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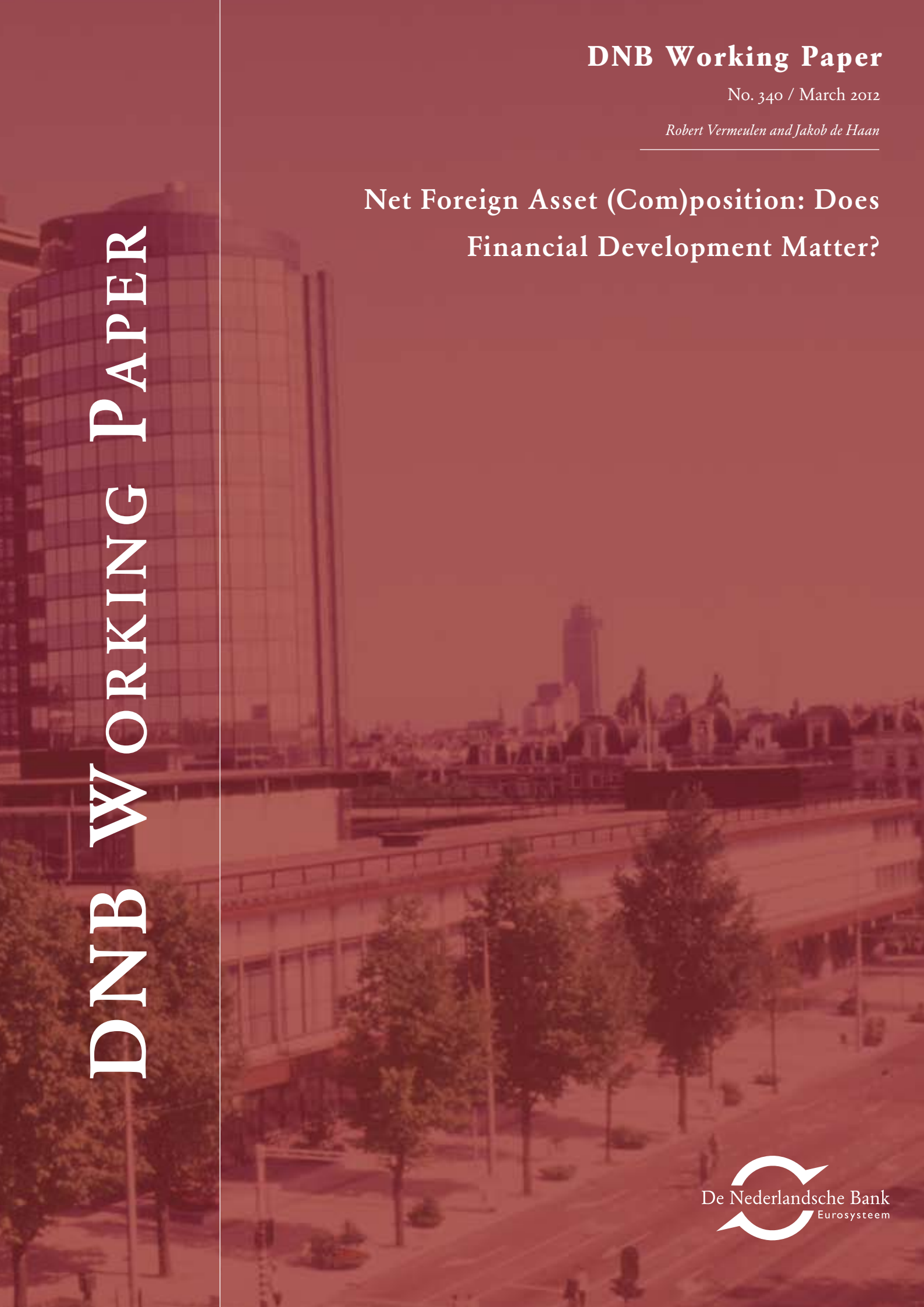

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* Views expressed are those of the authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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Net Foreign Asset (Com)position:
Does Financial Development Matter?

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Abstract

We investigate the relationship between a country's domestic financial development and the (composition of its) net foreign asset position using a pooled mean group estimator and data for 51 countries during the period 1970-2007. The results show that financial development reduces a country's long-run net foreign asset position. In addition, financial development leads to higher net equity and lower net debt positions. These findings confirm the theoretical predictions of Mendoza et al. (2009). The results are robust to using different indicators of financial development and inclusion of the level of development of a country in the cointegrating relationship.

JEL classification: F30; F41; G15
Keywords: net foreign assets; financial development; financial integration; pooled mean group estimator

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1. Introduction

Several economists and policy makers consider global imbalances as one of the causes of the financial crisis (e.g. Bernanke, 2009, Krugman, 2009).[1] A popular explanation for the current account deficit of the US and the current account surpluses of East Asian countries is the "global saving glut" (Bernanke, 2005, Clarida, 2005). In this view, East Asian financial markets are less sophisticated, deep, and open so that Asian excess saving inevitably flows into the highly developed U.S. financial market. As a consequence, East Asian countries have seen their net foreign asset position increase. To redress global imbalances, developing countries, especially those in the East Asian region, should be encouraged to develop financial markets. Once policies improving institutions and legal systems amenable to financial development and liberalizing markets are implemented, "a greater share of global saving can be redirected away from the United States and toward the developing nations" (Bernanke, 2005).

This paper investigates the link between a country's financial development and (the composition of) its net foreign asset position, thereby testing the predictions of the model of Mendoza et al. (2009). Using a two-country framework, Mendoza et al. (2009) argue that investors in financially developed countries are willing to take more risks as financial development allows for insurance against risk. Under financial integration, a financially more developed country obtains a positive net equity position while a financially less developed country obtains a positive net debt position. The implications of the model are that a country's net foreign asset and net debt positions are decreasing in financial development, while its net foreign equity position is increasing in financial development. We test these implications using a sample of 51 industrial and developing countries during 1970-2007.

Although there is some previous research on the relationship between financial development and current account positions (e.g. Chinn and Ito, 2007) or gross foreign asset positions (e.g. Faria et al., 2007) there is, to the best of our knowledge, no empirical work investigating the long-run relationship between a country's domestic financial development and (the composition of) its net foreign asset position.[2]

[1] See Borio and Disyatat (2011) for a different view.

[2] The paper that comes closest to the present study is Lane and Milesi-Ferretti (2000) who run cross sectional regressions relating financial development to the total net foreign asset position. These authors do not find evidence in favour of a relationship.

Our data on net foreign asset positions come from Lane and Milesi-Ferretti (2007). As a proxy for financial for development, we use the private credit-to-GDP ratio drawn from Beck et al. (2010). In order to distinguish between the long and short-run impact of financial development on net asset positions we employ the pooled mean group estimator (PMG) of Pesaran et al. (1999). This estimator imposes a common long-run relationship for all countries, but allows for different short-run country coefficients, error correction speeds and error variances.

The estimation results confirm our hypotheses. First, there is a negative relationship between a country's domestic financial development and its overall net foreign asset position. Second, financial development is positively related to a country's net equity position and negatively related to its net debt position. A battery of robustness tests confirms these results. Using alternative indicators of financial development, such as the deposits-to-GDP ratio and the ratio of bank credit to bank deposits, lend further support to our hypotheses. In addition, the results remain intact when using alternative control variables. Likewise, splitting the sample into industrial and developing countries and across different time periods, generally does not lead to substantive differences. Finally, changes to the long-run cointegrating vector do not alter the long-run effect of financial development on net asset positions.

