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Abstract

This paper documents the dynamic properties of the current account, trade balance and international capital flows. For this purpose, three different approaches are taken: probit, non-parametric estimation and an asymmetric autoregression. The probabilistic approach shows that, in general, deficits and net inflows tend to be more persistent than surpluses and net outflows. This result is robust to either specification of pooled and country-specific probits. Current account reversals have a significant effect on the persistence of capital flows, especially in developing countries. The latter also have more persistent deficits and net inflows than industrial countries. The results of non-parametric estimation are in line with the results obtained from the probit. In the case of asymmetric autoregression, we find that surpluses are more persistent than deficits: although the probability of remaining in a surplus state is lower, the scale of surpluses tends to show more persistence than the scale of deficits.

Keywords: Capital flows; Persistence
JEL classification: F00; F30

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1. Introduction

The sustainability and adjustment of current account imbalances have been major issues in recent research. The greatest attention has concerned the trajectory of possible adjustments of the US current account deficit, which, growing steadily since 1991, has reached a remarkable 6.5 percent of GDP in 2006. A situation such that a variable (the current account in this case) is steadily in a deficit or in a surplus may be labeled a persistent deficit or surplus.

How does the history of a variable matter for its current state? Do current account reversals affect the persistence of international capital flows? These questions, relevant in policy circles for the analysis of the trajectory and the timing of adjustment of external imbalances, are the motivators of the current study.

The persistence of capital flows has already received academic attention. Sarno and Taylor (1999), using maximum likelihood and Kalman Filtering techniques, study the persistence properties of international capital flows to Latin American and Asian developing countries. Clarida et al. (2007) use threshold autoregression model to estimate the asymmetric adjustment between different states of the current account.[1] Chortareas et al. (2004) test for current account solvency in Latin America using STAR-modified unit root tests. Edwards (2004) studies persistence of large current accounts, where persistence is measured with the marginal probability. Reinhart and Rogoff (2003), analyzing panel data on external debt, show that the probability of transition from a bad state into a good state is higher than the transition in the other direction.

To contribute to this literature, we study the persistence of wider range of international capital flow categories using three different methods: probit, a non-parametric estimator and an asymmetric autoregression. We find that deficits and net inflows tend to be more persistent than surpluses and net outflows. For instance, the probability of transition from a current account deficit into a deficit next period is 0.88, while the probability of transition from a current surplus into a surplus in the next period is 0.77. We find that FDI are more persistent than portfolio investments and the other investments category in either state. The probability of remaining in a deficit state is 0.88 for FDI, 0.74 for portfolio investments and 0.73 for the other investments category, while the probability of remaining in a surplus state is 0.75 for FDI, 0.72 for portfolio investments and 0.68 for the other investments category. Non-parametric approach yields results qualitatively consistent with probit. In the case of autoregression, in the total sample, only equity securities have a larger persistence of inflows (the autoregressive coefficient is 0.8 in the case of deficits, and 0.5 in the case of surpluses). In

[1] Though the estimated coefficients are significant, tests of coefficient equalities are not provided. For instance, autoregressive coefficients for Canada above mean and below mean are 0.927 and 0.930 respectively, while for Japan they are 0.908 and 0.894. The authors report half lives also, with surplus being more persistent for Canada, and deficit being more persistent for Japan. Definitely the measure of half-life depends on the reported autoregressive coefficients, which are very close to each other. The question is, are those coefficients significantly different from each other?

the sample of industrial countries portfolio investment with its subcomponents have a higher persistence of inflows (the autoregressive coefficient for equity securities is 0.8 in the case of deficits, and 0.3 in the case of surpluses; the coefficient for debt securities is 1.3 in the case of deficits, and 0.8 in the case of surpluses). In the case of developing countries, FDI have a higher persistence of inflows, with the autoregressive coefficient being equal to 0.3 in the case of deficits.

Some recent research has concentrated on understanding sharp reductions in current account to GDP ratios (Milesi-Ferretti and Razin, 1998, 2000). They document that a sudden stop of international capital flows can result in a current account reversal if the country already runs a sizable current account deficit. The next question that this paper studies is exactly the opposite of Milesi-Ferretti and Razin (1998). Namely, do the dynamic properties of international capital flows change when a country experiences a current account reversal? We use two different measures of current account reversals: (i) a reduction of the current account to GDP ratio by three percentage points, after controlling for temporary fluctuations and moderate current account to GDP ratios; and (ii) a change of the current account to a surplus from previous period's deficit.[2] We find that the current account reversals have a significant effect in the sample of developing countries. The latter have lower persistence of deficit and net inflows than industrial countries, given the current account reversal has occurred (except FDI category).

The paper is organized as follows. Section 2 discusses econometric specifications, describes the data and modifies the non-parametric measure of persistence developed by Dias and Marques (2005). Section 3 presents the main empirical findings. The last section concludes.

2. Data and Econometric Specifications

Different measures of persistence have been considered in the literature. Among widely used ones are "sum of autoregressive coefficients", "spectrum of zero frequency", "largest autoregressive root" and "half life".[3] The most prominent of these is the 'half life' which, having such an attractive feature as a measure of persistence in units of time, has been used extensively.[4] Dias and Marques (2005), studying the persistence of inflation, suggest a non-parametric measure, based on mean reversion. Another measure of persistence, widely spread in labor economics, is the probability of state dependence. State dependence arises when the probability of experiencing an event is a function of experiencing an event in the past. As a consequence of an event (e.g. positive FDI flows) the preferences, prices or possibly constraints are affected, which in turn affects the future probability of experiencing the same

[2] See Section 3 for more details.

[3] See Dias and Marques (2005) for discussions and relevant references on relative behavior of different measures of persistence.

[4] For examples see Imbs et al. (2005) and Clarida et al. (2007).

event.

2.1. Probit

The first approach we choose is a probabilistic one, specified by the following binary probit model:

$$p(x_{i,t} = 1|\cdot) = \Phi(\alpha + \beta x_{i,t-1}) \tag{1}$$

where x_t is the variable of interest and Φ stands for the normal cumulative distribution. We measure the persistence by the conditional probability $p(x_{i,t} = j|x_{i,t-1} = j)$ for $j = 0, 1$.

Regarding equation (1), we use a pooled estimator since the fixed effects estimator is biased. For comparison, individual country-by-country estimation of parameters is also done.

2.2. Non-parametric approach

Dias and Marques (2005) have suggested a non-parametric estimator, which is robust to the model specification (number of lags). Their approach is based on mean reversion and does not allow the positive and negative state distinction. In this section, we modify their approach to incorporate the latter as well.

Assume variable x_t crosses its mean n times out of total number of available T observations. So, $T - n$ times the series has not been crossing the mean. For the purpose of this paper we will assume the steady state mean value of the variable to be equal to zero. Define by T_p the time spent in the positive, and by T_n the time spent in the negative states. Then we can decompose the number of times not crossing the mean into the positive and negative state counterparts by writing it as a weighted average of relative time in either states of the series:

$$T - n = \frac{T_p}{T}(T - n) + \frac{T_n}{T}(T - n) = \frac{T_p}{T}(T - n) + (1 - \frac{T_p}{T})(T - n) \tag{2}$$

Because absolute $T - n$ has little interpretation, the relative to total T is a better measure of persistence.[5] Thus we have:

$$1 - \frac{n}{T} = \frac{T_p}{T}(1 - \frac{n}{T}) + (1 - \frac{T_p}{T})(1 - \frac{n}{T}) = \gamma_{positive} + \gamma_{negative} \tag{3}$$

Note that the left hand side is the measure of persistence suggested by Dias and Marques (2005). The right hand side is just the weighted average of this measure, where the weights are relative time in the positive and negative states of the series. In our paper, this allows the analysis of persistence of net inflows and outflows.

To study the properties of the estimator, assume the variable z takes value 1 if the series

[5] If $n_1 = n_2 = 5$ for two different series, while $T_1 > T_2$, then it would be reasonable to claim higher persistence of the first series.

is in a positive state and 0 otherwise, while variable y is defined the other way around. Then the weights are averages of series z and y. In a similar manner we can generate a variable m which takes value 1 if the mean is crossed and 0 otherwise. Thus n/T also represents the average of the variable m. Since the sample mean converges in probability to the expectation of the variable, the consistency of the estimator follows directly. The restrictive side of this estimator is its applicability to time series, and our ignorance of its asymptotic distribution.

2.3. Autoregression

The half life is an alternative measure for persistence, and measures the time necessary for the effect of a given shock to be halved. Thus persistence measured by this and the previous two methods is quite a different concept. For our purposes we use the asymmetric autoregression specified as

$$x_{i,t} = a_i + \begin{Bmatrix} b_1 x_{i,t-1} \text{if } x_{i,t-1} \geq \gamma \\ b_2 x_{i,t-1} \text{if } x_{i,t-1} < \gamma \end{Bmatrix} + u_{i,t} \tag{4}$$

where $\gamma = 0$.[6] This specification means that, depending on the country's state within a particular category, its 'speed of convergence', implicitly defined by the magnitude of autoregressive coefficient, is different. Equation (4) can be estimated using a dummy variable with the following econometric specification:

$$x_{i,t} = \alpha_i + \beta x_{i,t-1} + \delta D x_{i,t-1} + u_{i,t} \tag{5}$$

where D is a dummy variable, which takes value zero if $x_{i,t-1} < 0$, and one if $x_{i,t-1} \geq 0$. β measures the speed of convergence, and if δ is significant, and the hypothesis that $\beta + \delta$ equals to β is rejected, then the adjustment is asymmetric.

Equation (5) is a case of a dynamic panel model. These models have been studied by Anderson and Hsiao (1981) and Arellano and Bond (1991) among others. Estimation of a dynamic panel equation proceeds in two steps. First, the equation is differenced to remove the individual effect. Then the estimation is implemented under the assumption of sequential moment conditions and strictly exogenous instruments. Given the sequential moments condition holds, the differenced error term will be uncorrelated with $x_{i,t-2}$ and $Dx_{i,t-2}$ (or the corresponding differences).[7]

Anderson and Hsiao (1981) suggest instrumenting the endogenous variable in the first

[6] Another method is the Threshold Autoregression, in which the threshold would not be imposed, as is done in our case, but estimated. The reason why threshold autoregression is not considered here, is due to the panel nature of the data. Although this is an active are of research, there is no fully satisfactory answer to the problem of TAR in a panel setting.

