External Factors in Emerging Market Recoveries: An Empirical Investigation

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Abstract

We estimate conditional duration models to analyse recovery processes in emerging market economies. Our reduced form speci…cation is parsimonious, as we focus on the e¤ect of growth in the US, EU, and Japan on the prospects for economic recovery in emerging markets experiencing recessions. In order to assess the robustness and forecasting capability of our results, we performed out-of-sample predictions using recently available data pertaining to the economies hit by the Asian crisis. The results of this exercise show that external factors beyond the control of the authorities can sucessfully explain the bouncing back of most emerging markets economies hit by the Asian crisis.

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1 Introduction

The beginning of the Asian …nancial crisis in Thailand produced a chain of events few had imagined. While at the onset it was possible to think that the events of the summer of 1997 were just an adjustment after a period of overheating, the unfolding of events showed that the gloomiest predictions also proved to be the most accurate. The last months in Thailand were harsh, and instability quickly spread to the region. Malaysia and Indonesia were hit shortly after, and turbulence engulfed their more developed neighbours, such as Hong-Kong and Korea. The e¤ects on the growth of the real economy were quick to materialise: forecasts for growth in 1998 nose-dived in a region which had accustomed itself and the rest of the world to fast growth. Not long before, the World Bank's annual development report had praised these economies' ability to enjoy long, and apparently well balanced, expansions. It seemed that these economies could sustain fast growth inde…nitely, based on the dynamism of their export sectors. The …nancial crisis took its toll in 1998: growth rates of the real sector were negative in most cases (and close to zero in the remainder economies).

The Asian crisis presents some characteristics that seem to herald a new age. First, it took place in the context of perceived increased globalization. This phenomenon has a¤ected the real and …nancial sectors of the economy, and has been identi…ed as one of the culprits for the scope and severity of the last crisis. And it begun where it was least expected: among the "Asian dragons" and "Asian tigers". Second, the crisis quickly spread to another region, namely Latin America. Third, recovery was prompt: forecasts indicate that most emerging market economies will have bounced back by the end 1999, and the remainder by 2000. This paper focuses on the latter point.

The Asian crisis, and its contagion, have been analysed by a number of prestigious economists. Prior to these papers, the debt and Mexican crises had received the attention of academic economists. The next paragraph presents a partial review of these papers.

A …rst group examines institutional failures in emerging market economies that created situations propitious to speculative bubbles (Corsetti, Pesenti and Roubini (1998a), Mishkin (1999), Krugman (1998)). A related problem pertains to the nature of world economic governance, and how policies advocated by international organisations may have had an adverse e¤ect (Rodrik (1998), Kho and Stulz (1999), Radelet and Sachs (1998)). In the same line, International Monetary Fund (IMF) inspired adjustment plans have been scrutinised (Edwards (1989)). Another group of papers has focused on the macroeconomic evolution that preceded the onset of the crisis (Corsetti, Pesenti, and Roubini (1998b), Corsetti, Pesenti, and Roubini (1998c), Burnside, Eichenbaum and Rebelo (1998)). Contagion e¤ects have also received substantial attention (Glick and Rose (1998), Forbes and Rigobon (1999), Tornell (1999)). Last, Diwan and Hoekman (1999) have examined how trade patterns in‡uenced the unfolding of the crisis in Asia. This paper is probably closest to ours, as it focuses on transmission mechanisms in the real economy. Prior to these papers, the Mexican crisis of 1994-95 had been thoroughly analysed (Edwards (1997), Sachs, Tornell, and Velasco (1996a and 1996b)).

This corpus has greatly enhanced our understanding of the build up to a crisis and its subsequent unfolding. There is nonetheless a related question which remains largely unanswered. Indeed, recovery processes have received little attention, save for speci…c case studies. Apart from an analysis of IMF

inspired plans (see Corbo and Fisher (1995) for a survey), we do not know of general analyses of emerging market recoveries.

While it is clear that an analysis of crises presents an intrinsic interest for economists, we feel that recovery processes are also worth attention. The bouncing back of most Asian (in 1999) and Latin American economies (forecasted for 2000) has indeed been astounding. What looked like the possible onset of a global recession turned out to be a severe adjustment. Of course, it could be the case that globalization has changed the behavioural rules of emerging market economies: adjustments are more virulent, but so are recoveries.