The remainder of the paper is structured as follows. Section 2 reviews the theoretical framework of Mendoza et al. (2009) and previous empirical studies on the relationship between domestic financial development and (the composition of) net foreign asset positions. Section 3 discusses the data and empirical methodology, while Section 4 presents the empirical results. Section 5 discusses robustness checks and the final section provides some concluding remarks.

2. Theoretical framework and related literature

We base our analysis on the theoretical model of Mendoza et al. (2009).[3] This section provides an informal discussion of the main elements of their framework and highlights the key transmission channels.

[3] See Caballero et al. (2008) for an alternative model explaining net foreign asset positions. However, their model does not distinguish between equity and debt instruments, rendering the model unsuitable for the present study.

Consider two identical economies, which only differ in their degree of financial development. Agents have endowment income Y_n^{end} and investment income R_n*K, where R_n is the return on the investment K, while n indicates the state of nature. Agents can buy contingent claims B, which depend on Y_n^{end} and R_n. The agents' net wealth before consumption (W) is the sum of endowment income, the capital stock owned, the return on the capital stock and the value of bond holdings:

$$W(Y_n^{end}, R) = Y_n^{end} + K*P_n + R_n*K + B(Y_n^{end}, R_n) \quad (1)$$

where P_n is the price of capital. Financial development captures the degree to which contracts are enforceable. Let parameter ϕ_i measure the degree of financial development in country i. Mendoza et al. (2009) show that limited contract enforceability results in the following constraints:

$$W(Y_n^{end}, R_n) - W(Y_1^{end}, R_1) >= (1- \phi_i)*[(Y_n^{end} + R_n*K) – (Y_1^{end} + R_1*K)] \text{ for all } n=\{1;N\} \quad (2)$$

$$W(Y_n^{end}, R_n) >= 0 \qquad \text{for all } n=\{1;N\} \quad (3)$$

Equation (2) indicates that the variation in net wealth cannot be smaller than the variation in income, scaled by the enforceability parameter. When financial development is very low, e.g. $\phi_i = 0$, income cannot be transferred across states of nature. On the other hand, when financial development is high, $\phi_i = 1$, wealth can be perfectly smoothed across all states of nature. Under equation (3), agents have limited liability and cannot be excluded from the market after defaulting.

Rewriting equation (2) in terms of contingent claims shows directly that agents cannot buy state contingent claims when $\phi_i = 0$.[4]

$$B(Y_n^{end}, R_n) - B(Y_1^{end}, R_1) >= - \phi_i *[(Y_n^{end} + R_n*K) – (Y_1^{end} + R_1*K)] \quad (4)$$

[4] Note that ϕ_i pertains to the country of residence and not the geographical location of assets. Mendoza et al. (2009) explore the importance of this assumption, but the main results remain even with partial residence based enforcement.

The ability to buy state contingent claims and limited liability allows agents to insure against bad states of nature. Therefore, agents are willing to take more risk in the financially more developed country. This implies that in autarky both the return on capital and the interest rate are higher in the financially more developed country.

When both countries lift international financial restrictions and become financially integrated, the financially more developed country will accumulate foreign productive assets (K) and sell domestic bonds (B) to the foreign country. Due to the higher return on productive assets, the financially more developed country will obtain a negative net foreign asset position in equilibrium.

Hence, the model generates the following three testable hypotheses:

1) The overall net foreign asset position (NFA) is decreasing in financial development,

2) The net foreign equity position (NFE) is increasing in financial development, and

3) The net foreign debt position (NFD) is decreasing in financial development.

This paper tests these three hypotheses. The dynamics of the model indicate that countries accumulate net foreign asset positions gradually over time. This implies that the methodology used needs to be able to distinguish between short and long-run effects to capture that financial liberalization started in most countries during the 1970s.

To the best of our knowledge, there is no empirical evidence on the long-run relationship between financial development and (the composition of) net foreign asset positions. Cross sectional regressions of Lane and Milesi-Ferretti (2000) suggest the absence of a relationship between financial development and the net foreign asset positions. However, these regressions only consider one year, 1997 and are uninformative about a potential long run relationship, nor do they provide information regarding the relationship between financial development and the composition of net foreign assets.

Several studies examine the determinants of gross foreign asset positions and capital flows. For instance, Lane (2000) assesses the factors explaining why some countries have more cross border asset holdings than others. He finds that trade openness and domestic financial development have a positive effect on a country's total gross foreign assets and liabilities. Lane's (2000) analysis is cross sectional, but Faria et al. (2007) also take the time dimension into account, focusing on the debt-to-equity ratio of foreign liabilities. Their results indicate that trade openness and GDP per capita largely explain changes in the equity

share of foreign liabilities during 1996-2004. In addition, Faria et al. (2007) report that financial reforms decrease total liabilities while they increase the equity share of liabilities.

Binici et al. (2010) calculate capital in- and outflows from the Lane and Milesi-Ferretti (2007) database on foreign asset and liability stocks. They find that domestic financial development, proxied by the private credit-to-GDP ratio, has a significantly positive effect on equity and debt outflows but no effect on equity and debt inflows. Daude and Fratzscher (2008) report that domestic financial development has a stronger positive effect on portfolio investment than on FDI and loans.

Alternatively, some studies focus on the relationship between financial development and the current account. The results of these studies are mixed. Gruber and Kamin (2009) do not find evidence that differences in domestic financial development explain the global pattern of current account imbalances. However, Chinn and Ito (2007) argue that financial development has a nonlinear effect on the current account, depending on a country's capital account openness and legal system.

Whereas previous research has investigated the relationship between financial development and gross asset or liability positions, capital flows or current accounts, we examine the relationship between financial development and net foreign asset, net equity position and net debt positions, thereby testing the implications of the model of Mendoza et al. (2009).

3. Data and empirical methodology

3.1 Data

We use the updated Lane and Milesi Ferretti (2007) database that contains annual foreign asset and liability positions for most countries during 1970-2007. We construct three measures for the net foreign asset position of a country:

1) Total net asset position (= (total assets – total liabilities) / GDP),

2) Net equity position (= (portfolio equity assets + FDI assets – portfolio equity liabilities – FDI liabilities) / GDP)[5], and

3) Net debt position (= (total debt assets – total debt liabilities) / GDP).

[5] We follow the literature by pooling portfolio equity and foreign direct investment into one equity category (cf. Lane and Milesi-Ferretti, 2007).

Domestic financial development is proxied by the private credit-to-GDP ratio from the World Bank's financial structure dataset (Beck et al., 2010). It is defined as claims on the private sector by deposit money banks and other financial institutions. Although this variable has been widely used in previous research (cf. Chinn and Ito, 2007), it is not a perfect measure of financial development. In the robustness section, we will therefore assess the sensitivity of our results to alternative indicators of financial development. All countries are included in our sample for which data on the three net foreign asset variables and the private credit-to-GDP ratio for the period 1970-2007 are available. This yields a sample of 51 countries. Appendix A provides a list of the countries.

To assess stationarity of the data, we conduct three panel unit root tests. Table 1 reports the results. Both the Im-Pesaran-Shin and Levin-Lin-Chu unit root tests do not reject the presence of unit roots. In addition, we run the Hadri stationarity test, which tests the null hypothesis of a constant against the alternative of a unit root. This test leads to the rejection of stationarity for all four variables. Therefore, we consider the three net foreign asset variables and the private credit-to-GDP ratio as nonstationary variables.

