesi-Ferretti (1995)
Real exchange rate: Trade weighted, CPI based, calculated in the Research Department of the IMF. In logs, 1982=1.

The following countries were included in the sample. The first column refers to countries that were included in the industrial country sample. The second column lists the additional countries that were included in the full sample. The number refers to the IMF country code:

Industrial country sample:		Full sample:			
111	United States	176	Iceland	578	Thailand
112	United Kingdom	186	Turkey	616	Botswana
122	Austria	213	Argentina	664	Kenya
124	Belgium	218	Bolivia	674	Madagascar
128	Denmark	228	Chile	676	Malawi
132	France	233	Columbia	684	Mauritius
134	Germany	243	Dominican Republic	686	Morocco
136	Italy	248	Ecuador	694	Nigeria
138	Netherlands	268	Honduras	698	Zimbabwe
142	Norway	273	Mexico	724	Sierra Leone
144	Sweden	283	Panama	734	Swaziland
146	Switzerland	299	Venezuela	754	Zambia
156	Canada	343	Jamaica	964	Poland
158	Japan	429	Iran		
172	Finland	436	Israel		
174	Greece	463	Syria		
178	Ireland	524	Sri Lanka		
182	Portugal	534	India		
184	Spain	542	Korea		
193	Australia	558	Nepal		
196	New Zealand	566	Philippines		

Industrial and Developing Countries Cross Section

In this section we extend the sample to include an additional 34 (mainly developing) countries. 1/ The first two columns of Table A1 use a linear specification for stage of development measured by the capital per worker ratio and relative income (in per capita GDP). Both these variables enter significantly and have the expected positive sign: more developed countries tend to run smaller current account deficits/larger surpluses. The budget surplus is again insignificant but does have a positive sign. The dependency ratio is also insignificant although again has the expected negative sign.

Column 3 of Table A1 reports the results from a quadratic specification. The quadratic capital per worker terms are significant and suggest that over the whole sample, as a country's capital per worker increases, the current account deficit initially widens but then as capital per worker continues to increase, the current account eventually improves. The turning point in this relationship is close to the break between developing countries and the industrial countries. The low levels of the current account of countries with low capital output ratios may reflect the effect of liquidity constraints on less developed economies.

While the squared term on the relative income variable is not significant, the turning point in the income quadratic is a country around 84 percent of the income of the United States. 2/ Below this level, as a country's per capita GDP increases, it's current account increases. 3/

The dependency ratio and the budget surplus are again insignificant in column 3, although the dependency ratio does have the expected negative sign. The coefficient on the dependency ratio is lower than that obtained in the industrial country sample. The dependency ratio was split into the youth and the old age dependency ratios. 4/ In the full sample, the old age dependency ratio was significant with a negative sign, which was principally driven by the industrial countries. In contrast, for developing countries the youth dependency ratio exerted a significantly negative impact on the current account.

1/ Note that the presence of large foreign aid flows in some developing countries may affect the quality of the dependent variable.

2/ Only the United States, Canada and Switzerland are beyond the turning point.

3/ Once again, this suggests that a more appropriate functional form may again be an exponential. We find some support for such a specification, although, as above, the results are sensitive to the choice of starting values for the point estimates.

4/ The young dependency ratio is the ratio of those 19 and under to the population aged between 20 and 65, while the old dependency ratio is the ratio of the population over 65 to those aged between 20 and 65.

To test whether capital controls exerted an influence on the current account, we interacted the capital control variable with the explanatory variables in the various specifications in Table A1. While the presence of capital controls generally did bias the coefficients towards zero as might be expected, the effect was not significant.

We also estimated these same specifications using only the developing country sample. The results are shown in Table A2. The quadratics in income per capita and capital per worker were of the opposite shape to that in the full sample. However, the turning points in both quadratics lay outside the range of the developing countries and so the results are not incompatible with those for the full sample. When a quadratic specification was used (column 3 and 4), fiscal policy was found to have a positive but still insignificant effect.

The other significant difference between the developing and industrial countries was the impact of the terms of trade. The terms of trade had a positive impact on the current account for the developing countries in contrast to the negative or zero impact on the current account for the industrial countries. 1/

In summary, these results generally support the results from the industrial country sample that the stage of development has a significant impact on the current account. There is also some evidence that initially countries may be constrained in their access to capital markets. There is some support (although less than in the industrial country sample) for the impact of demographics on the current account. The current accounts of the industrial countries however are more effected by population aging while the young population of the developing countries has more of an influence on their current account.