[7] Arellano and Bond (1991) have shown that lagged levels as instruments are more efficient than their differences. For this reason we choose the lagged levels as instruments.

stage, then, using the fitted values of the endogenous variable, estimate the equation of interest. As opposed to the previous estimator, Arellano and Bond (1991) suggest the entire set of instruments in a generalized method of moments estimation by exploiting additional moment restrictions, and thus gaining efficiency compared to Anderson and Hsiao (1981). We choose the Anderson-Hsiao type estimator, based on the simulations by Judson and Owen (1996). Using Monte-Carlo simulations, they show that from a list of compatible fixed effects estimators, for the time span and cross-sectional units used in this study, Anderson-Hsiao estimator is the least biased (though it is the least efficient also (has relatively large standard errors)).

Another possible estimator is the least square dummy variable corrected estimator (Kiviet, 1995), developed for a balanced panel. It has been shown that with AR(1) panel representation the least squares dummy variable estimator is biased of order T^{-1}. Since the two stage least squares tend to have large standard errors "[o]ften we must choose between a possibly inconsistent estimator that has relatively small standard errors (OLS) and a consistent estimator that is so imprecise, that nothing interesting can be concluded (2SLS)" (Wooldridge, 2002:104). For this reason we report results from the ordinary least squares fixed effects estimation as well.

2.4. Data

The data used in this paper are annual and cover the period 1970-2005. Data on capital flows, current account and trade balance are obtained from International Financial Statistics database by the IMF. GDP in current US dollars is taken from the World Development Indicators database by the World Bank. The sample of countries includes 19 industrial and 33 developing countries, which are listed in in Appendix A.

3. Results

3.1. Probit

3.1.1. Main specification

The first econometric specification considered is the pooled probit. Table 1 shows the combined estimates for positive and negative flows. Almost all coefficients are statistically significant. The column "Lag" has only positive coefficients in the total sample as well as subsamples of industrial and developing countries. All of the lagged variables are statistically significant at the conventional levels of significance. Since the coefficients in probit specifications are hard to interpret, it is common to construct marginal probabilities. Instead we will construct the levels of probabilities since we think that the levels of transition probabilities are a better measure of persistence than the marginal probabilities. But first we check whether

the transition probabilities from deficit to deficit and surplus to surplus states are significantly different from each other. This would signal existence of asymmetric adjustment. A formal way to do that would be deriving asymptotic distribution of conditional probabilities, and then testing the hypothesis of equality. We choose an approach that is relatively simpler to implement.

Since both slopes and the corresponding standard errors are equal by construction between the two probits (positive and negative flows) in Table 1, the source of asymmetry can be found in the intercept.[8] All intercepts are statistically significant at 10 percent. So, by constructing 90 percent confidence intervals and looking for the intersection regions, we can judge whether the coefficients and thus the transitional probabilities are equal.[9]

From Table 2 we can see the presence of asymmetry in the process of adjustment. In the total sample, only the trade balance has a relatively large overlap of confidence intervals of negative and positive intercepts. Portfolio investments and debt securities also have an overlap, but it is relatively smaller. The confidence intervals of negative and positive intercepts do not overlap in all other categories. Thus the probabilities of transition for the latter group can be asymmetric. In the sample of industrial countries, all of the categories, except other investments and reserve assets, have overlapping confidence intervals. The overlap is minor for the current account balance, trade balance, FDI and debt securities. In the sample of developing countries only portfolio investments and other investments have a major overlap of confidence intervals. There is a minor overlap in the case of the trade balance. All other categories seem to have asymmetric transition probabilities.

So far the confidence intervals indicated asymmetry in the transition probabilities. To judge the size of this asymmetry we must construct the transition probability matrix. These are presented in Figure 1. In the total sample, the current account balance, the trade balance, FDI, portfolio investments and other investments have a larger persistence of deficits than surpluses. The probability of remaining in a deficit state is 0.88 for the current account, compared to the 0.77 probability of remaining in the surplus state. The probability of remaining in a deficit state is 0.84 for the trade balance, compared to the 0.84 probability of remaining in the surplus state. This was expected as there was a major overlap of the confidence intervals. The probability of remaining in a deficit state for FDI is 0.88, compared to the 0.75 probability of remaining in the surplus state. For portfolio investments the probability of remaining in a deficit state is 0.74, compared to the 0.72 probability of remaining in the surplus state. Though there is a slight difference in persistence, the overlap of confidence

[8] The same data with different definitions has been used: in one case surpluses and net outflows take value one and deficits and net inflows - zero, in the other case - the other way around. These two problems are mathematically equivalent.

[9] A formal way for testing for intercept equality from two different estimation would be deriving the asymptotic distribution of the difference between coefficients, and then using some test, say Wald. The computation of the asymptotic variance is quite complicated. For this reason we approach the problem using confidence intervals.

intervals of negative and positive intercepts for this category suggests possible symmetry in the persistence of flows. This is true for the category of the debt securities as well, though the persistence of outflows is greater than the persistence of inflows. For other investments the probability of remaining in a deficit state is 0.73, compared to the 0.68 probability of remaining in the surplus state.

In the sample of industrial countries the current account deficit has a persistence of 0.87, while the surplus has a persistence of 0.81. The inflow of portfolio investments has a persistence of 0.76, compared to the 0.70 persistence of outflows. The inflow of debt securities has a persistence of 0.77, as opposed to the 0.69 persistence of outflows. The inflow of other investments has a persistence of 0.69, as opposed to the 0.57 persistence of outflows. All other categories have a greater persistence of outflows, although the confidence interval test suggest possible symmetry in all of the cases.

In the sample of developing countries the current account deficit has a persistence of 0.88, while the surplus has a persistence of 0.72. The trade deficit is more persistent than the trade surplus, with persistence probabilities of 0.86 and 0.82. Note that the trade balance has marginally overlapping confidence intervals. The inflow of other investments has a persistence of 0.76, as opposed to the 0.74 persistence of outflows. In this case there is a major overlap of confidence intervals, signalling symmetry in persistence. All other categories have a greater persistence of outflows, though the confidence interval test suggests possible symmetry in all of the cases.

In general, the evidence is for higher persistence of deficits and net inflows than surpluses and net outflows, meaning that countries in the negative state are more likely to stay in that state than countries in the positive state. This can be seen more easily by looking at the probabilities of transition from one state into the opposite one: $p(x_t > 0|x_{t-1} < 0) < p(x_t < 0|x_{t-1} > 0)$. Once a country is in the negative state, it is harder to move to the positive state, than would be otherwise. This conclusion was also achieved by the analysis of Reinhart and Rogoff (2003) for external debt.

Although pooled probit estimation provides a good description of asymmetric adjustment of international balance sheet components, the results can be biased due to false state dependence. In the case of pooled probit, the estimator, *ceteris paribus*, is consistent, as opposed to the properties of fixed-effects probit.[10] Yet, possible individual heterogeneity can bias the results significantly, particularly if the unobserved heterogeneity is correlated with the disturbance term. In this case ignoring the former will result in false state dependence (Heckman, 1981).

To overcome this problems, country-specific probits are used. But this approach in turn has problems. For some countries, data length is too short and for that particular period the variable of interest may carry the same sign. In this case, probit estimation is impossible.

[10]Bias can be reduced by using, for example, a modified maximum likelihood estimator (Carro, 2006).

For this reason some countries are dropped out of the estimation.[11] Averaged transition probabilities are computed and the transition probability matrix based on these results is presented in Table 3.

As can be seen from this table, the average of transition probabilities supports the results of pooled estimation for both full sample, and breakdown into industrial and developing countries subsamples. In the samples of all countries, the current account, FDI, portfolio investments and other investments have a higher persistence of deficits and net inflows than surpluses and net outflows. In the case of industrial countries, the current account, portfolio investments, debt securities and other investments categories have a higher persistence of surpluses and net outflows. In the sample of developing countries, the current account balance, FDI and other investments categories have a higher persistence of surpluses and net outflows. For the rest of the categories the situation is reversed. It is worth noting, that the magnitude of standard deviations suggest a failure to reject the null hypothesis of symmetry in all of the cases.

Comparing the results of current account persistence to Edwards (2004), we can see some differences. His direct interests are episodes of large surpluses and deficits. Running fixed-effects probits, Edwards (2004) finds that the point estimates of marginal probabilities are larger for large surpluses than for large deficits. Based on this finding, the conclusion is that countries running large surpluses tend to stay in the surplus state longer than countries running large deficits. A possible explanation could be current account reversals. While the results are interesting, they are sensitive to the definition of persistence. A plausible definition of persistence given in the introduction states that it is the probability of experiencing an event conditional on the fact that the same event happened in the past. Using this definition of persistence, our estimations so far suggest that deficits are more persistent than surpluses.

3.1.2. Current account reversals

In this subsection, the study of current account persistence is dropped in order to investigate the effects of current account reversals on the persistence of different categories of international capital flows. Tables 4 and 5 show the results from estimation with a current account reversal dummy as an additional explanatory variable. Two definitions of current account reversal are used. In Table 4 a current account reversal is defined in a strong sense: if a country changes its current account to a surplus from the previous period's deficit, then the country experiences a current account reversal. The introduction of the new explanatory variable has not affected the statistical significance of the lagged dependent variable. In fact, it has some explanatory power for the state of the trade balance, portfolio investments, other investments and reserve assets. The positive coefficient on $\mathrm{CA}^{\mathrm{rvs}}_{\mathrm{positive}}$ and negative coefficient on $\mathrm{CA}^{\mathrm{rvs}}_{\mathrm{negative}}$ suggest that the current account reversal contributes positively to the probabil-

[11] The list of dropped countries is available on request from the author.

ity of net outflows and negatively to the probability of net inflows. For instance, the negative sign on $CA^{rvs}_{negative}$ indicates a decreasing probability of being in the negative state after the reversal, if the country was in that state initially.

A further decomposition into different subsamples slightly changes the picture. In the sample of industrial countries the current account reversal is statistically significant in explaining the state of the trade balance and equity securities. For all other categories the current account reversal variable is statistically insignificant.

In the sample of developing countries the current account reversal is statistically significant in explaining the states of the trade balance, portfolio investments and other investments. For all other categories the current account reversal variable is statistically insignificant.