[Table 1 about here]

3.2 Methodology

Our sample consists of a reasonably large number of countries (51) and a relatively large time dimension (annual data from 1970-2007). However, the time series is too short to estimate reasonable models for each country. We therefore pool the data but want to allow for sufficient heterogeneity in view of the diversity in our sample. In addition, we want to distinguish between short and long-run effects. We therefore use the pooled mean group estimator (PMG), developed by Pesaran et al. (1999). This methodology estimates a common long-run cointegrating vector which holds for all countries, but allows for different short-run coefficients for each country. We will test explicitly whether the assumption of homogeneity of the long-run coefficients is valid. Even though the cointegrating vector is the same across countries, the PMG estimator allows the speed of adjustment to the long-run equilibrium to differ across countries. Also error variances may differ across countries.

Alternative estimation methods that we considered have severe disadvantages. A cointegrated VAR needs to be estimated for each country individually, but the length of the time series makes it impossible to estimate the coefficients accurately. A panel VAR does not allow the short-run coefficients to vary across countries, which is too restrictive.[6] While classic least squares methods, such as OLS or panel fixed effects, can potentially provide more statistical power, these methods do not distinguish between short and long-run effects, which is important to accurately capture the slow underlying process of international financial integration. PMG combines the advantages of pooling, while still allowing for sufficient heterogeneity and is therefore the most appropriate empirical methodology for the sample at hand.

To apply PMG to the hypotheses outlined in Section 2, assume the following long run relationship between the net foreign asset position (NFA) and financial development (FD):

$$NFA_{p,i,t} = \theta_{0,p,i} + \theta_{1,p,i} * FD_{i,t} + u_{p,i,t} \quad (5)$$

where p indicates either the total net foreign asset position, net foreign equity position or net foreign debt position, i the country (i = 1,2,…,N) and t the year (t = 1,2,…,T), $\theta_{0,p,i}$ is a country specific intercept and $u_{p,i,t}$ is a stationary residual for all i, under the assumption that NFA and FD are cointegrated. Rewriting (5) as a dynamic model with one lag and also adding a lag for FD yields:

$$NFA_{p,i,t} = \mu_{p,i} + \delta_{10,p,i} * FD_{i,t} + \delta_{11,p,i} * FD_{i,t-1} + \lambda_{p,i} * NFA_{p,i,t-1} + \varepsilon_{p,i,t} \quad (6)$$

Rewriting (6) in its error correction form gives:

$$\Delta NFA_{p,i,t} = \phi_{p,i} * (NFA_{p,i,t-1} - \theta_{0,p,i} - \theta_{1,p,i} * FD_{i,t}) + \gamma_{1,p,i} * \Delta FD_{i,t} + \varepsilon_{p,i,t} \quad (7)$$

where $\phi_{p,i} = -(1- \lambda_{p,i})$, $\theta_{0,p,i} = \mu_{p,i} / (1- \lambda_{p,i})$, $\theta_{1,p,i} = (\delta_{10,p,i} + \delta_{11,p,i}) / (1- \lambda_{p,i})$ and $\gamma_{1,p,i} = - \delta_{11,p,i}$. We enrich model (7) by allowing control variables $X_{i,t}$ to determine short-run movements in the net foreign asset position:

[6] Unreported results show a large heterogeneity in the short-run coefficients.

$$\Delta NFA_{p,i,t} = \phi_{p,i}*(NFA_{p,i,t-1} - \theta_{0,p,i} - \theta_{1,p,i} *FD_{i,t}) + \gamma_{1,p,i} *\Delta FD_{i,t} + \Lambda_{p,i} *X_{i,t} + \varepsilon_{p,i,t} \quad (8)$$

The pooled mean group estimator restricts the long-run coefficients $\theta_{0,p,i}$ and $\theta_{1,p,i}$ to be equal for all countries i, but allows the short-run coefficients $\gamma_{1,p,i}$, $\Lambda_{p,i}$ and the error correction coefficient $\phi_{p,i}$ to differ across countries. Also the error variances are allowed to differ across countries. We will test the validity of $\theta_{0,p,i} = \theta_{0,p}$ for all i and $\theta_{1,p,i} = \theta_{0,p}$ for all i with the Hausman test. The coefficients are estimated using maximum likelihood, because (8) is nonlinear in the parameters (see Pesaran et al. (1999) for a detailed exposition).[7]

The control variables included in $X_{i,t}$ are derived from previous empirical studies discussed in Section 2. These control variables are the current account, GDP growth, exchange rate appreciation, and capital account openness.

The current account represents the sum of the trade balance and income transfers, which can be viewed as net lending to or net borrowing from the rest of the world. Hence, when the current account is positive a country's residents accumulate net foreign assets, thereby boosting the net foreign asset position. As GDP growth will affect the dependent variable, we include GDP growth in the regression. Foreign assets and liabilities are in general not denominated in the same currency. We therefore include the exchange rate depreciation (in %) vis-à-vis the US dollar to capture potential valuation effects induced by exchange rate movements. Finally, we account for capital account restrictions. As detailed measures, such as Schindler's (2009) capital account openness indicator, are not available for a sufficiently long time period we opt for Chinn and Ito's (2008) KAOPEN indicator which is available for the entire sample period.

Table 2 presents summary statistics of all variables used in the analysis. In the sensitivity analysis, we will use two alternative indicators of financial development, i.e. the ratio of bank credit to bank deposits and the total deposits-to-GDP ratio (see Section 5). In the same vein, we use net exports and the real effective exchange rate, as alternatives to the current account and the nominal exchange rate vis-à-vis the US dollar, respectively, in Section 5. The table shows that the mean net foreign asset/GDP ratio and its subcomponents are negative. There is also a large variety in the ratios, ranging from about -2 to 2 times GDP.

[7] We use the xtpmg command in Stata to estimate the model (Blackburne and Frank, 2007).

[Table 2 about here]

The correlation matrix in Table 3 shows that the net foreign asset/GDP and net debt/GDP ratios are strongly correlated. The control variables are not highly correlated except for private credit/GDP and bank deposits/GDP, which are both proxies for financial development and they are therefore not included simultaneously in the estimations. The same holds for net exports and the current account.

[Table 3 about here]

4. Empirical results

We start with the benchmark specification of the model in Equation (8), capturing the main hypotheses we test. The long-run equation posits a cointegrating relationship between the net foreign asset position and financial development, while we include the current account surplus, GDP growth, exchange rate depreciation and capital account openness in the short-run equation. Table 4 reports the estimation results for total net foreign assets (NFA), net foreign equity assets (NFE) and net foreign debt assets (NFD) as dependent variables in columns (1), (2) and (3), respectively.

[Table 4 about here]

Column (1) shows that the long-run relationship between the net foreign asset position and domestic financial development is significantly negative. Next, column (2) reports a significantly positive long-run relationship between financial development and the net equity position. Finally, column (3) shows that the long-run relationship between financial development and the net debt position is significantly negative. These three results confirm the hypotheses we test for and lend empirical support to the theoretical predictions of the model of Mendoza et al. (2009).[8]

[8] In Table 4, we use the private credit-to-GDP ratio to measure domestic financial development. Alternatively, financial development can be constructed relative to the world average. Unreported results that are available on request show that using relative financial development confirms the results reported in Table 4.