1/ As in the previous section we added a number of variables to the specifications in Table 4. Average growth, inflation, and the level of real interest rates were all insignificant. Controlling for the influence of oil, by including the ratio of oil exports and oil imports to GDP, also proved insignificant.

Table A1. Cross-Sectional Regression Results: Full Sample

Variable	(1)	(2)	(3)	(4)
Constant	-5.37**	-4.95**	-5.88**	-5.95**
	(1.42)	(1.27)	(1.77)	(1.85)
Budget surplus	0.06	0.06	-0.004	0.11
	(0.31)	(0.31)	(0.15)	(0.15)
Dependency ratio (normalized)	-0.023	-0.029	-0.024	-0.004
	(0.024)	(0.022)	(0.025)	(0.025)
Capital per worker (/1000)		0.12**	-0.39*	-0.31
		(0.06)	(0.22)	(0.24)
Capital per worker squared			0.0076**	0.0064*
			(0.0035)	(0.0036)
Relative income	0.057**		0.22*	0.24*
	(0.027)		(0.13)	(0.13)
Relative income squared			-0.0013	-0.0017
			(0.0010)	(0.0011)
Terms of trade	0.40**	0.39**	0.45**	
	(0.18)	(0.19)	(0.19)	
Adj R^2	0.28	0.28	0.31	0.25

Notes: **(*) denotes significance at the 5 percent (10 percent) level.
Number of observations: 55
Mean of dependent variable (current account): -3.17
Standard error of dependent variable: 4.20

Table A2. Cross-Sectional Regression Results: Developing Countries

Variable	(1)	(2)	(3)	(4)
Constant	-6.42	-5.12	-1.91	-2.56
	(1.41)	(1.33)	(2.18)	(2.59)
Budget surplus	-0.02	-0.01	0.13	0.26
	(0.15)	(0.16)	(0.15)	(0.17)
Dependency ratio (normalized)	-0.040*	-0.051**	-0.041**	-0.023
	(0.022)	(0.023)	(0.021)	(0.024)
Capital per worker (/1000)		0.19*	0.69	0.34
		(0.11)	(0.61)	(0.61)
Capital per worker squared			-0.047	-0.020
			(0.030)	(0.035)
Relative income	0.14**		-0.56*	-0.30
	(0.05)		(0.30)	(0.34)
Relative income squared			0.016**	0.011
			(0.006)	(0.007)
Terms of trade	0.44**	0.48**	0.56**	
	(0.17)	(0.18)	(0.16)	
Adj R^2	0.44	0.37	0.53	0.33

Notes: **(*) denotes significance at the 5 percent (10 percent) level.
Number of observations: 32
Mean of dependent variable (current account): -4.21
Standard error of dependent variable: 2.93

References

Blanchard, O., "Debt, Deficits, and Finite Horizons", *Journal of Political Economy*, Vol. 93 (April 1985), pp. 223-47.

Blanchard, O., and S. Fischer, *Lectures on Macroeconomics* (Cambridge, Massachusetts: MIT Press, 1989).

Campbell, J., and P. Perron, "Pitfalls and Opportunities: What Macroeconomists should know about Unit Roots", in *NBER Macro Annual* (Cambridge, Massachusetts: MIT Press), pp 141-201.

Cashin, P., and N. Loayza, "Paradise Lost? Growth, Convergence, and Migration in the South Pacific", *IMF Staff Papers*, Vol 42 no.3 (September 1995), pp. 608-41.

Daniel, B., "Precautionary Saving and Persistent Current Account Imbalance: An Analytical Approximation," (unpublished; Pittsburgh: Department of Economics, University of Pennsylvania, 1995).

Diamond, P., "National Debt in a Neoclassical Growth Model", *American Economic Review*, Vol. 55 (December 1965), pp. 1126-150.

Engle, R., and C. Granger, "Cointegration and Error Correction: Representation, Estimation and Testing", *Econometrica*, Vol. 55 (March 1987), pp. 251-76.

Faruqee, H., D. Laxton, and S. Symansky, " Government Debt, Life-cycle Income and Liquidity Constraints: Beyond Approximate Ricardian Equivalence" (unpublished; Washington: International Monetary Fund, 1996).

Feldstein, M., and C. Horioka, "Domestic Saving and International Capital Flows," *Economic Journal*, Vol. 90 (June 1980), pp. 314-29.