In Table 5, the definition of reversal is similar in construction to Milesi-Ferretti and Razin (1998). Three conditions need to be satisfied for a country to experience a current account reversal: (i) a reduction of current account deficit to GDP ratio by 3 percentage points; (ii) right after the reversal current account deficit to GDP ratio should be below 10 percent; and (iii) for two years after the reversal occurred, the current account to GDP ratio should be larger than it was a year before the reversal. The first condition states that the current account deficit should decrease by three percentage points relative to GDP. The second condition is necessary for considering sizable reductions of current account deficit.[12] The third condition removes temporary changes of the current account due to consumption smoothing.

In these specifications, all intercepts and coefficients on lags of the variables are statistically significant. The lag again has only positive coefficients, implying increasing probability conditioned on the past value. The situation with current account reversal coefficient is slightly different than in the case of definition I. In the sample of all countries the current account reversal is statistically significant in explaining states of the trade balance, portfolio investments, debt securities and other investments. In the sample of industrial countries the current account reversal is not significant for any category, implying that the current account reversals do not affect the persistence of international capital flows. In the sample of developing countries, the current account reversal explains states of the trade balance, portfolio investments, debt securities and other investments.

We have also computed the transition probabilities conditioned on the current account reversal. These are presented in Figures 2 and 3. Both definitions of current account reversal give similar results for persistence. When a country has not encountered a current account reversal, the probability of remaining in a surplus state is smaller than the probability of remaining in a deficit state, implying a higher persistence of deficits and net inflows. The situation changes when a current account reversal has occurred. For instance, the probability of remaining in a surplus state for trade balance jumps for various country samples and stays

[12] A reduction of current account deficit from 10 to 7 percent of GDP is relatively more important than a reduction of current account from 25 to 22 percent of GDP.

above the probability of remaining in a deficit state. This also holds for portfolio investments, debt securities and other investments. When the opposite is true, the probabilities are so close, that the null hypothesis of symmetry is hard to reject.

Summarizing this section, in general, deficits and net inflows seem to be more persistent than surpluses and net outflows. The result is robust to either specification of pooled and individual probits. FDI is more persistent than portfolio investments in either state. In turn, the latter is more persistent than other investments category in either state. The persistence of the current account is larger than the persistence of the trade balance, although the probabilities are quite close. This result can be linked to the high persistence of investment income. The current account reversals have a significant effect in the sample of developing countries. The latter have lower persistence of deficit and net inflows than industrial countries, given the current account reversal has occurred (except FDI category).

3.2. Non-parametric approach

This subsection presents results from the non-parametric estimation, which, being a more intuitive measure of persistence, is robust to the model specification as well.

Equation (3) has been estimated for our subsamples and the results are summarized in Table 6. In the sample of all countries, the current account, trade balance, FDI, portfolio investments and other investments have a higher probability of remaining in the deficit state, than remaining in the surplus state. In the sample of industrial countries, the current account, portfolio investments debt securities and other investments have a higher probability of remaining in the deficit state, than remaining in the surplus state. In the sample of developing countries the current account, trade balance, FDI and other investments have a higher probability of remaining in the deficit state, than remaining in the surplus state.

Looking at the composite measure of persistence $\gamma = \gamma_{positive} + \gamma_{negative}$, we see that FDI is more persistent than portfolio investments. The latter is more persistent that the other investments category. So, the adjustment is not only asymmetric between deficits and surpluses, but also different components of balance sheet adjust differently. These results are consistent with the probit specification, supporting the idea that deficits and net inflows are more persistent than surpluses and net outflows. Note that persistence coefficients, that are very close to each other, have also been very close in the probit case. This symmetry between the two approaches signals a consistency of the probit estimates.

The current account is more persistent than the trade balance in either state both in the total sample as well as in sub-samples. This result is also consistent with the results from the probit specification. The current account, trade balance deficits and net FDI inflows are more persistent in the developing than industrial countries.

In summary, the results of this subsection are qualitatively the same as the results from

probit estimations: deficits and net inflows seem to be more persistent than surpluses and net outflows.

3.3. Autoregressive approach

In the previous subsections we measured the probability of being in a given state conditional on being in the same state in the previous period. The half life is an alternative measure for persistence, and measures the time necessary for the effect of a given shock to be halved. Thus persistence measured by this method has a different meaning than the one measured by either probit or non-parametric methods.

To implement the estimation, we transform our variables into their ratios to GDP. Before proceeding further, we test for the presence of the unit root in our data. Two panel unit root tests have been used: ADF and Philips-Perron. Summary results, presented in Table 7, suggest that a unit root is rejected for all variables in our sample.

Equation (5) has been estimated for net flows using both two stage least squares and fixed effects approaches. The results are reported in Tables 8 and 9. In the case of fixed effects, the lag and the interaction dummy are significant for almost all variables in all subsamples. Whenever both the lag and the interaction dummy are significant, and the equality of computed negative and positive state coefficients is rejected, the results differ from the results of previous subsection. For instance, in the total sample, only equity securities have a larger persistence of inflows (the autoregressive coefficient is 0.8 in the case of deficits, and 0.5 in the case of surpluses). In the sample of industrial countries portfolio investment with its subcomponents have a higher persistence of inflows (the autoregressive coefficient for equity securities is 0.8 in the case of deficits, and 0.3 in the case of surpluses; the coefficient for debt securities is 1.3 in the case of deficits, and 0.8 in the case of surpluses). In the case of developing countries, FDI have a higher persistence of inflows, with the autoregressive coefficient being equal to 0.3 in the case of deficits.

In the case of two stage least squares the lag and interaction dummy are significant in most of the cases. Whenever both lag and interaction dummy are significant, and the equality of computed negative and positive state coefficients is rejected, the equity securities category has a higher persistence of inflows than outflows (the autoregressive coefficient for equity securities is 0.7 in the case of deficits, and -0.6 in the case of surpluses in the total sample and in the sample of industrial countries, while 0.4 and -0.4 in the sample of developing countries). In all the other cases the opposite is true. We find less support for asymmetric autoregression for the current account in this section when the results are compared to Clarida et al. (2007). These authors, using threshold autoregression, find that from seven industrial countries, four have higher persistence of deficits than surpluses (persistence is measured by half life).[13]

[13]We think that the difference between our approach and Clarida et al. (2007) is driven by estimated versus

Tables 10 to 13 present results from both of the regressions above with an additional explanatory variable: the current account reversal dummy for both of its definitions. The reversal dummy is always significant in the trade balance regressions and hardly significant in the other cases. Inclusion of the reversal dummy has not significantly affected the coefficients from the previous estimation. In case of the first definition of the current account reversal, results from the fixed effects regression suggest portfolio equities have higher persistence of net inflows in the total sample, with surplus and deficit coefficients being 0.8 and 0.5 respectively. In the sample of industrial countries portfolio investments with its subcomponents have a higher persistence of net inflows: the autoregressive coefficient for equity securities is 0.8 in the case of deficits, and 0.3 in the case of surpluses; the coefficient for debt securities is 1.3 in the case of deficits, and 0.8 in the case of surpluses. Results from the two stage regression suggest portfolio equities have a higher persistence of net inflows in the total sample, with the autoregressive coefficient being equal to 0.7 in the case of deficits, and -0.6 in the case of surpluses. In the sample of industrial countries equity securities have a higher persistence of inflows with the autoregressive coefficient being equal to 0.8 in the case of deficits, and -0.7 in the case of surpluses. In the developing countries sample FDI have a higher persistence of inflows, with the autoregressive coefficient being equal to 0.4 in the case of deficits, and 0.2 in the case of surpluses.

Thus we find that the scale of surpluses tends to show more persistence than the scale of deficits

3.4. Discussion

In the case of probit, deficits and net inflows are more persistent than surpluses and net outflows. The result is robust to either specification of pooled and individual probits. FDI is more persistent than portfolio investments in either state. In turn, the latter is more persistent than other investments category in either state. The persistence of the current account is larger than the persistence of the trade balance, though the probabilities are quite close. The current account reversals have a significant effect in the sample of developing countries. The latter have lower persistence of deficits and net inflows than industrial countries, given the current account reversal has occurred (except FDI category).

In the case of the non-parametric estimator, the results strongly support the results from probit estimations: deficits and net inflows are more persistent than surpluses and net outflows. FDI is more persistent than portfolio investments. The latter is more persistent that the other investments category. The current account is more persistent than the trade balance in either state. The current account, trade balance deficits and net FDI inflows are more persistent in the developing than industrial countries.

imposed threshold tradeoff.

In the case of asymmetric autoregression, we obtain a different set of results: the equity securities is the only category with higher persistence of inflows than outflows. In all the other cases the we find that surpluses are more persistent.

The definition of persistence as probability of transition from one state into the other is very close in logic to the definition of persistence based on a mean reversion. For this reason the results from these two approaches are in line with each other. The logic underlying the measure of persistence using the speed of convergence, is a different concept. There is a major difference in the data as well: with probabilistic and mean reversion approaches we use binary data, while with the autoregression we use ratios of flow variables to GDP. For this reason the results between probabilistic and mean reversion approaches are not directly comparable to the results of asymmetric autoregression.

4. Conclusions

The existing literature on the persistence of capital flows has concentrated on either the estimates of half life, or constructions of marginal probabilities. To contribute to this literature, we study a wider range of capital flows using three possible approaches to understanding the persistence and the dynamics of the current account and main components of international capital flows.

The probabilistic approach shows, that, in general, deficits and net inflows are more persistent than surpluses and net outflows. This result is robust to either specification of pooled and individual probits. FDI are more persistent than portfolio investments in either state. The latter is more persistent than other invetments category in either state. The persistence of the current account is larger than the persistence of the trade balance. Developing countries tend to have a higher persistence of deficits and net inflows than industrial countries. Current account reversals have a significant effect on transition probabilities, particularly in developing countries.

We developed further the non-parametric estimator, proposed by Dias and Marques (2005). The estimation results strongly support the results from probit estimations. The current account, trade balance, FDI, portfolio investments and other investments have a higher probability of remaining in the deficit state, than remaining in the surplus state. FDI is more persistent than the portfolio investments category, while the current account is more persistent than the trade balance in either the deficit or surplus state.