The error correction terms are significantly negative, signalling cointegration between the (components of the) net foreign asset position and financial development. Importantly, the Hausman tests do not reject the assumption of common long-run coefficients across countries indicating that the countries in our sample do have a *common* long-term cointegrating relationship. The significance of the long-run coefficients and the error correction terms confirm the necessity of taking a long-run perspective when modelling net foreign asset positions and its subcomponents. The average error-correcting speed is not very fast: on average every year about 15 percent of the gap between the current and the long-run position is closed. This confirms the implication of the model of Mendoza et al. (2009) that the process towards the long-term equilibrium is quite slow.

Turning to the short-run effects of financial development, the coefficients need to be interpreted with care, because each country has its own short-run coefficients and Table 2 only reports the average across counties.[9] The results suggest that the short-run impact of financial development is quite limited. This provides further evidence that taking a long-run perspective is important to accurately study the relationship between net foreign assets and financial development.

Current account developments are economically and statistically important in the short-run for the total net asset and net debt positions, but turn out insignificant for the net equity position. One possible reason for the latter result is that equity investments are potentially more sensitive to valuation changes compared to debt investments.

GDP growth has a significantly positive effect on all net asset positions. The positive sign is not obvious, because GDP growth decreases the denominator of the net foreign asset position. However, recall from Table 2 that the majority of countries have a negative net foreign asset-to-GDP ratio. This implies that GDP growth decreases the negative position and thereby has a positive effect on the net asset positions.

Exchange rate depreciation has a positive effect, which is as expected, because foreign assets become more valuable when converted into local currency after a depreciation of the local currency.

Capital account openness has a significantly negative effect on the net equity position. Closed capital accounts usually coincide with closed equity markets to foreigners

[9] A detailed set of individual country results is available upon request.

(Bekaert et al., 2003). Open countries attract more foreign equity investors, which increases equity liabilities and thereby worsens countries' net equity position, ceteris paribus.

All long-run coefficients discussed above have the predicted sign. However, because of the maximum likelihood estimation it is not immediately obvious how well the estimated model fits the data. Therefore, we graphically assess how well the model captures net foreign asset positions for six countries from six continents: the United States, Germany, Australia, Ecuador, Thailand and Nigeria. These countries are very diverse and have different levels of financial and economic development. Figure 1 shows the actual net foreign asset position (solid line) and the net foreign asset position predicted by the model (dashed line). Figures 2 and 3 show the net equity and net debt position in the same manner, respectively.

[Figure 1 about here]

First, Figure 1 shows that the model captures the short and long-run movements in total net foreign asset position very well. The performance of the model across a wide range of countries is remarkable. The model explains the net foreign asset positions of developed countries, such as the US and Germany, and those of emerging countries, like Ecuador and Thailand, reasonably well. Note, however, that heterogeneity of the parameters across countries is very important. While the long-run parameters are identical for all countries, there are differences in the short-run parameters and the error correction coefficient.

[Figure 2 about here]

Figure 2 shows that the model does not explain net equity positions very well in the short run. This poor explanatory power is due to the relatively high volatility in the net equity position. A large part of the observed volatility is due to the large swings in global stock market returns. Unreported results show that adding a stock market index, such as the MSCI global index does not improve the fit. Note also that the net equity position contains FDI assets and liabilities. It is not obvious how to accurately model valuation changes in these variables.

[Figure 3 about here]

Figure 3 shows that the model does a much better job explaining net debt positions. These positions also show a more gradual development over time and the empirical fit is good.

5. Robustness

We conduct several checks to assess the robustness of our results. First, we test for the robustness using different indicators of financial development. Second, we use alternative control variables for the current account and nominal exchange rate. Third, we re-estimate the model for samples of industrial and developing countries. In addition, we assess the robustness of the results over different time periods. Finally, we augment the long-run specification by including additional variables.

5.1 Financial development indicators

The benchmark specification uses the private credit-to-GDP ratio as indicator of financial development. Even though many studies have used this variable, several studies suggest alternative indicators (Beck et al., 2010; Gruber and Kamin, 2009). Table 5 shows the results when using two different indicators of financial development: the ratio of bank credit to bank deposits and the total deposits-to-GDP ratio.

[Table 5 about here]

The ratio of bank credit to bank deposits captures the efficiency of a financial system. It measures to which extent a financial system is able to generate credit for a given amount of deposits. The results using this indicator of financial development confirm our previous findings. Also when we use the bank deposits-to-GDP ratio to proxy financial development the results confirm the benchmark findings. When comparing the magnitude of the coefficients with those of the private credit-to-GDP ratio it turns out that the coefficients for the deposits-to-GDP ratio are smaller (in absolute value) for the net asset and net debt positions.

5.2 Control variables

The current account represents the sum of the trade balance and income transfers. Gross foreign assets and liabilities determine the incoming and outgoing income transfers. Hence, it is conceivable that a country's net foreign asset position influences the current account. Therefore we test the validity of the benchmark results by replacing the current account with net exports. Table 6 shows that the long run impact, in terms of sign and significance, of financial development on the respective net foreign asset positions remains intact.

[Table 6 about here]

Unfortunately, the currency denomination of the assets and liabilities is not available. In the benchmark regression we include the nominal exchange rate vis-à-vis the US dollar to control for valuation changes due to exchange rate developments. As an alternative, we use the real effective exchange rate in Table 6. The long-run coefficients on private credit/GDP in columns (4)-(6) are in line with the benchmark results. However, note that due to limited data availability we lose many observations.

5.3 Country and time periods

Next, we investigate the sensitivity of the results to the country and time dimensions. We split the sample into industrial countries and developing countries and consider two time periods: 1970-2007 and 1980-2007.[10] Note that the country sample differs in the 1980-2007 estimation period, because we add countries for which had missing data before 1980. Table 7 broadly confirms the benchmark results, but there are some noteworthy differences across the country groups.

[Table 7 about here]

The results for industrial countries are very much in line with those of the benchmark specification, both for the 1970-2007 and 1980-2007 subsamples. The long-run coefficients

[10] We use the IMF International Financial Statistics to select which countries are industrial (IFS code<200) and which are developing (IFS code>200).

all have the predicted sign and are statistically significant. In fact the magnitude of the coefficients is remarkably similar across both periods.

On the other hand, the results for developing countries do show some differences compared to the benchmark model. The sign and significance of the long-run relationship between financial development and the total net asset position and net equity position are the same. However, the results differ for net debt, which has a positive sign. It is not clear what drives this positive sign. Also, fitting the net equity position appears to be more difficult for the model, given the high log-likelihood.

5.4 Long-run cointegrating relationship

In the final robustness check we investigate the specification of the long-run relationship between net foreign asset positions and financial development. First, we augment the long-run relationship by including the general level of development of a country, for which we use the log of GDP per capita (cf. Faria et al., 2007). If net foreign asset positions are simply determined by the general level of economic development, the level of financial development might not be important. However, the results in columns (1) – (3) of Table 8 confirm the findings from the benchmark specification. The coefficient of our proxy for financial development is statistically significant across all three estimations and its sign is in line with our hypotheses.

[Table 8 about here]

A sceptic may argue that the current net foreign asset position is simply the sum of all past current accounts, apart from valuation effects. Still, when we add the cumulative sum of the current account/GDP ratios to the long-run equation, the results (presented in columns (4) – (6) of Table 8) show that the sign and statistical significance of the coefficient of our proxy for domestic financial development are identical to those of the benchmark specification.

6. Concluding remarks

This paper provides empirical evidence on the relationship between a country's domestic financial development and its net foreign asset position. Using a pooled mean group

estimator, we find that financial development has a significant negative effect on a country's total net foreign asset position. Our results also suggest a significantly positive relationship between financial development and a country's net equity position and a significantly negative relationship between financial development and a country's net debt position. These findings confirm the implications of the theoretical model of Mendoza et al. (2009).