In this paper, we attempt to shed some light on this issue. We hope to contribute to an understanding of exogenous factors a¤ecting emerging market recoveries, while shying away from providing (ex-post) explanations for the onset of crises. To this end, we analyse emerging market recessions since the late 1950's, and attempt to identify general recovery patterns (beyond some tautological …ndings).

Given the exploratory nature of this venture, we limit ourselves to simple and transparent exercises, that can be easily interpreted in light of economic theory. Indeed, the theoretical underpinnings of our estimations are the predictions of a Mundell-Fleming model of small open economies under di¤erent exchange rate and balance of payment regimes. Our objective is purely descriptive: we try to unearth some general patterns of emerging market recoveries (for the real economy) since the late 1950's.

As for many things, the "proof of the pudding is in the eating". Given that our exercise is exploratory and descriptive, we assessed its predictive power. Our sample ends in 1997, and does not include the Asian crisis.

We therefore used our estimates to assess how the statistical model behaved by making out-of-sample predictions. Our model successfully replicates the observed time-path of recoveries.

The remainder of this paper proceeds as follows. Section 2 describes how we have de…ned recessions for the emerging market economies of East Asia and Latin America. We also explain how the variables were constructed, and attempts to identify geographic and/or time …xed e¤ects. Section 3 motivates the exercise and proposes a simple econometric model . Section 4 presents the results and discusses them. Section 5 carries out of sample predictions, while section 6 provides some concluding comments.

2 Motivation

Save for the existence of trading Martians in …nancial or real assets, the world economy is a closed one. This implies that all economic transactions are, in the ultimate instance, endogenous. For example, the …scal situation in Brazil may worry foreign investors who may adopt strategies which may have an e¤ect on the valuation of Wall Street stocks. This may in turn a¤ect consumers' perception of their own wealth (in the US and elsewhere), which may feed through savings decisions, and may a¤ect the growth rate of the real economy. Realised growth may bear some weight on the decisions of macro policy makers (both in the US and elsewhere), which may a¤ect Brazil's potential for revenue collection. The repetitive tone of the last sentences aims at emphasizing the speculative nature of the realisation of the chain of events.

The above statement is correct, but needs to be quali…ed. First, there are purely exogenous technology shocks. Second, some of the economic re-

lations in the world economy are very weak, and can be safely assumed to have second order e¤ects. For instance, while it is true that the rest-of the-world's health a¤ect US growth prospects in the short to medium term, the same cannot be said of, say, the Ecuadorian economy. This statement ultimately motivates our empirical exercise: in the short to medium term, the growth rate in the US, Europe, and Japan may be reasonably considered as exogenous for each emerging market economy taken individually. Indeed, it is improbable that decisions by agents in each developing economy have a direct consequence on the growth prospects of Japan, the US, and the EU. By contrast, we believe that the realised growth performance in the large economic blocks a¤ect the potential for emerging market recoveries. The latter statement is self-evident; our contribution is try to measure its magnitude and to determine whether it is constant through time and space.

The theoretical underpinnings of our estimations are simple. We think of emerging market economies as small and open, and that they behave according to an IS-LM framework. We do not require to make any speci…c assumptions pertaining to the exchange rate (…xed, ‡exible, or crawling peg), or balance of payments regime (full, limited, or prohibited, movements in capital ‡ows). In all of the cases alluded to above, a recovery in the external sector driven by (exogenous) foreign demand increases national income in the short to medium term. Our analytical framework is keynesian to its core, and focuses on "export led recoveries".[1] Appendix A.1 provides a brief reminder of the "mechanics" of this class of models.

We assume that all emerging markets share the same knowledge on how

[1] As mentioned previously, positive technology shocks may also a¤ect the prospects of recoveries. While not denying the importance of this e¤ect, we do not attempt to measure its magnitude.

to recover from a recession. and that they sistematically implement this technology and eventually succeed in coming out of recession. However, there are external factors that speed up or slow down the recovery process and are beyond the control of the country. We attemp to identify the importance of these exogenous factors. In particular, the aim is to assess the extent to which growth in the large economies a¤ect recoveries. The idea is, again, simple: we want to identify the e¤ect of growth in the US, EU, and Japan, on the recovery prospects of emerging market economies. To this end, we estimate a parsimonious reduced form. Indeed, endogeneity problems prevent the use of variables that are known to a¤ect recoveries. For instance, country speci…c risk premia, …nancial ‡ows, or trade policy variables are all endogenous to an incipient recovery. Of course, these policy dependent variables, could, in principle, be instrumentalised. In practice, the task is insuperable. The diversity of recessions and policy variables we are dealing with imply that valid and well performing instruments are simply not available. Thus the choice of a simple, readily interpretable, reduced form.