In the case of asymmetric autoregression, we find that surpluses are more persistent than deficits: although the probability of remaining in a surplus state is lower, the scale of surpluses tends to show more persistence than the scale of deficits.

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Table 1: Pooled probit of a dummy variable on its lag

A: All countries	$C_{positive}$	$C_{negative}$	Lag	R^2	Obs.
Current account balance	-1.15	-0.72	1.88	0.32	1587
	(0.05)***	(0.06)***	(0.08)***		
Trade balance	-0.99	-0.98	1.96	0.36	1587
	(0.05)***	(0.05)***	(0.08)***		
FDI	-1.20	-0.68	1.87	0.32	1528
	(0.05)***	(0.06)***	(0.08)***		
Portfolio investments	-0.64	-0.58	1.22	0.16	1553
	(0.05)***	(0.05)***	(0.07)***		
Equity securities	-0.56	-0.88	1.44	0.21	1477
	(0.06)***	(0.05)***	(0.07)***		
Debt securities	-0.57	-0.65	1.22	0.16	1514
	(0.05)***	(0.05)***	(0.07)***		
Other investments	-0.62	-0.46	1.08	0.13	1587
	(0.05)***	(0.05)***	(0.07)***		
Reserve assets	0.18	-0.51	0.33	0.01	1587
	(0.05)***	(0.04)***	(0.07)***		
B: Industrial countries					
Current account balance	-1.14	-0.89	2.03	0.38	613
	(0.08)***	(0.09)***	(0.12)***		
Trade balance	-0.79	-1.05	1.84	0.32	613
	(0.09)***	(0.08)***	(0.12)***		
FDI	-0.73	-0.96	1.68	0.28	605
	(0.08)***	(0.08)***	(0.12)***		
Portfolio investments	-0.70	-0.53	1.23	0.16	613
	(0.07)***	(0.08)***	(0.11)***		
Equity securities	-0.53	-0.71	1.24	0.16	603
	(0.08)***	(0.07)***	(0.11)***		
Debt securities	-0.73	-0.49	1.23	0.16	611
	(0.07)***	(0.08)***	(0.11)***		
Other investments	-0.51	-0.19	0.69	0.05	613
	(0.07)***	(0.08)**	(0.11)***		
Reserve assets	0.05	-0.33	0.28	0.01	613
	(0.08)	(0.07)***	(0.10)***		
C: Developing countries					
Current account balance	-1.16	-0.58	1.75	0.28	974
	(0.06)***	(0.08)***	(0.10)***		
Trade balance	-1.08	-0.91	2.00	0.37	974
	(0.07)***	(0.07)***	(0.10)***		
FDI	-1.44	-0.16	1.60	0.22	923
	(0.07)***	(0.11)	(0.12)***		
Portfolio investments	-0.59	-0.61	1.20	0.15	940
	(0.06)***	(0.06)***	(0.09)***		
Equity securities	-0.59	-1.00	1.59	0.25	874
	(0.08)***	(0.06)***	(0.10)***		
Debt securities	-0.43	-0.73	1.16	0.14	903
	(0.07)***	(0.06)***	(0.09)***		
Other investments	-0.71	-0.63	1.34	0.19	974
	(0.06)***	(0.06)***	(0.09)***		
Reserve assets	0.29	-0.61	0.33	0.01	974
	(0.07)***	(0.05)***	(0.09)***		

Note: Results from pooled probit estimation. Column $C_{positive}$ indicates value of intercept of probit estimation with assigned value of one to positive flows and zero to negative flows. Column $C_{negative}$ indicates value of intercept of probit estimation with assigned value of one to negative flows and zero to positive flows.

***,**,* significant at 1,5 and 10 percent respectively.

Table 2: Testing asymmetry: confidence intervals

A: All countries	$\theta^{lower}_{positive}$	$\theta^{upper}_{positive}$	$\theta^{lower}_{negative}$	$\theta^{upper}_{negative}$
Current account balance	-1.24	-1.07	-0.82	-0.62
Trade balance	-1.07	-0.90	-1.06	-0.90
FDI	-1.28	-1.12	-0.77	-0.58
Portfolio investments	-0.72	-0.56	-0.67	-0.50
Equity securities	-0.66	-0.46	-0.97	-0.80
Debt securities	-0.65	-0.49	-0.73	-0.57
Other investments	-0.71	-0.54	-0.54	-0.38
Reserve assets	0.10	0.26	-0.58	-0.44
B: Industrial countries				
Current account balance	-1.27	-1.01	-1.04	-0.74
Trade balance	-0.94	-0.64	-1.18	-0.92
FDI	-0.86	-0.60	-1.09	-0.83
Portfolio investments	-0.82	-0.59	-0.66	-0.40
Equity securities	-0.66	-0.40	-0.82	-0.59
Debt securities	-0.85	-0.62	-0.63	-0.36
Other investments	-0.62	-0.39	-0.32	-0.06
Reserve assets	-0.08	0.18	-0.45	-0.22
C: Developing countries				
Current account balance	-1.26	-1.06	-0.72	-0.45
Trade balance	-1.20	-0.97	-1.03	-0.80
FDI	-1.56	-1.33	-0.34	0.02
Portfolio investments	-0.69	-0.49	-0.71	-0.52
Equity securities	-0.72	-0.46	-1.10	-0.90
Debt securities	-0.55	-0.32	-0.83	-0.63
Other investments	-0.81	-0.61	-0.73	-0.53
Reserve assets	0.17	0.40	-0.70	-0.53

Note: $\theta^{lower}_{positive}$ and $\theta^{upper}_{positive}$ indicate lower and upper bounds of 90 percent confidence interval of intercept for positive flows, while $\theta^{lower}_{negative}$ and $\theta^{upper}_{negative}$ indicate lower and upper bounds of 90 percent confidence interval of intercept for negative flows. The interval was computed by $w \pm z_{\frac{\alpha}{2}} s.e.$, where w is the intercept and $s.e.$ is the standard error of the intercept.

Table 3: Country estimates

A: All countries	$P(X_t > 0 \mid X_{t-1} > 0)$	$P(X_t < 0 \mid X_{t-1} > 0)$	$P(X_t < 0 \mid X_{t-1} < 0)$	$P(X_t > 0 \mid X_{t-1} < 0)$	Obs.
Current account balance	0.67	0.33	0.81	0.19	43
	(0.20)	(0.20)	(0.14)	(0.14)	
Trade balance	0.77	0.23	0.68	0.32	41
	(0.19)	(0.19)	(0.20)	(0.20)	
FDI	0.64	0.36	0.70	0.30	27
	(0.19)	(0.19)	(0.20)	(0.20)	
Portfolio investments	0.67	0.33	0.68	0.32	46
	(0.18)	(0.18)	(0.19)	(0.19)	
Equity securities	0.75	0.25	0.67	0.33	45
	(0.17)	(0.17)	(0.17)	(0.17)	
Debt securities	0.68	0.32	0.66	0.34	47
	(0.19)	(0.19)	(0.19)	(0.19)	
Other investments	0.64	0.36	0.70	0.30	50
	(0.19)	(0.19)	(0.14)	(0.14)	
Reserve assets	0.67	0.33	0.41	0.59	49
	(0.11)	(0.11)	(0.14)	(0.14)	
B: Industrial countries					
Current account balance	0.70	0.30	0.82	0.18	17
	(0.21)	(0.21)	(0.13)	(0.13)	
Trade balance	0.79	0.21	0.62	0.38	16
	(0.20)	(0.20)	(0.17)	(0.17)	
FDI	0.76	0.24	0.65	0.35	14
	(0.13)	(0.13)	(0.23)	(0.23)	
Portfolio investments	0.61	0.39	0.69	0.31	16
	(0.20)	(0.20)	(0.16)	(0.16)	
Equity securities	0.68	0.32	0.68	0.32	17
	(0.18)	(0.18)	(0.17)	(0.17)	
Debt securities	0.62	0.38	0.71	0.29	17
	(0.18)	(0.18)	(0.17)	(0.17)	
Other investments	0.55	0.45	0.68	0.32	19
	(0.16)	(0.16)	(0.12)	(0.12)	
Reserve assets	0.62	0.38	0.45	0.55	19
	(0.10)	(0.10)	(0.17)	(0.17)	
C: Developing countries					
Current account balance	0.64	0.36	0.80	0.20	26
	(0.20)	(0.20)	(0.15)	(0.15)	
Trade balance	0.76	0.24	0.72	0.28	25
	(0.19)	(0.19)	(0.21)	(0.21)	
FDI	0.51	0.49	0.76	0.24	13
	(0.16)	(0.16)	(0.15)	(0.15)	
Portfolio investments	0.70	0.30	0.67	0.33	30
	(0.16)	(0.16)	(0.20)	(0.20)	
Equity securities	0.80	0.20	0.66	0.34	28
	(0.15)	(0.15)	(0.17)	(0.17)	
Debt securities	0.71	0.29	0.64	0.36	30
	(0.18)	(0.18)	(0.20)	(0.20)	
Other investments	0.69	0.31	0.71	0.29	31
	(0.18)	(0.18)	(0.15)	(0.15)	
Reserve assets	0.69	0.31	0.39	0.61	30
	(0.12)	(0.12)	(0.12)	(0.12)	

Note: Probit specification (dummy variable on its lag) is estimated for each country separately. Then the probabilities are computed using $\Phi(\alpha + \beta X_{t-1})$ normal distribution. Columns 2 to 5 indicate arithmetic averages of the group with standard deviation in parenthesis. The last column indicates the number of countries in each group.