Our results suggest that in the long run financial development contributes to diminishing current global imbalances. However, it will take quite a long time before financial development will have an economically significant impact, as our results show that the average error-correcting speed is not very fast: on average every year about 15 percent of the gap between the current and the long-run position is closed.

It is also important to consider country specific characteristics when drawing policy inferences from our results. For example, US foreign assets are denominated in foreign currencies, while US liabilities are denominated in US dollars. Hence, the US can improve its net foreign asset position by a depreciation of the dollar. On the other hand, most foreign assets and liabilities of countries in the euro area, such as Greece, Portugal and Spain, are denominated in euros. So, these countries cannot improve their net foreign asset position by depreciating their currency.

References

Beck, T., Demirguc-Kunt, A., Levine, R. (2010). Financial institutions and markets across countries and over time: The updated financial development and structure database. World Bank Economic Review, 24(1), 77-92.

Bekaert, G., Lundblad, C., Harvey, C.R. (2003). Equity market liberalization in emerging markets. Journal of Financial Research, 26(3), 275-299.

Bernanke, B. (2005). The global saving glut and the U.S. current account deficit. Speech at the Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia, 10 March.

Bernanke, B. (2009). Financial reform to address systemic risk. Speech at the Council on Foreign Relations, Washington, D.C., 10 March.

Binici, M., Hutchison, M., Schindler, M. (2010). Controlling capital? Legal restrictions and the asset composition of international financial flows. Journal of International Money and Finance, 29, 666–684.

Blackburne, E.F., Frank, M.W. (2007). Estimating nonstationary heterogeneous panels. Stata Journal, 7(2), 197−208.

Borio, C., Disyatat, P. (2011). Global imbalances and the financial crisis: Link or no link? BIS Working Paper No. 346.

Caballero, R., Farhi, E. and Gourinchas, P.O. (2008). An equilibrium model of "global imbalances" and low interest rates. American Economic Review, 98(1), 358-393.

Chinn, M.D., Itô, H. (2007). Current account balances, financial development and institutions: Assaying the world ''saving glut''. Journal of International Money and Finance, 26, 546-569.

Chinn, M.D., Prasad, E.S. (2003). Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration. Journal of International Economics, 59, 47–76.

Clarida, R., (2005). Japan, China, and the U.S. current account deficit. CATO Journal, 25(1), 111-114.

Corsetti, G., Dedola, L., Leduc, S. (2008). Productivity, external balance and exchange rates: Evidence on the transmission mechanism among G7 countries. Review of Economic Studies, 75, 443-473.

Daude, C., Fratzscher, M. (2008). The pecking order of cross-border investment. Journal of International Economics, 74, 94–119.

Faria, A., Lane, P., Mauro, P., Milesi-Ferretti, G.M. (2007). The shifting composition of financial liabilities. Journal of the European Economic Association, 5(2–3), 480–490.

Gruber, J., Kamin, S. (2009). Do differences in financial development explain the global pattern of current account imbalances? Review of International Economics, 17(4), 667–688.

Krugman, P. (2009). Revenge of the glut. The New York Times, 1 March.

Lane, P. (2000). International investment positions: A cross-sectional analysis. Journal of International Money and Finance, 19, 513–534.

Lane, P., Milesi-Ferretti, G.M. (2000). External capital structure: Theory and evidence. CEPR discussion paper 2583.

Lane, P., Milesi-Ferretti, G.M. (2007). The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970–2004. Journal of International Economics, 73, 223–250.

Mendoza, E., Quadrini, V., Rios-Rull, J.-V. (2009). Financial integration, financial development, and global imbalances. Journal of Political Economy, 117(3), 371-416.

Pesaran, M.H., Shin, Y., Smith, R.P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. Journal of the American Statistical Association, 94, 621-634.

Schindler, M. (2009). Measuring financial integration: A new data set. IMF Staff Papers, 56(1), 222–238.

Table 1. Panel unit root tests

Variable	LLC	IPS	Hadri
Net foreign assets / GDP	0.46	1.00	86.2***
Net foreign equity / GDP	6.17	6.88	99.1***
Net foreign debt / GDP	2.30	2.12	93.4***
Private credit / GDP	2.06	2.81	129.4***

Note: The table reports the statistics of the Levin-Lin-Chu (LLC), Im-Pesaran-Shin (IPS) and Hadri panel unit root tests. The LLC and IPS unit root tests are against the alternative of a constant, while the Hadri test tests against a constant under the null. All tests are calculated using the Stata command xtunitroot. *** indicates rejection at the 1% level.

Table 2. Descriptive statistics

Variable	Observations	Mean	Variance	Minimum	Maximum
Net foreign assets / GDP	1938	-0.31	0.45	-2.17	1.96
Net foreign equity / GDP	1938	-0.13	0.24	-2.59	0.35
Net foreign debt / GDP	1938	-0.28	0.38	-1.84	2.30
Private credit / GDP	1938	0.48	0.41	0.02	2.02
Bank credit / bank deposits	1934	1.01	0.40	0.10	3.07
Bank deposits / GDP	1928	0.42	0.33	0.03	2.30
Current account (% of GDP)	1717	-0.02	0.06	-0.24	0.38
Net exports (% of GDP)	1846	-0.02	0.09	-0.79	0.37
GDP growth	1887	0.08	0.13	-0.83	1.07
Exchange rate depreciation (%)	1873	0.04	0.17	-0.43	1.92
Real effective exchange rate depreciation (%)	1029	-0.01	0.11	-1.14	0.62
Capital account openness	1895	0.27	1.53	-1.84	2.48

Table 3. Correlation matrix

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Net foreign assets / GDP	1											
(2)	Net foreign equity / GDP	0.28	1										
(3)	Net foreign debt / GDP	0.79	-0.28	1									
(4)	Private credit / GDP	0.48	0.15	0.43	1								
(5)	Bank credit / bank deposits	0.07	0.09	0.09	0.33	1							
(6)	Bank deposits / GDP	0.52	0.06	0.46	0.82	0.02	1						
(7)	Current account (% of GDP)	0.43	0.04	0.34	0.17	-0.03	0.21	1					
(8)	Net exports (% of GDP)	0.16	-0.15	0.25	0.15	0.07	0.11	0.71	1				
(9)	GDP growth	0.16	-0.05	0.17	0.03	-0.03	0.06	0.12	0.07	1			
(10)	Exchange rate depreciation (%)	-0.22	-0.01	-0.21	-0.27	-0.11	-0.25	-0.05	-0.08	-0.53	1		
(11)	Real effective exchange rate depreciation (%)	0.10	-0.03	0.13	0.06	0.03	0.06	-0.03	0.00	0.45	-0.41	1	
(12)	Capital account openness	0.37	0.07	0.40	0.64	0.30	0.53	0.21	0.23	0.06	-0.25	0.08	1