3 Variable de…nition and data analysis

The …rst hurdle is to de…ne recessions and recoveries in emerging market economies. The main sources are the Penn World Tables on real per capita GDP growth till 1992, and IMF statistics thereafter. Our series run from the late 1950's till 1997. We have gathered data on twenty two emerging market economies, both from Asia and Latin America, and Turkey. The selection of countries was determined by data availability, that is we have not excluded an economy for which data was available.[2] We constructed the series on per

[2] The exception is Taiwan which is not included in our database, though series exist. The reason is that, given our de…nition of recessions and Taiwan's hitorical growth rates,

capita GDP growth in the large economies (US, EU, and Japan) from the same sources and Eurostat.[3]

The way we de…ne a recession, or crisis, is the following: an economy is deemed to enter into a recessionary cycle if it ful…lls two conditions. The latter are that per capita GDP is found to be below its trend level, and that the growth rate is also found to be below its local trend growth rate.[4] The two conditions are thus that the economy's output is below potential, and that the economy grows below potential. We thus de…ne recoveries as the moment in which the economy starts growing at a rate greater that its local trend growth (i.e., the gap between actual and potential output is being closed). We obtained the trend levels of GDP by applying the Hodrick-Prescott …lter to the GDP series, using a smoothing factor of 1600. Table 1 lists the countries that are included in our sample and the recessions we have identi…ed.

Insert Table 1 about here

These de…nitions are simple, transparent, and concur with generally accepted recessionary periods. Indeed, this taxonomy properly identi…es all previously labelled global crises. Our approach has the twin advantage of being "mechanical", and thus avoids ad-hoc judgments as to what amounts to recession, and also caters for structural variations in the growth potential of each emerging market economy.[5] Last, our estimation of the trends generate business cycles of 4 to 8 years, well in line with existing empirical

we would have had to classify Taiwan as experiencing a recession with growth rates of 4% or more. This did not appear as reasonable.

[3] We de…ned "Europe" as the …fteen countries currently forming the EU. Including all Western European economies did not result in any signi…cant di¤erences.

[4] Once we obtain trend levels of GDP, computation of the local potencial growth rate is immediate.

[5] This is particularly relevant for countries such as China, which have experienced sharp changes in their potencial growth rate during the time period under consideration.

evidence.

The number of recessions we identi…ed since the late 1950's is fairly similar across countries, and ranges from 5 to 9 episodes. Global crises are clearly identi…ed by our method. For instance, 19 of the 22 countries experienced a recession during the …rst half of the 1970's. Moreover, the debt crisis is re‡ected in our sample; all Latin American countries are in recession during 1982-84, except for Ecuador, which was hit later. While global crises are clearly identi…ed, it also emerges that emerging market recession are not always general phenomena (e.g. the Philippines are in recession in 1993, while the rest of the economies are growing fast). This diversity clearly indicates that emerging market recessions can not be solely explained by the evolution of the world economy.[6]

For the sample as a whole, the average duration is of 1.91 years and the incidence ratio stands at 1.41.[7] These summary statistics for each country are given in Table 2.

Insert Table 2 about here

Before turning to estimation, we checked wether time or region speci…c …xed e¤ects were discernible in the data. To this end we have estimated non-parametric survival functions for each of the four decades present in

[6] It is important to stress that the results we present below depend on our de…nition of recessions and recoveries. We have tried alternative methodologies, none of which appeared as superior. For instance we used the geometric mean of the growth rate over the entire period and deviations thereof. The drawback is that some emerging market economies experience important changes in their trend growth rates, which are not catered for when using the geometric mean. We also imposed a stricter criterion for identifyning recoveries, namely that observed growth ought to be superior to the local trend rate for at least two years. Applying this methodology lengthens recessionary cycles, and reduces the number of recession cum recovery episodes. We re-ran all our estimations using this alternative method. The results for the variables of interests were qualitatively similar. Overall, we feel that the de…nition we end-up using was the most reasonable.