Table 4: Pooled probit conditioned on the current account reversal (definition I)

A: All countries	$C_{positive}$	$C_{negative}$	Lag	CA^{rvs}_{pos}	CA^{rvs}_{neg}	R^2	Obs.
Trade balance	-1.19	-0.92	2.11	1.68	-1.68	0.41	1580
	(0.06)***	(0.06)***	(0.08)***	(0.17)***	(0.17)***		
FDI	-1.22	-0.67	1.89	0.17	-0.17	0.33	1521
	(0.05)***	(0.06)***	(0.08)***	(0.14)	(0.14)		
Portfolio investments	-0.66	-0.57	1.23	0.21	-0.21	0.16	1546
	(0.05)***	(0.05)***	(0.07)***	(0.12)*	(0.12)*		
Equity securities	-0.56	-0.88	1.45	0.01	-0.01	0.21	1470
	(0.06)***	(0.05)***	(0.07)***	(0.13)	(0.13)		
Debt securities	-0.59	-0.63	1.22	0.19	-0.19	0.16	1507
	(0.05)***	(0.05)***	(0.07)***	(0.12)	(0.12)		
Other investments	-0.68	-0.42	1.10	0.63	-0.63	0.14	1580
	(0.05)***	(0.05)***	(0.07)***	(0.12)***	(0.12)***		
Reserve assets	0.15	-0.49	0.34	0.24	-0.24	0.01	1580
	(0.05)***	(0.04)***	(0.07)***	(0.12)**	(0.12)**		
B: Industrial countries							
Trade balance	-0.93	-1.01	1.94	1.29	-1.29	0.35	613
	(0.10)***	(0.08)***	(0.13)***	(0.28)***	(0.28)***		
FDI	-0.75	-0.94	1.69	0.30	-0.30	0.28	605
	(0.09)***	(0.08)***	(0.12)***	(0.22)	(0.22)		
Portfolio investments	-0.71	-0.53	1.23	0.03	-0.03	0.16	613
	(0.08)***	(0.08)***	(0.11)***	(0.21)	(0.21)		
Equity securities	-0.50	-0.73	1.23	-0.36	0.36	0.16	603
	(0.08)***	(0.08)***	(0.11)***	(0.22)*	(0.22)*		
Debt securities	-0.74	-0.49	1.23	0.10	-0.10	0.16	611
	(0.08)***	(0.08)***	(0.11)***	(0.20)	(0.20)		
Other investments	-0.52	-0.17	0.69	0.22	-0.22	0.05	613
	(0.07)***	(0.08)**	(0.11)***	(0.20)	(0.20)		
Reserve assets	0.04	-0.31	0.28	0.24	-0.24	0.01	613
	(0.08)	(0.07)***	(0.1)***	(0.20)	(0.20)		
C: Developing countries							
Trade balance	-1.34	-0.84	2.18	1.89	-1.89	0.44	967
	(0.08)***	(0.08)***	(0.11)***	(0.21)***	(0.21)***		
FDI	-1.47	-0.15	1.62	0.15	-0.15	0.23	916
	(0.07)***	(0.11)	(0.13)***	(0.19)	(0.19)		
Portfolio investments	-0.62	-0.59	1.21	0.32	-0.32	0.16	933
	(0.06)***	(0.06)***	(0.09)***	(0.16)**	(0.16)**		
Equity securities	-0.61	-0.99	1.59	0.23	-0.23	0.25	867
	(0.08)***	(0.07)***	(0.1)***	(0.18)	(0.18)		
Debt securities	-0.46	-0.70	1.16	0.24	-0.24	0.14	896
	(0.07)***	(0.06)***	(0.09)***	(0.16)	(0.16)		
Other investments	-0.81	-0.57	1.39	0.94	-0.94	0.21	967
	(0.06)***	(0.07)***	(0.09)***	(0.16)***	(0.16)***		
Reserve assets	0.25	-0.60	0.34	0.22	-0.22	0.01	967
	(0.08)***	(0.05)***	(0.09)***	(0.15)	(0.15)		

Note: Columns 5 and 6 indicate the coefficient on the current account reversal dummy (takes value one if reversal occurred) for positive and negative flows respectively. Current account reversal is defined as a condition when the sign of the current account changes from negative to positive in one year. ***,**,* significant at 1,5 and 10 percent respectively.

Table 5: Pooled probit conditioned on the current account reversal (definition II)

A: All countries	$C_{positive}$	$C_{negative}$	Lag	CA^{rvs}_{pos}	CA^{rvs}_{neg}	R^2	Obs.
Trade balance	-1.16	-0.93	2.10	1.12	-1.12	0.38	1474
	(0.06)***	(0.06)***	(0.08)***	(0.14)***	(0.14)***		
FDI	-1.21	-0.68	1.89	-0.05	0.05	0.33	1416
	(0.05)***	(0.07)***	(0.08)***	(0.15)	(0.15)		
Portfolio investments	-0.69	-0.58	1.27	0.27	-0.27	0.17	1443
	(0.05)***	(0.05)***	(0.07)***	(0.13)**	(0.13)**		
Equity securities	-0.58	-0.87	1.45	0.20	-0.20	0.21	1370
	(0.06)***	(0.05)***	(0.08)***	(0.14)	(0.14)		
Debt securities	-0.61	-0.63	1.24	0.22	-0.22	0.16	1411
	(0.05)***	(0.05)***	(0.07)***	(0.13)*	(0.13)*		
Other investments	-0.71	-0.43	1.13	0.50	-0.50	0.14	1474
	(0.05)***	(0.05)***	(0.07)***	(0.12)***	(0.12)***		
Reserve assets	0.19	-0.47	0.28	0.12	-0.12	0.01	1474
	(0.06)***	(0.04)***	(0.07)***	(0.12)	(0.12)		
B: Industrial countries							
Trade balance	-0.77	-1.04	1.81	0.25	-0.25	0.31	575
	(0.09)***	(0.08)***	(0.13)***	(0.29)	(0.29)		
FDI	-0.77	-0.95	1.72	-0.05	0.05	0.29	567
	(0.09)***	(0.09)***	(0.12)***	(0.30)	(0.30)		
Portfolio investments	-0.73	-0.55	1.28	-0.32	0.32	0.17	575
	(0.08)***	(0.08)***	(0.11)***	(0.31)	(0.31)		
Equity securities	-0.54	-0.69	1.23	0.11	-0.11	0.16	565
	(0.08)***	(0.08)***	(0.11)***	(0.29)	(0.29)		
Debt securities	-0.73	-0.51	1.24	-0.31	0.31	0.16	573
	(0.08)***	(0.08)***	(0.11)***	(0.31)	(0.31)		
Other investments	-0.55	-0.20	0.75	0.25	-0.25	0.06	575
	(0.07)***	(0.08)**	(0.11)***	(0.26)	(0.26)		
Reserve assets	0.11	-0.31	0.20	0.15	-0.15	0.00	575
	(0.08)	(0.07)***	0.11)*	(0.26)	(0.26)		
C: Developing countries							
Trade balance	-1.44	-0.84	2.27	1.51	-1.51	0.43	899
	(0.09)***	(0.08)***	(0.12)***	(0.16)***	(0.16)***		
FDI	-1.48	-0.15	1.63	0.15	-0.15	0.23	849
	(0.07)***	(0.11)	(0.13)***	(0.18)	(0.18)		
Portfolio investments	-0.66	-0.60	1.26	0.38	-0.38	0.17	868
	(0.07)***	(0.07)***	(0.09)***	(0.15)***	(0.15)***		
Equity securities	-0.62	-1.00	1.62	0.20	-0.20	0.25	805
	(0.08)***	(0.07)***	(0.1)***	(0.17)	(0.17)		
Debt securities	-0.49	-0.70	1.19	0.28	-0.28	0.15	838
	(0.07)***	(0.06)***	(0.09)***	(0.15)*	(0.15)*		
Other investments	-0.82	-0.58	1.40	0.60	-0.60	0.20	899
	(0.07)***	(0.07)***	(0.09)***	(0.14)***	(0.14)***		
Reserve assets	0.26	-0.57	0.30	0.06	-0.06	0.01	899
	(0.08)***	(0.06)***	(0.09)***	(0.14)	(0.14)		

Note: Columns 5 and 6 indicate the coefficient on the current account reversal dummy (takes value one if reversal occurred) for positive and negative flows respectively. Current account reversal is defined as a condition when (i) reduction of current account deficit as a share of GDP is at least 3 percent, (ii) right after the reversal the current account deficit as a share of GDP is below 10 percent, (iii) for two years after the reversal has occurred the current account deficit as a share of GDP is larger than pre-reversal level.

***,**,* significant at 1,5 and 10 percent respectively.

Table 6: Non-parametric estimate of persistence

A: All countries	$\gamma_{positive}$	$\gamma_{negative}$	γ
Current account balance	0.27	0.55	0.82
	(0.23)	(0.24)	(0.08)
Trade balance	0.39	0.43	0.82
	(0.26)	(0.28)	(0.09)
FDI	0.23	0.58	0.81
	(0.25)	(0.31)	(0.12)
Portfolio investments	0.35	0.37	0.72
	(0.17)	(0.17)	(0.12)
Equity securities	0.49	0.28	0.77
	(0.22)	(0.16)	(0.13)
Debt securities	0.38	0.33	0.72
	(0.19)	(0.17)	(0.11)
Other investments	0.31	0.39	0.70
	(0.15)	(0.15)	(0.12)
Reserve assets	0.40	0.20	0.60
	(0.14)	(0.06)	(0.11)
B: Industrial countries			
Current account balance	0.36	0.48	0.84
	(0.27)	(0.25)	(0.08)
Trade balance	0.49	0.33	0.82
	(0.26)	(0.26)	(0.10)
FDI	0.44	0.35	0.78
	(0.27)	(0.25)	(0.10)
Portfolio investments	0.32	0.40	0.72
	(0.20)	(0.20)	(0.13)
Equity securities	0.43	0.32	0.74
	(0.22)	(0.15)	(0.15)
Debt securities	0.32	0.41	0.72
	(0.21)	(0.20)	(0.12)
Other investments	0.26	0.37	0.64
	(0.08)	(0.12)	(0.10)
Reserve assets	0.34	0.23	0.58
	(0.08)	(0.06)	(0.09)
C: Developing countries			
Current account balance	0.22	0.59	0.81
	(0.20)	(0.23)	(0.09)
Trade balance	0.33	0.49	0.82
	(0.23)	(0.28)	(0.09)
FDI	0.11	0.72	0.83
	(0.14)	(0.24)	(0.14)
Portfolio investments	0.36	0.35	0.72
	(0.15)	(0.16)	(0.11)
Equity securities	0.53	0.26	0.79
	(0.22)	(0.16)	(0.12)
Debt securities	0.42	0.29	0.71
	(0.18)	(0.15)	(0.11)
Other investments	0.34	0.39	0.73
	(0.17)	(0.17)	(0.12)
Reserve assets	0.44	0.18	0.62
	(0.15)	(0.05)	(0.12)

Note: Standard deviation in parenthesis. $\gamma = \gamma_{positive} + \gamma_{negative}$.