Table 4. Benchmark results

	(1) NFA	(2) NFE	(3) NFD
Long run			
Private credit / GDP	-0.140***	0.086***	-0.183***
	(0.032)	(0.024)	(0.041)
Error correction coefficient	-0.183***	-0.106***	-0.137***
	(0.015)	(0.028)	(0.019)
Short-run coefficients:			
Δ Private credit / GDP	0.048	-0.005	0.052
	(0.096)	(0.047)	(0.085)
Current account (% of GDP)	0.642***	-0.035	0.486***
	(0.122)	(0.060)	(0.083)
GDP growth	0.367***	0.124***	0.314***
	(0.054)	(0.030)	(0.042)
Exchange rate depreciation (%)	0.069**	0.097***	0.031
	(0.032)	(0.025)	(0.028)
Capital account openness	-0.006	-0.012***	0.006
	(0.005)	(0.004)	(0.005)
Observations	1,659	1,659	1,659
Log-likelihood	2697	4081	2956
Hausman test	0.55	0.27	0.57

Note: The table shows the coefficients of the estimation of Equation (8) using the pooled mean group estimator. NFA is net foreign asset position / GDP, NFE is net foreign equity position / GDP and NFD is net foreign debt position / GDP. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 5. Robustness to alternative indicators of financial development

	(1) NFA	(2) NFE	(3) NFD	(4) NFA	(5) NFE	(6) NFD
Long-run coefficient:						
Bank credit / bank deposits	-0.281***	0.046***	-0.477***			
	(0.036)	(0.011)	(0.053)			
Bank deposits / GDP				-0.084**	0.090***	-0.094***
				(0.033)	(0.020)	(0.036)
Error correction coefficient	-0.165***	-0.098***	-0.118***	-0.175***	-0.101***	-0.138***
	(0.016)	(0.028)	(0.021)	(0.014)	(0.028)	(0.018)
Short-run coefficients:						
Δ Bank credit / bank deposits	-0.001	0.039**	-0.003			
	(0.034)	(0.019)	(0.027)			
Δ Deposits / GDP				0.090	-0.016	0.052
				(0.089)	(0.044)	(0.086)
Current account (% of GDP)	0.634***	0.009	0.415***	0.661***	-0.035	0.489***
	(0.121)	(0.051)	(0.082)	(0.118)	(0.052)	(0.083)
GDP growth	0.381***	0.111***	0.328***	0.366***	0.125***	0.313***
	(0.054)	(0.029)	(0.038)	(0.053)	(0.028)	(0.042)
Exchange rate depreciation (%)	0.070**	0.088***	0.036	0.069**	0.098***	0.028
	(0.029)	(0.024)	(0.024)	(0.032)	(0.026)	(0.027)
Capital account openness	-0.002	-0.011***	0.008	-0.005	-0.013***	0.007
	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)	(0.006)
Observations	1,651	1,651	1,651	1,644	1,644	1,644
Log-likelihood	2712	4065	2953	2673	4073	2933

Note: see notes under Table 4.

Table 6. Alternative control variables

	(1) NFA	(2) NFE	(3) NFD	(4) NFA	(5) NFE	(6) NFD
Long run						
Private credit / GDP	-0.327***	0.283***	-0.231***	-0.141***	0.034**	-0.325***
	(0.031)	(0.043)	(0.048)	(0.035)	(0.017)	(0.033)
Error correction coefficient	-0.189***	-0.077***	-0.125***	-0.210***	-0.190***	-0.161***
	(0.025)	(0.028)	(0.021)	(0.023)	(0.049)	(0.037)
Short-run coefficients:						
Δ Private credit / GDP	0.022	-0.043	0.022	0.082	0.009	0.018
	(0.090)	(0.053)	(0.082)	(0.104)	(0.067)	(0.094)
Current account (% of GDP)				0.631***	0.002	0.513***
				(0.184)	(0.109)	(0.119)
GDP growth	0.357***	0.130***	0.290***	0.321***	0.070**	0.260***
	(0.043)	(0.032)	(0.039)	(0.077)	(0.028)	(0.057)
Exchange rate depreciation (%)	0.061**	0.094***	0.010			
	(0.031)	(0.024)	(0.030)			
Capital account openness	0.004	-0.008**	0.013***	-0.010*	-0.015**	0.003
	(0.004)	(0.003)	(0.005)	(0.006)	(0.006)	(0.007)
Net exports (% of GDP)	0.387***	-0.024	0.257***			
	(0.089)	(0.062)	(0.082)			
Real effective exchange rate depreciation (%)				-0.106	-0.025	-0.020
				(0.072)	(0.039)	(0.060)
Observations	1,747	1,747	1,747	989	989	989
Log-likelihood	2789	4328	3058	1538	2040	1794

Note: see notes under Table 4.

Table 7. Industrial vs. developing country samples

	Industrial (1970-2007)			Industrial (1980-2007)			Developing (1970-2007)			Developing (1980-2007)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	NFA	NFE	NFD	NFA	NFE	NFD	NFA	NFE	NFD	NFA	NFE	NFD
Long-run coefficient:												
Private credit / GDP	-0.115***	0.054**	-0.231***	-0.155***	0.051**	-0.127***	-0.270***	0.486***	0.373**	-0.221***	0.408***	0.759***
	(0.033)	(0.021)	(0.043)	(0.036)	(0.021)	(0.032)	(0.081)	(0.072)	(0.151)	(0.057)	(0.062)	(0.098)
Error correction coefficient	-0.225***	-0.215***	-0.154***	-0.255***	-0.242***	-0.190***	-0.164***	-0.042	-0.135***	-0.171***	-0.037	-0.152***
	(0.023)	(0.056)	(0.039)	(0.033)	(0.052)	(0.043)	(0.019)	(0.026)	(0.021)	(0.020)	(0.025)	(0.020)
Short-run coefficients:												
Δ Private credit / GDP	0.066	0.024	-0.018	0.030	0.026	-0.089	0.052	-0.026	0.062	0.213	-0.037	0.187
	(0.098)	(0.098)	(0.078)	(0.098)	(0.103)	(0.080)	(0.140)	(0.050)	(0.120)	(0.168)	(0.055)	(0.128)
Current account (% of GDP)	0.732**	-0.084	0.601***	0.801***	0.019	0.730***	0.604***	-0.014	0.425***	0.533***	0.094*	0.272**
	(0.298)	(0.159)	(0.156)	(0.276)	(0.197)	(0.158)	(0.101)	(0.041)	(0.095)	(0.118)	(0.054)	(0.109)
GDP growth	0.179***	0.124	0.140***	0.213***	0.128	0.165***	0.469***	0.128***	0.417***	0.483***	0.198***	0.399***
	(0.066)	(0.077)	(0.053)	(0.062)	(0.081)	(0.051)	(0.069)	(0.020)	(0.053)	(0.171)	(0.033)	(0.141)
Exchange rate depreciation (%)	0.091	0.095*	0.047	0.147**	0.120**	0.085	0.058	0.098***	0.017	0.043	0.057*	0.060
	(0.064)	(0.055)	(0.065)	(0.064)	(0.055)	(0.062)	(0.035)	(0.025)	(0.027)	(0.059)	(0.030)	(0.075)
Capital account openness	-0.013*	-0.013	0.005	-0.004	-0.008	0.007	-0.002	-0.009***	0.004	0.018	-0.007*	0.016
	(0.007)	(0.010)	(0.008)	(0.011)	(0.012)	(0.009)	(0.006)	(0.003)	(0.006)	(0.014)	(0.004)	(0.013)
Observations	612	612	612	525	525	525	1,047	1,047	1,047	1,437	1,437	1,437
Log-likelihood	1142	1181	1318	961.1	1007	1122	1557	2911	1642	2017	3651	2208