[7] The incidence ratio is de…ned as the average occurence of recoveries in our sample.

our sample. The survival functions presented below were obtained using the estimators proposed by Kaplan-Meier (Kafbleisch and Prentice 1980). Concretely, the survival rate is given by:

$$S(t) = \prod_{k|t_k \cdot t} \left(\frac{n_k - d_k}{n_k} \right) \quad (1)$$

where n_k is the population alive at time k and d_k the number of failures. We estimated (1) for the entire sample as well as by decade. The results are presented in Table 3.

Insert Table 3 about here

As can be readily seen, the estimates by decades are less precise than for the entire sample, as the number of observations is smaller. However, the con…dence intervals overlap substantially. As a result, a $\hat{A}^2$ test does not reject the hypothesis of equality of the survival functions. In other words, we cannot detect a time speci…c …xed e¤ect with regard to recession cum recovery cycles.

We carried out the same exercise by regions, grouping Asian and Latin American countries together. The results are presented in Table 4.

Insert table 4 about here

As before, the estimates by region are less precise than those for the entire sample. More importantly, we are unable to unearth a region speci…c e¤ect. Indeed, a standard $\hat{A}^2$ test does not permit rejection of the hypothesis of equality between the survival functions of Asia and Latin America. This implies that, once we correct for di¤erences in terms of potential growth rates, no signi…cant di¤erence seems to exist between the emerging market

economies of Asia and Latin America in terms of recessions' duration. All in all, we were unable to identify …xed e¤ects, both with respect to decades or geographic origin. This suggests that there may be some common pattern in emerging market recoveries, irrespective of time or geographic origin. We thus move on to identify the e¤ect of growth in the three large economies (EU, US, and Japan) on the recovery prospects of the economies present in our sample.

4 Speci…cation

4.1 Exogeneity tests

It appears reasonable to assume that, in the short run, growth in the three large economies is exogenous for each emerging market economy taken individually. However, it may be the case that these economies, grouped together, do have an in‡uence on the behaviour of our three blocks over the short run. We therefore carried-out exogeneity tests for growth and real interest rates in the EU, US, and Japan with respect to growth of the Asian and Latin American regions.[8] The results are presented in Table 5. The second and third columns report the test for weak exogeneity proposed by Engle (1984, pp. 815-816).

Insert Table 5 about here

We cannot reject the hypothesis of weak exogeneity, save for Japanese growth with respect to the Asian region.[9] In the fourth and …fth columns, we

[8] Real interest rates in the EU, US, and Japan are de…ned in the next section.

[9] We carried out the same exogeneity tests with respect to each individual emerging market. At the 5% con…dence level, we only rejected the null of weak exogeneity in 7 out of 132 cases. As for Japanese growth, weak exogeneity was only rejected in one out 22 cases at the same con…dence level: Singapore. Given the size of the two economies,

present the results for Granger's Lagrange multiplier causality test (Charemza and Deadman 1997). The …rst step in this two stage procedure for identifying strong exogeneity consists in testing for weak exogeneity. In the second stage, we test the null hypothesis of absence of Granger causality.[10] The results are that exogeneity is only rejected in the case of Japan with respect to Asia. Consequently, one avenue is to eliminate Japan from our reduced form estimation, and only include growth in the EU and the US. However, this would probably yield spurious results, as we would estimate the net effect of growth in the EU and US, plus the indirect e¤ect of Japan. Instead, we chose to instrument Japanese growth using growth in the EU and US, Japanese public spending, and dummies for election years.[11] We then used the estimated values as regressors.

4.2 Econometric speci…cation

We focus on duration models, and attempt to assess the e¤ect of growth in the three large economies on the recovery prospects of Asian and Latin American countries. We estimated four distinct speci…cations, both in discrete (linear and probit) and in continuous time (Cox and Weibull). For the dichotomous dependent variable models (in discrete time), the universe is made-up of all the years in which emerging market economies are in recession or have just recovered. Our dependent variable takes value zero when the economy enters in a recession and remains in that situation, and value one the year the recovery cycle begins. Subsequent recovery/expansion years

we take this result as evidence that endogeneity only appears when Asian economies are grouped together.

[10] This sequential procedure increases the likelihood of rejecting the hypothesis of strong exogeneity. See Charemza and Deadman (1997, p. 234).

[11] In addition to these dummies, we introduced one for 1993, the …rst time since the 1950's that Liberal Democratic Party lost power.

are not included in our sample. In the continuous time speci…cations, our dependent variable is an entire recession cum recovery cycle. As a result, we have fewer observations, which reduces the precision with which we estimate our coe¢cients. We condition the probability of recovery on the length of time that the economy has been in recession.