Table 7: Unit root tests

A: All countries	*ADF*	*ADF**	*PP*	*PP**
Current account balance	229.3	217.0	223.7	221.7
	(0.00)	(0.00)	(0.00)	(0.00)
Trade balance	180.6	237.7	165.0	159.3
	(0.00)	(0.00)	(0.00)	(0.00)
FDI	399.8	398.8	389.6	593.4
	(0.00)	(0.00)	(0.00)	(0.00)
Portfolio investments	431.5	358.5	520.3	659.9
	(0.00)	(0.00)	(0.00)	(0.00)
Equity securities	307.0	523.5	390.5	650.9
	(0.00)	(0.00)	(0.00)	(0.00)
Debt securities	409.4	389.9	521.2	649.3
	(0.00)	(0.00)	(0.00)	(0.00)
Other investments	444.5	409.5	488.5	475.1
	(0.00)	(0.00)	(0.00)	(0.00)
Reserve assets	790.8	643.5	877.5	1743.1
	(0.00)	(0.00)	(0.00)	(0.00)
B: Industrial countries				
Current account balance	58.1	60.1	47.7	45.1
	(0.02)	(0.01)	(0.13)	(0.20)
Trade balance	62.9	93.7	52.7	54.3
	(0.01)	(0.00)	(0.06)	(0.04)
FDI	216.8	195.2	173.5	387.4
	(0.00)	(0.00)	(0.00)	(0.00)
Portfolio investments	159.2	139.0	201.6	177.2
	(0.00)	(0.00)	(0.00)	(0.00)
Equity securities	111.2	95.8	168.5	175.6
	(0.00)	(0.00)	(0.00)	(0.00)
Debt securities	162.7	160.9	207.0	201.5
	(0.00)	(0.00)	(0.00)	(0.00)
Other investments	202.3	180.0	250.8	256.6
	(0.00)	(0.00)	(0.00)	(0.00)
Reserve assets	334.0	280.0	375.7	746.3
	(0.00)	(0.00)	(0.00)	(0.00)
C: Developing countries				
Current account balance	171.1	156.9	176.1	176.6
	(0.00)	(0.00)	(0.00)	(0.00)
Trade balance	117.7	144.0	112.4	104.9
	(0.00)	(0.00)	(0.00)	(0.00)
FDI	183.0	203.5	216.1	206.0
	(0.00)	(0.00)	(0.00)	(0.00)
Portfolio investments	272.2	219.4	318.7	482.7
	(0.00)	(0.00)	(0.00)	(0.00)
Equity securities	195.8	427.7	222.0	475.3
	(0.00)	(0.00)	(0.00)	(0.00)
Debt securities	246.7	229.0	314.2	447.7
	(0.00)	(0.00)	(0.00)	(0.00)
Other investments	242.2	229.5	237.7	218.5
	(0.00)	(0.00)	(0.00)	(0.00)
Reserve assets	456.8	363.5	501.8	996.8
	(0.00)	(0.00)	(0.00)	(0.00)

Note: P-values are in parenthesis. All regressions include individual intercept. Columns 3 and 5 include trend.

Table 8: Autoregression: fixed effects estimation of persistence

A: All countries	Lag	D_s	R^2	Prob.	Obs.
Current account balance	0.11	0.81	0.28	0.00	1580
	(0.03)***	(0.08)***			
Trade balance	0.60	0.20	0.70	0.00	1580
	(0.03)***	(0.05)***			
FDI	0.28	0.42	0.32	0.00	1521
	(0.03)***	(0.07)***			
Portfolio investments	0.59	-0.07	0.34	0.26	1546
	(0.04)***	(0.06)			
Equity securities	0.80	-0.32	0.57	0.00	1470
	(0.02)***	(0.05)***			
Debt securities	0.73	-0.06	0.46	0.29	1507
	(0.04)***	(0.06)			
Other investments	0.18	0.60	0.12	0.00	1580
	(0.03)***	(0.08)***			
Reserve assets	-0.11	0.29	0.09	0.00	1580
	(0.06)*	(0.08)***			
B: Industrial countries					
Current account balance	0.72	0.20	0.78	0.00	613
	(0.04)***	(0.07)***			
Trade balance	0.74	0.17	0.83	0.01	613
	(0.05)***	(0.07)**			
FDI	0.21	0.68	0.33	0.00	605
	(0.07)***	(0.10)***			
Portfolio investments	1.24	-0.87	0.54	0.00	613
	(0.06)***	(0.09)***			
Equity securities	0.82	-0.46	0.61	0.00	603
	(0.03)***	(0.08)***			
Debt securities	1.29	-0.55	0.68	0.00	611
	(0.06)***	(0.07)***			
Other investments	0.27	0.40	0.20	0.00	613
	(0.07)***	(0.12)***			
Reserve assets	-0.01	0.04	0.00	0.76	613
	(0.10)	(0.13)			
C: Developing countries					
Current account balance	0.09	0.82	0.26	0.00	967
	(0.04)**	(0.11)***			
Trade balance	0.58	0.20	0.68	0.00	967
	(0.04)***	(0.06)***			
FDI	0.34	-0.14	0.28	0.19	916
	(0.04)***	(0.11)			
Portfolio investments	-0.16	0.77	0.37	0.00	933
	(0.06)***	(0.07)***			
Equity securities	0.20	0.43	0.46	0.00	867
	(0.07)***	(0.08)***			
Debt securities	-0.19	0.72	0.28	0.00	896
	(0.06)***	(0.08)***			
Other investments	0.18	0.61	0.12	0.00	967
	(0.04)***	(0.10)***			
Reserve assets	-0.13	0.32	0.09	0.00	967
	(0.07)*	(0.10)***			

Note: The third column indicates the coefficient on the lagged interaction of the dummy variable with the flow data. Dummy variable takes a value of 1 if the flow is positive. Prob. indicates Wald probability of rejecting $H_0 : Lag = Lag + D_s$.
***,**,* significant at 1,5 and 10 percent respectively.

Table 9: Autoregression: two stage least squares estimation of persistence

A: All countries	Lag	D_s	Prob.	Obs.
Current account balance	0.10	1.46	0.00	1527
	(0.05)**	(0.43)***		
Trade balance	0.49	0.47	0.03	1527
	(0.13)***	(0.22)**		
FDI	0.31	-0.10	0.62	1461
	(0.09)***	(0.20)		
Portfolio investments	-0.33	0.81	0.00	1484
	(0.11)***	(0.21)***		
Equity securities	0.72	-1.34	0.00	1398
	(0.19)***	(0.30)***		
Debt securities	-0.65	1.50	0.00	1441
	(0.14)***	(0.25)***		
Other investments	0.20	0.83	0.00	1527
	(0.05)***	(0.20)***		
Reserve assets	-0.24	0.58	0.00	1527
	(0.11)**	(0.17)***		
B: Industrial countries				
Current account balance	0.88	0.44	0.83	594
	(0.30)***	(2.08)		
Trade balance	0.88	0.40	0.69	594
	(0.28)***	(0.99)		
FDI	0.21	0.11	0.73	585
	(0.17)	(0.33)		
Portfolio investments	-8.20	11.40	0.28	594
	(8.21)	(10.6)		
Equity securities	0.75	-1.43	0.00	583
	(0.29)***	(0.42)***		
Debt securities	8.33	-7.82	0.26	591
	(6.37)	(6.93)		
Other investments	0.28	-0.68	0.02	594
	(0.14)**	(0.30)**		
Reserve assets	-0.05	0.17	0.45	594
	(0.16)	(0.23)		
C: Developing countries				
Current account balance	0.09	1.49	0.00	933
	(0.06)	(0.53)***		
Trade balance	0.45	0.51	0.05	933
	(0.15)***	(0.26)**		
FDI	0.37	-0.21	0.37	876
	(0.11)***	(0.24)		
Portfolio investments	-0.02	0.19	0.44	890
	(0.09)	(0.24)		
Equity securities	0.43	-0.77	0.05	815
	(0.16)***	(0.39)**		
Debt securities	-0.07	0.34	0.13	850
	(0.10)	(0.23)		
Other investments	0.20	0.93	0.00	933
	(0.06)***	(0.25)***		
Reserve assets	-0.27	0.67	0.00	933
	(0.14)**	(0.22)***		

Note: The third column indicates the coefficient on the lagged interaction of the dummy variable with the flow data. Dummy variable takes a value of 1 if the flow is positive. Prob. indicates Wald probability of rejecting $H_0 : Lag = Lag + D_s$.
***,**,* significant at 1,5 and 10 percent respectively.

Table 10: Autoregression: fixed effects estimation of persistence, definition I

A: All countries	Lag	D_s	CA_{rvs}	R^2	Prob.	Obs.
Trade balance	0.57	0.26	0.04	0.72	0.00	1580
	(0.03)***	(0.05)***	(0.00)***			
FDI	0.28	0.42	0.00	0.32	0.00	1521
	(0.03)***	(0.07)***	(0.00)			
Portfolio investments	0.59	-0.07	0.00	0.34	0.26	1546
	(0.04)***	(0.06)	(0.00)			
Equity securities	0.80	-0.32	0.00	0.57	0.00	1470
	(0.02)***	(0.05)***	(0.00)			
Debt securities	0.73	-0.06	0.00	0.46	0.29	1507
	(0.04)***	(0.06)	(0.00)			
Other investments	0.18	0.60	0.03	0.13	0.00	1580
	(0.03)***	(0.08)***	(0.01)***			
Reserve assets	-0.10	0.29	0.01	0.10	0.00	1580
	(0.06)*	(0.08)***	(0.00)***			
B: Industrial countries						
Trade balance	0.71	0.23	0.02	0.84	0.00	613
	(0.04)***	(0.07)***	(0.00)***			
FDI	0.21	0.68	0.00	0.33	0.00	605
	(0.07)***	(0.10)***	(0.00)			
Portfolio investments	1.24	-0.87	0.01	0.54	0.00	613
	(0.06)***	(0.09)***	(0.01)			
Equity securities	0.82	-0.47	-0.01	0.61	0.00	603
	(0.03)***	(0.08)***	(0.00)			
Debt securities	1.29	-0.55	0.01	0.68	0.00	611
	(0.06)***	(0.07)***	(0.01)			
Other investments	0.27	0.41	0.01	0.20	0.00	613
	(0.07)***	(0.12)***	(0.01)			
Reserve assets	-0.03	0.07	0.01	0.02	0.61	613
	(0.10)	(0.13)	(0.00)***			
C: Developing countries						
Trade balance	0.56	0.26	0.06	0.71	0.00	967
	(0.04)***	(0.06)***	(0.01)***			
FDI	0.34	-0.14	0.00	0.28	0.19	916
	(0.04)***	(0.11)	(0.00)			
Portfolio investments	-0.16	0.77	0.00	0.37	0.00	933
	(0.06)***	(0.07)***	(0.00)			
Equity securities	0.20	0.44	0.00	0.46	0.00	867
	(0.07)***	(0.08)***	(0.00)			
Debt securities	-0.19	0.72	0.00	0.28	0.00	896
	(0.06)***	(0.08)***	(0.00)			
Other investments	0.18	0.62	0.04	0.12	0.00	967
	(0.04)***	(0.10)***	(0.02)***			
Reserve assets	-0.11	0.32	0.01	0.10	0.00	967
	(0.07)	(0.10)***	(0.00)***			

Note: The third column indicates the coefficient on the lagged interaction of the dummy variable with the flow data. Dummy variable takes a value of 1 if the flow is positive. Prob. indicates Wald probability of rejecting $H_0 : Lag = Lag + D_s$.
***,**,* significant at 1,5 and 10 percent respectively.