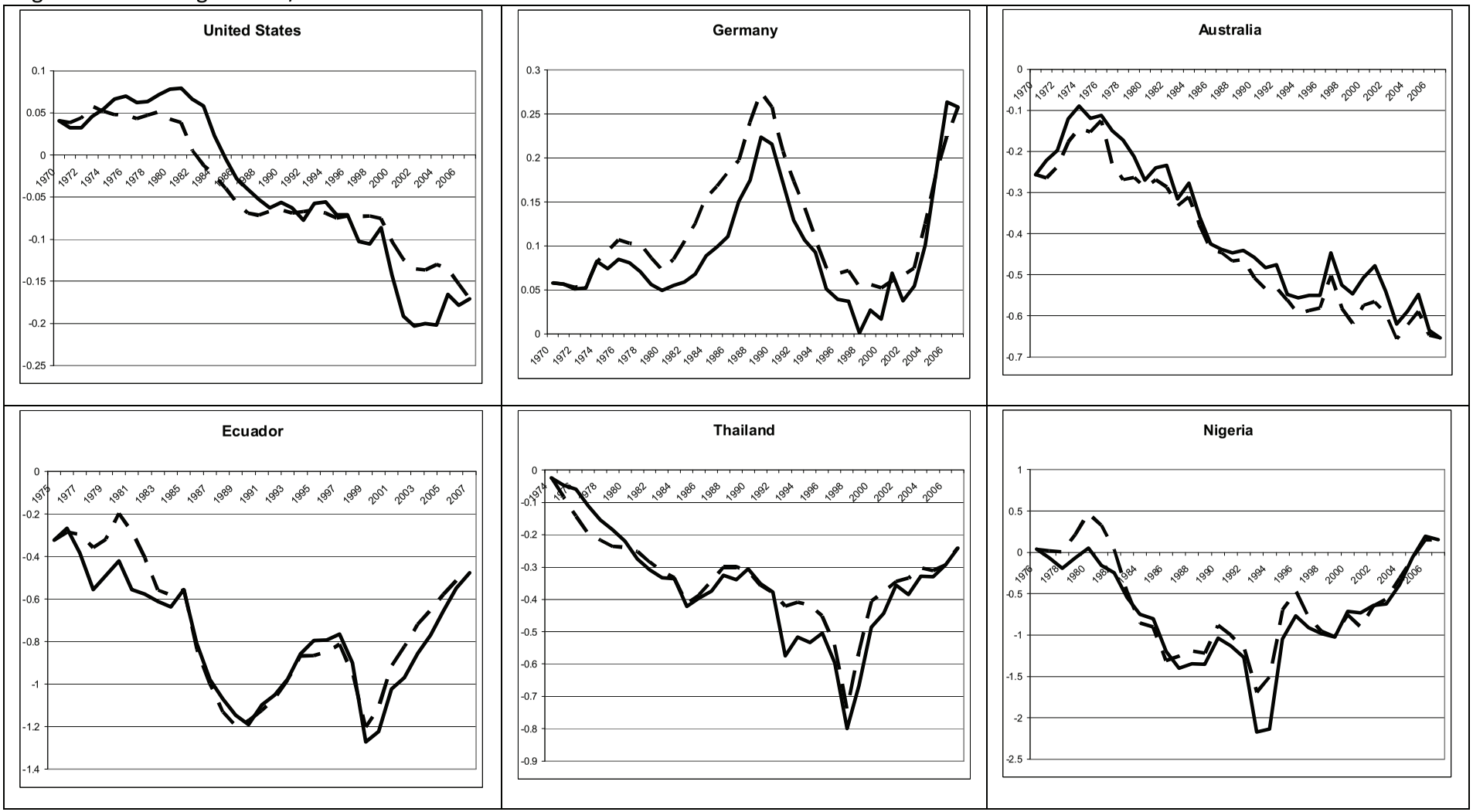
Note: see notes under Table 4.

Table 8. Extending the long-run cointegrating vector

	(1) NFA	(2) NFE	(3) NFD	(4) NFA	(5) NFE	(6) NFD
Long-run coefficients:						
Private credit / GDP	-0.129***	0.136***	-0.171***	-0.104***	0.086***	-0.354***
	(0.031)	(0.030)	(0.046)	(0.027)	(0.025)	(0.056)
Cumulative current account	0.039	0.019***	-0.363***			
	(0.026)	(0.007)	(0.060)			
Log(GDP per capita)				-0.046***	-0.010	0.094***
				(0.009)	(0.010)	(0.015)
Error correction coefficient	-0.192***	-0.109***	-0.107***	-0.188***	-0.116***	-0.154***
	(0.016)	(0.028)	(0.016)	(0.016)	(0.029)	(0.021)
Short-run coefficients:						
Δ Private credit / GDP	0.046	-0.017	0.054	-0.010	-0.046	0.017
	(0.096)	(0.049)	(0.090)	(0.132)	(0.057)	(0.113)
Current account (% of GDP)	0.642***	-0.038	0.488***	0.554***	-0.047	0.381***
	(0.121)	(0.058)	(0.078)	(0.143)	(0.060)	(0.110)
GDP growth	0.367***	0.125***	0.319***			
	(0.053)	(0.030)	(0.043)			
GDP per capita growth				0.355***	0.118***	0.279***
				(0.057)	(0.031)	(0.046)
Exchange rate depreciation (%)	0.069**	0.098***	0.025	0.065*	0.094***	0.016
	(0.031)	(0.025)	(0.033)	(0.035)	(0.027)	(0.030)
Capital account openness	-0.006	-0.011***	0.007	-0.007*	-0.012***	0.003
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
Observations	1,659	1,659	1,659	1,639	1,639	1,639
Log-likelihood	2698	4082	2980	2557	3928	2828