Frenkel, J., and A. Razin, *Fiscal Policies and the World Economy* (Cambridge, Massachusetts: MIT Press, 1992).

Ghosh, A., "International Capital Mobility Amongst the Major Industrial Countries: Too Little or Too Much," *Economic Journal*, Vol. 105 (January 1995), pp. 107-28.

Ghosh, A., and J. Ostry, "Export Instability and the External Balance in Developing Countries," *IMF Staff Papers*, Vol. 41 (Washington: International Monetary Fund, June 1994), pp 214-35.

———, "The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach," *World Bank Economic Review*, Vol. 9, No. 2 (Washington: World Bank, 1995), pp. 305-33.

Glick, R., and K. Rogoff, "Global Versus Country-Specific Productivity Shocks and the Current Account," *Journal of Monetary Economics*, (April 1995), pp 159-92.

Hsiao, C., *Analysis of Panel Data*, Econometric Society Monographs No. 11, (Melbourne, Australia: Cambridge University Press, 1986).

Im, K., H. Pesaran, and Y. Shin, "Testing for Unit Roots in Heterogeneous Panels", DAE Working Paper No. 9526 (June 1995).

Islam, N., "Growth Empirics: A Panel Data Approach", *Quarterly Journal of Economics*, Vol 110, No. 4 (November 1995), pp. 1127-170.

Keane, M, and D. Runkle, "On the Estimation of Panel-Data Models With Serial Correlation when Instruments are not Strictly Exogenous", *Journal of Business and Economic Statistics*, Vol. 10, No. 1 (January 1992), pp. 433-41.

Levin, A., and C. Lin, "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties" (unpublished; University of San Diego, 1993).

Masson, P., T. Bayoumi, and H. Samiei, "International Evidence on the Determinants of Private Saving," IMF Working Paper No. WP/95/51 (Washington: International Monetary Fund, May 1995).

Masson, P., J. Kremers, and J. Horne, "Net Foreign Assets and International Adjustment: The United States, Japan, and Germany," *Journal of International Money and Finance*, Vol. 13 (February 1994), pp. 27-40.

Meade, J., *The Balance of Payments* (London, Oxford University Press, 1951).

Milesi-Ferretti, G.M., "Why Capital Controls? Theory and Evidence", (unpublished; Washington: International Monetary Fund, 1995).

———, and A. Razin, "Persistent Current Account Deficits: A Warning Signal?," (unpublished; Washington: International Monetary Fund, March 1996).

Montiel, P., "Capital Mobility in Developing Countries: Some Measurement Issues and Empirical Estimates," *World Bank Economic Review*, Vol. 8 (Washington: World Bank, 1994), pp. 311-50.

Obstfeld, M., and K. Rogoff, "The Intertemporal Approach to the Current Account," in *Handbook of International Economics*, ed. by G. Grossman and K. Rogoff (Amsterdam, Holland: Elsevier Science Publishing, 1995).

Ostry, J., and C. Reinhart, "Private Saving and Terms of Trade shocks," *IMF Staff Papers*, Vol. 39 (Washington: International Monetary Fund, September 1992), pp 495-517.

Otto, G., "Testing a Present-Value Model of the Current Account: Evidence from US and Canadian Time Series," *Journal of International Money and Finance*, Vol. 11, (October 1992), pp. 414-30.

Razin, A., "The Dynamic-Optimizing Approach to the Current Account: Theory and Evidence," in *Understanding Interdependence: The Macroeconomics of the Open Economy*, ed. by P. Kenen (Princeton, New Jersey: Princeton University Press, 1995).

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

Sheffrin, S., and W. Woo, "Present Value Tests of an Intertemporal Model of the Current Account," *Journal of International Economics*, Vol. 84 (August 1990), pp.237-53.

St Paul, G., "Fiscal Policy in an Endogenous Growth Model," *Quarterly Journal of Economics*, Vol. 107 (November 1992), pp. 1243-260.

Sutherland, A., "Fiscal Crises and Aggregate Demand: Can High Public Debt Reverse the Effects of Fiscal Policy?," CEPR Discussion Paper No. 1246 (September 1995).

Swan, T., "Longer-run Problems of the Balance of Payments," in The Australian Economy: A Volume of Readings, ed. by H. Arndt and W. Corden (Melbourne, Australia: Chesire Press, 1963), pp. 455-64.