Table 11: Autoregression: two stage least squares estimation of persistence, definition I

A: All countries	Lag	D_s	CA_{rvs}	Prob.	Obs.
Trade balance	0.45	0.52	0.04	0.02	1527
	(0.12)***	(0.22)**	(0.00)***		
FDI	0.31	-0.10	0.00	0.62	1461
	(0.09)***	(0.20)	(0.00)		
Portfolio investments	-0.33	0.81	0.00	0.00	1484
	(0.11)***	(0.21)***	(0.00)		
Equity securities	0.73	-1.34	0.00	0.00	1398
	(0.19)***	(0.30)***	(0.00)		
Debt securities	-0.65	1.50	0.00	0.00	1441
	(0.14)***	(0.25)***	(0.00)		
Other investments	0.19	0.83	0.02	0.00	1527
	(0.05)***	(0.19)***	(0.01)**		
Reserve assets	-0.22	0.57	0.01	0.00	1527
	(0.11)**	(0.17)***	(0.00)***		
B: Industrial countries					
Trade balance	0.83	0.40	0.02	0.67	594
	(0.26)***	(0.94)	(0.01)***		
FDI	0.21	0.11	0.00	0.74	585
	(0.17)	(0.33)	(0.00)		
Portfolio investments	-8.40	11.68	-0.02	0.30	594
	(8.63)	(11.1)	(0.03)		
Equity securities	0.75	-1.45	0.00	0.00	583
	(0.29)***	(0.43)***	(0.00)		
Debt securities	8.40	-7.88	0.01	0.26	591
	(6.44)	(7.00)	(0.02)		
Other investments	0.28	-0.68	0.00	0.02	594
	(0.14)**	(0.30)**	(0.00)		
Reserve assets	-0.11	0.25	0.01	0.28	594
	(0.16)	(0.23)	(0.00)***		
C: Developing countries					
Trade balance	0.40	0.56	0.05	0.02	933
	(0.14)***	(0.25)**	(0.01)***		
FDI	0.37	-0.22	0.00	0.37	876
	(0.11)***	(0.24)	(0.00)		
Portfolio investments	-0.02	0.19	0.00	0.43	890
	(0.10)	(0.25)	(0.00)		
Equity securities	0.44	-0.78	0.00	0.05	815
	(0.16)***	(0.39)**	(0.00)		
Debt securities	-0.07	0.35	0.00	0.13	850
	(0.10)	(0.23)	(0.00)		
Other investments	0.19	0.93	0.04	0.00	933
	(0.06)***	(0.25)***	(0.01)**		
Reserve assets	-0.24	0.63	0.02	0.00	933
	(0.14)*	(0.22)***	(0.00)***		

Note: The third column indicates the coefficient on the lagged interaction of the dummy variable with the flow data. Dummy variable takes a value of 1 if the flow is positive. Prob. indicates Wald probability of rejecting $H_0 : Lag = Lag + D_s$.
***,**,* significant at 1,5 and 10 percent respectively.

Table 12: Autoregression: fixed effects estimation of persistence, definition II

A: All countries	Lag	D_s	CA_{rvs}	R^2	Prob.	Obs.
Trade balance	0.66	0.16	0.06	0.72	0.00	1474
	(0.03)***	(0.05)***	(0.00)***			
FDI	0.35	-0.06	0.00	0.33	0.36	1416
	(0.03)***	(0.07)	(0.00)			
Portfolio investments	-0.03	0.65	0.00	0.30	0.00	1443
	(0.05)	(0.06)***	(0.00)			
Equity securities	0.83	-0.36	0.00	0.60	0.00	1370
	(0.02)***	(0.05)***	(0.00)			
Debt securities	-0.06	0.89	0.00	0.48	0.00	1411
	(0.05)	(0.06)***	(0.00)			
Other investments	0.18	0.61	0.03	0.11	0.00	1474
	(0.03)***	(0.08)***	(0.01)***			
Reserve assets	-0.11	0.26	0.00	0.08	0.00	1474
	(0.06)*	(0.08)***	(0.00)			
B: Industrial countries						
Trade balance	0.87	0.07	0.04	0.85	0.33	575
	(0.05)***	(0.07)	(0.00)***			
FDI	0.34	0.03	0.00	0.29	0.75	567
	(0.06)***	(0.09)	(0.00)			
Portfolio investments	0.36	0.34	-0.01	0.38	0.00	575
	(0.08)***	(0.11)***	(0.01)			
Equity securities	0.86	-0.65	0.00	0.63	0.00	565
	(0.03)***	(0.09)***	(0.01)			
Debt securities	0.37	0.59	0.00	0.69	0.00	573
	(0.09)***	(0.10)***	(0.01)			
Other investments	0.46	-0.37	0.02	0.14	0.01	575
	(0.07)***	(0.15)**	(0.01)***			
Reserve assets	-0.04	0.04	0.00	0.00	0.75	575
	(0.10)	(0.14)	(0.00)			
C: Developing countries						
Trade balance	0.63	0.17	0.06	0.71	0.01	899
	(0.04)***	(0.06)***	(0.01)***			
FDI	0.36	-0.22	0.00	0.29	0.05	849
	(0.04)***	(0.11)**	(0.00)			
Portfolio investments	-0.17	0.73	0.00	0.28	0.00	868
	(0.06)***	(0.08)***	(0.00)			
Equity securities	0.16	0.64	0.00	0.59	0.00	805
	(0.06)**	(0.07)***	(0.00)			
Debt securities	-0.21	0.72	0.00	0.23	0.00	838
	(0.06)***	(0.08)***	(0.00)			
Other investments	0.18	0.64	0.04	0.12	0.00	899
	(0.04)***	(0.11)***	(0.01)**			
Reserve assets	-0.12	0.30	0.00	0.08	0.00	899
	(0.08)	(0.10)***	(0.00)			

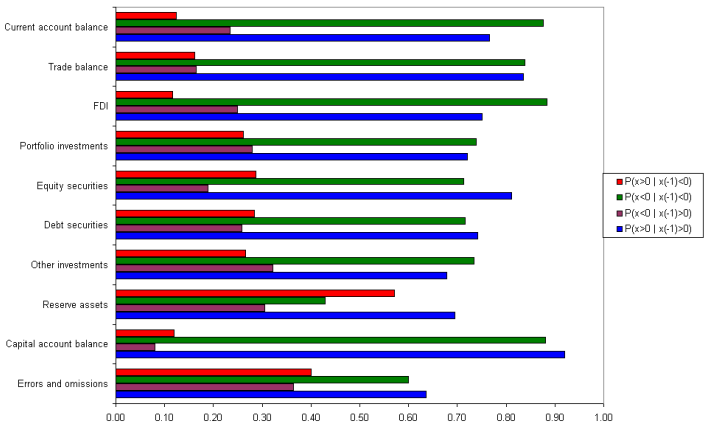
Note: The third column indicates the coefficient on the lagged interaction of the dummy variable with the flow data. Dummy variable takes a value of 1 if the flow is positive. Prob. indicates Wald probability of rejecting $H_0 : Lag = Lag + D_s$.
***,**,* significant at 1,5 and 10 percent respectively.

Table 13: Autoregression: two stage least squares estimation of persistence, definition II