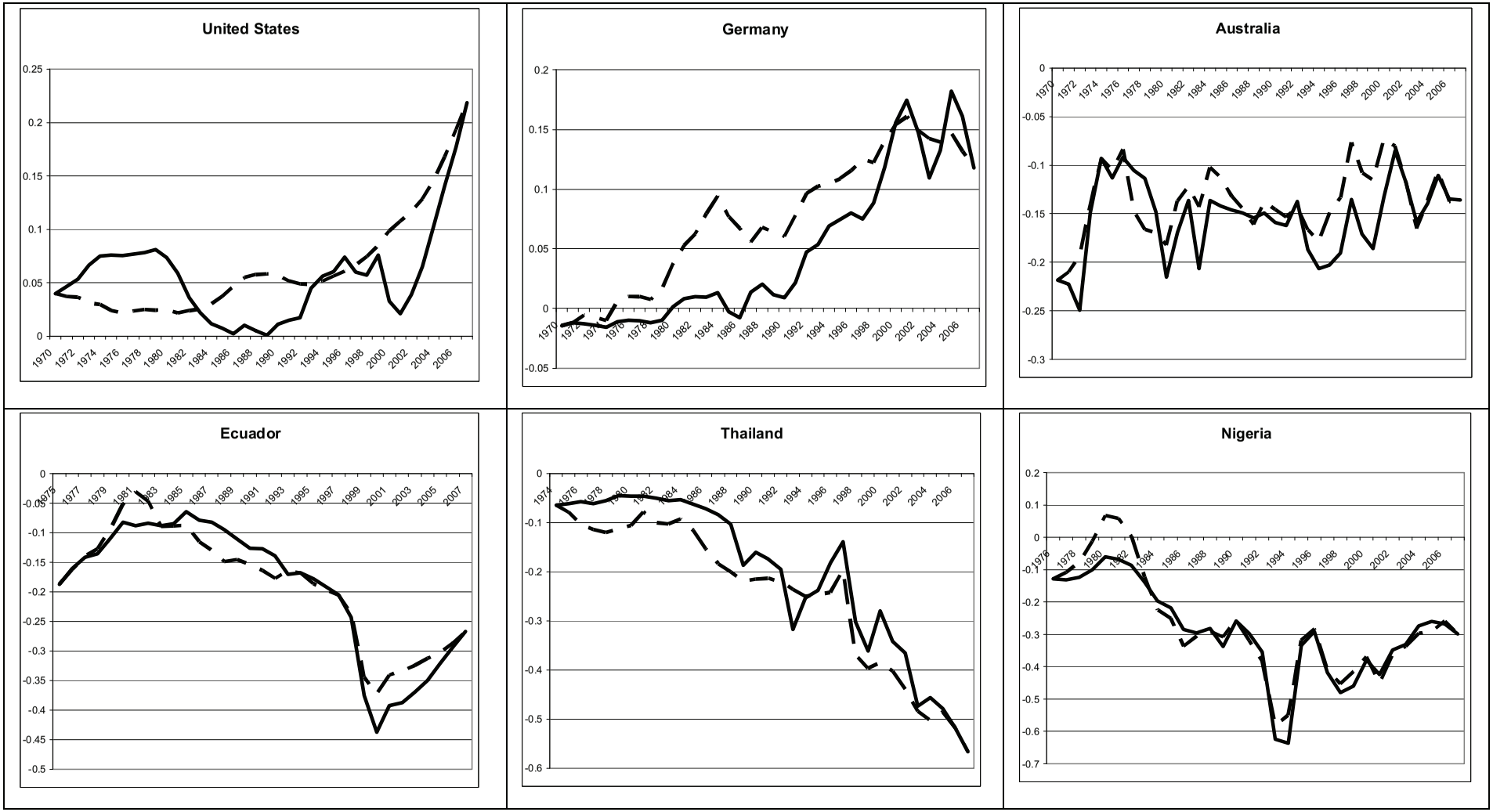
Note: see notes under Table 4.

Figure 1. Net foreign assets/GDP for selected countries



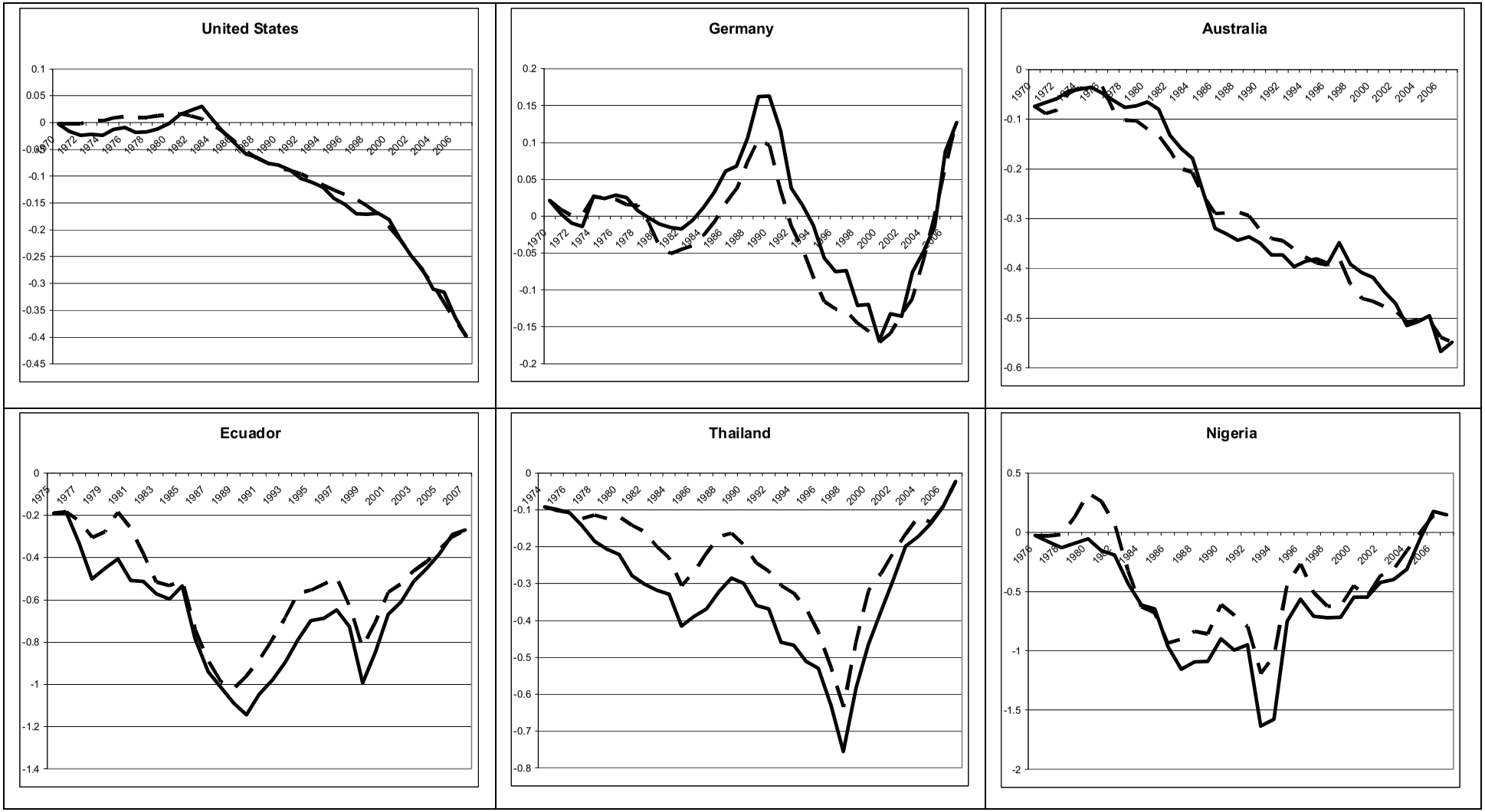
Note: The solid line represent the actual data, whereas the dashed line represents the predicted value based on the estimates from column (4) in Table 4.

Figure 2. Net foreign equity/GDP for selected countries



Note: The solid line represent the actual data, whereas the dashed line represents the predicted value based on the estimates from column (5) in Table 4.

Figure 3. Net foreign debt/GDP for selected countries



Note: The solid line represent the actual data, whereas the dashed line represents the predicted value based on the estimates from column (6) in Table 4.

Appendix A. Sample.

Ifs code	Country	Ifs code	Country	Ifs code	Country
111	United States	238	Costa Rica	524	Sri Lanka
112	United Kingdom	243	Dominican Republic	534	India
122	Austria	248	Ecuador	548	Malaysia
128	Denmark	253	El Salvador	558	Nepal
132	France	258	Guatemala	564	Pakistan
134	Germany	263	Haiti	566	Philippines
136	Italy	268	Honduras	576	Singapore
138	Netherlands	283	Panama	578	Thailand
144	Sweden	288	Paraguay	618	Burundi
146	Switzerland	299	Venezuela, Rep. Bol.	622	Cameroon
156	Canada	343	Jamaica	644	Ethiopia
158	Japan	369	Trinidad and Tobago	646	Gabon
172	Finland	469	Egypt	662	Côte d'Ivoire
178	Ireland			664	Kenya
181	Malta			674	Madagascar
193	Australia			684	Mauritius
196	New Zealand			692	Niger
199	South Africa			694	Nigeria
				722	Senegal
				724	Sierra Leone

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