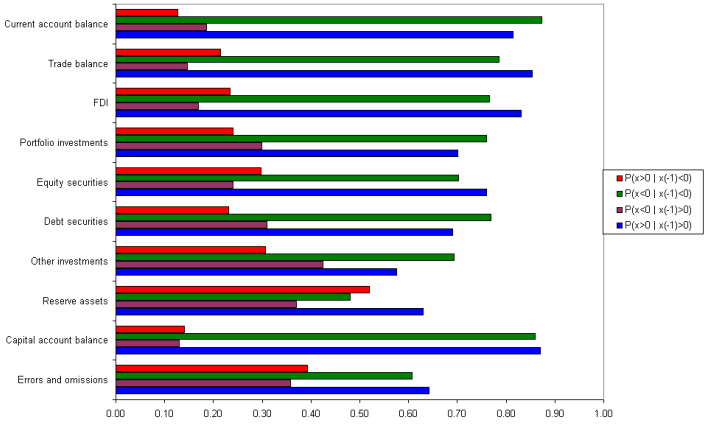
A: All countries	Lag	D_s	CA_{rvs}	Prob.	Obs.
Trade balance	0.53	0.56	0.06	0.01	1421
	(0.12)***	(0.21)***	(0.01)***		
FDI	0.21	0.14	0.00	0.44	1356
	(0.09)**	(0.18)	(0.00)		
Portfolio investments	-0.03	0.17	0.01	0.45	1383
	(0.08)	(0.23)	(0.00)*		
Equity securities	0.51	-0.92	0.00	0.01	1300
	(0.27)*	(0.38)**	(0.00)		
Debt securities	0.01	-0.16	0.01	0.71	1347
	(0.11)	(0.44)	(0.00)*		
Other investments	0.20	0.90	0.05	0.00	1421
	(0.05)***	(0.20)***	(0.01)***		
Reserve assets	-0.06	0.36	0.01	0.05	1421
	(0.12)	(0.18)*	(0.00)***		
B: Industrial countries					
Trade balance	0.97	0.57	0.05	0.59	556
	(0.28)***	(1.06)	(0.01)***		
FDI	-0.44	1.01	0.00	0.00	547
	(0.14)***	(0.25)***	(0.00)		
Portfolio investments	-0.02	-0.04	-0.01	0.89	556
	(0.16)	(0.31)	(0.01)		
Equity securities	0.57	-1.11	0.00	0.06	546
	(0.45)	(0.59)*	(0.00)		
Debt securities	-0.47	3.03	0.00	0.49	554
	(0.61)	(4.39)	(0.01)		
Other investments	0.10	-0.10	0.02	0.73	556
	(0.14)	(0.28)	(0.01)***		
Reserve assets	-0.06	0.18	0.00	0.47	556
	(0.17)	(0.24)	(0.00)		
C: Developing countries					
Trade balance	0.49	0.60	0.07	0.01	865
	(0.15)***	(0.24)**	(0.01)***		
FDI	0.44	-0.31	0.00	0.21	809
	(0.11)***	(0.25)	(0.00)		
Portfolio investments	-0.05	0.28	0.01	0.37	827
	(0.11)	(0.31)	(0.00)**		
Equity securities	0.18	0.14	0.00	0.79	754
	(0.18)	(0.53)	(0.00)		
Debt securities	-0.04	0.22	0.01	0.41	793
	(0.10)	(0.26)	(0.00)**		
Other investments	0.20	0.97	0.06	0.00	865
	(0.07)***	(0.27)***	(0.01)***		
Reserve assets	-0.06	0.39	0.01	0.10	865
	(0.16)	(0.23)*	(0.00)***		

Note: The third column indicates the coefficient on the lagged interaction of the dummy variable with the flow data. Dummy variable takes a value of 1 if the flow is positive. Prob. indicates Wald probability of rejecting $H_0 : Lag = Lag + D_s$.
***,**,* significant at 1,5 and 10 percent respectively.

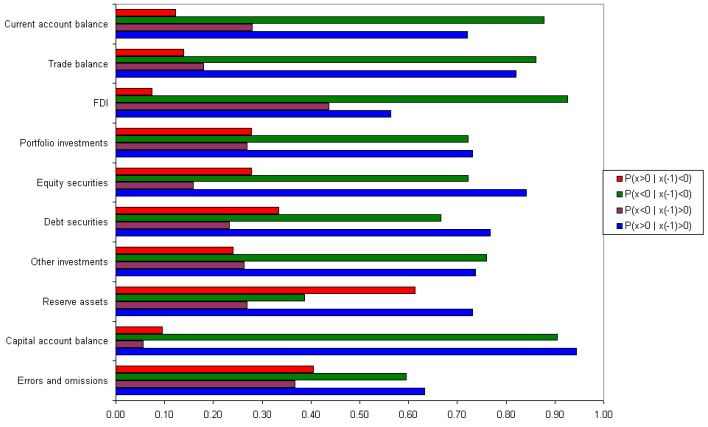
Figure 1: Transition probabilities



(a) All countries

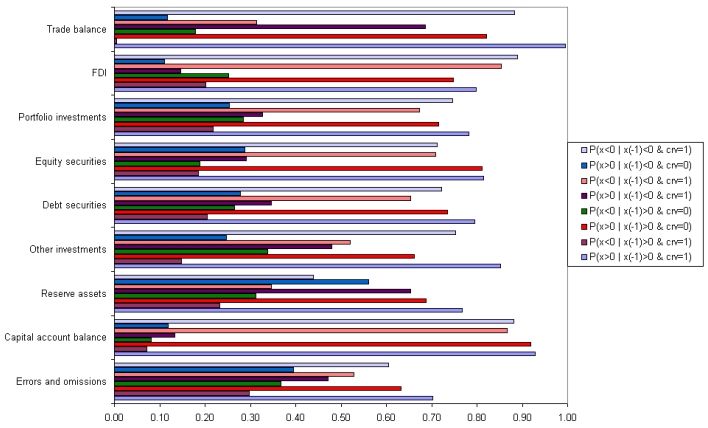


(b) Industrial countries

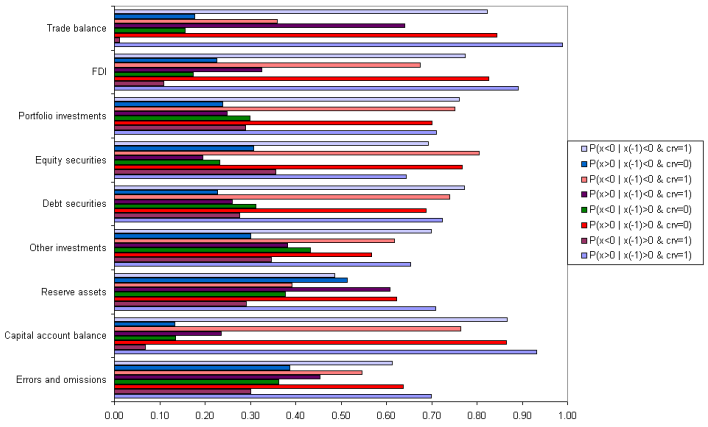


(c) Developing countries

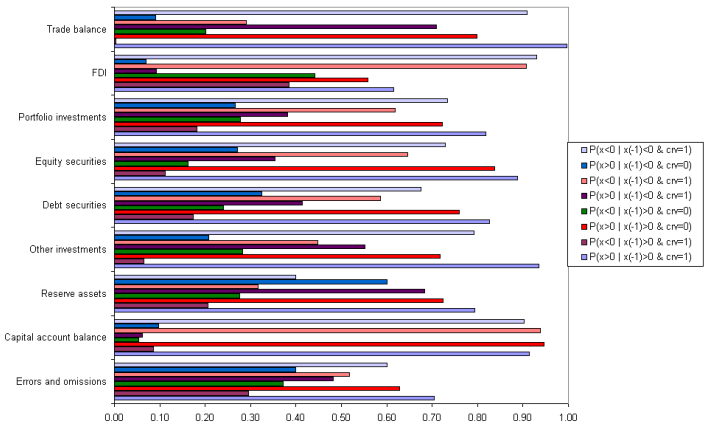
Figure 2: Transition probabilities conditional on current account reversal: definition I



(a) All countries

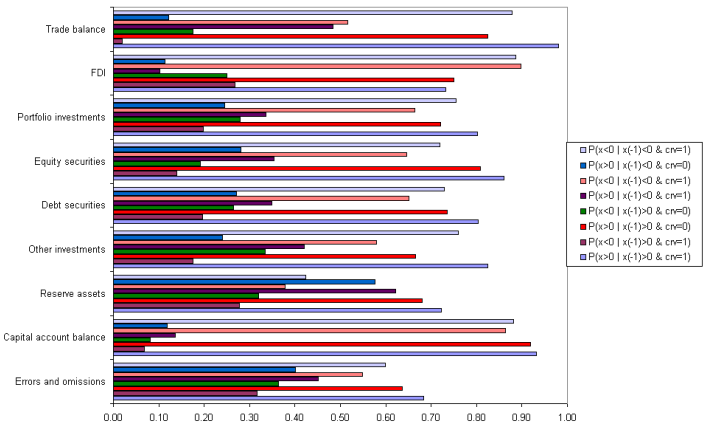


(b) Industrial countries

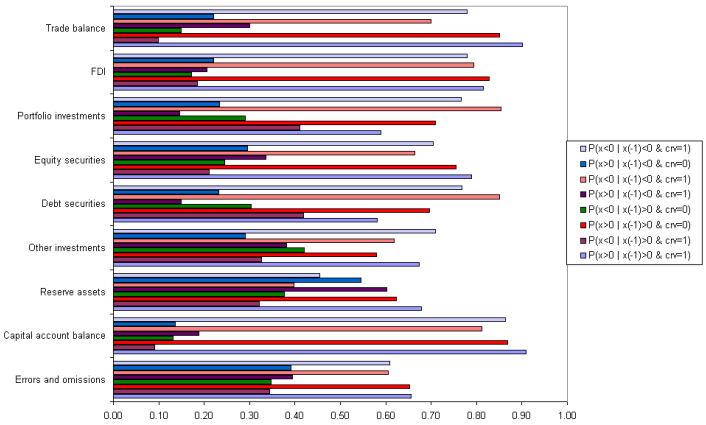


(c) Developing countries

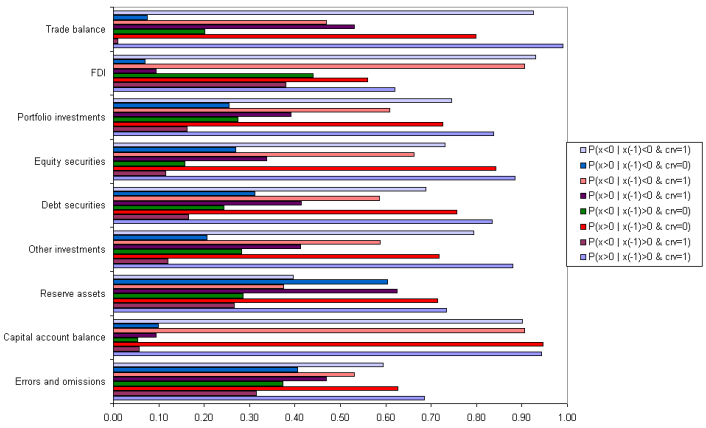
Figure 3: Transition probabilities conditional on current account reversal: definition II



(a) All countries



(b) Industrial countries



(c) Developing countries

Appendix A: Country list

Sample of industrial countries: Australia, Austria, Canada, Finland, France, Germany, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

Sample of developing countries: Argentina, Bahrain, Barbados, Brazil, Cameroon, Chile, China, Colombia, Costa Rica, Cte d'Ivoire, Egypt, El Salvador, Gabon, Guatemala, Hungary, Israel, Korea, Kuwait, Malaysia, Mexico, Pakistan, Panama, Peru, Philippines, Senegal, Singapore, South Africa, Sri Lanka, Thailand, Tunisia, Turkey, Uruguay, Venezuela

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