The duration models we estimate are described in detail in appendix A.2.???? In what follows, we limit ourselves to the main modelisation issues. We de…ne the random variable T as the time that economy is in recession, and call this variable the duration. Each emerging market economy enters in recession at time $T = 0$. We assume that all the economies are homogeneous with respect to the factors that a¤ect the distribution of T. Last, the probability that an economy in recession during t periods and described by vector x will recover during the time interval dt is given by:

$$\Pr(t \cdot T < t + dt \mid T \, ¸ \, t; x) \qquad (X)$$

Thus, the hazard function conditional on x is given by:

$$h(t; x) = \lim_{dt \,!\, 0} \frac{\Pr(t \cdot T < t + dt \mid T \, ¸ \, t; x)}{dt}: \qquad (X)$$

It is possible to interpret $h(t; x)dt$ as the probability of recovery during the interval dt; given that the economy has been in recession for period t. Therefore, $h(t; x)$ must be restricted to non-negative values. We estimate two hazard functions in continuous time. The …rst is the Cox hazard function that is represented by an exponential of the following form:

$$h(t; x) = h_1(t) \exp(\beta' x) \qquad (X)$$

One advantage of this specification is that, given the assumption of proportionality, it is not necessary to estimate $h_1(t)$ in order to estimate $\bar{}$.

Our second continuous time model is the Weibull specification, where:

$$h_1(t) = pt^{p-1} \qquad (X)$$

In the discrete time formulation, the hazard function takes the form:

$$h(t;x) = Pr(T = t \mid T \geq t; x(t)) \qquad (X)$$

Note that this formulation can be viewed as a sequence of dichotomous binary choices for the surviving population in each moment in time, subject to restrictions across equations (Kiefer 1987).

Given the exploratory nature of our exercise, we have used these four distinct estimation techniques in order to check the robustness of our results. In discrete time, the two specifications are the linear and probit models in which the dependent variable is dichotomous. For the linear model we simply carried out GLS, whilst we estimated the probit model by maximum likelihood. In continuous time, we have estimated the two duration models presented above (Cox and Weibull) by maximum likelihood.

4.3 Variable definition

The independent variables are, first, the per capita growth rates of the EU, Japan, and the US interacted with the exports from each emerging market economy to each of these three blocks. We then multiplied this variable by the degree of openness of each emerging market economy.

Openess is defined as the ratio of imports plus exports over total GDP. In order to deal with possible problems of short term endogeneity, we took

the average by decades for each country. That is:

$$Open_{j;D} = Mean_D \left(\frac{X_j + M_j}{GDP_j} \right)$$

where X_j and M_j respectively denote exports and imports, D = 1960's, 1970's, 1980's, and 1990's, and j = our 22 emerging market economies.

We have data on bilateral trade flows from 1978 to 1997. The share in exports of each block is very stable across time for all emerging market economies. We thus used the 78-97 average for the entire sample. Apart from solving the problem of data availability, this choice also alleviates possible problems of short term endogeneity. Thus, exports flows from emerging market economies to each of the three large blocks are defined as:

$$Exports_{j;i} = \frac{X_{j;i}}{X_{j;US} + X_{j;EU} + X_{j;Jap}}$$

where i = EU, US, and Jap.

Thus, the regressor measuring the effect of growth in the three large economies on emerging market recovery prospects is constructed as:

$$\Delta GDP_{i;t} = \Delta gdp_{i;t} * Exports_{j;i;t} * Open_{j;D}$$

where t denotes time and $\Delta gdp_{i;t}$ is the per capita growth rate in the three large blocks at time t. In the Tables, these regressors are respectively denoted ΔGDP_{US}, ΔGDP_{EU}, and ΔGDP_{Jap}.

We introduced the changes in the terms-of-trade of country j, assuming that each individual economy acts as a price taker in world markets (that is, this variable exogenous). The latter is denoted as Δtot and is defined as:

$$\Delta tot_{j;t} = \Delta \left(\frac{\text{Export index price}}{\text{Import index price}} \right)_{j;t}$$

Both the denominator and the numerator are expressed in the same currency; this implies that we use an index of real relative prices. For some emerging market economies, data is lacking on import and export prices. In the latter cases, we used the regional index (Asia or Latin America).

To account for exogenous monetary shocks, we constructed real short term interest rates in Yens, Deutsche Marks, and US dollars. These three variables were constructed by subtracting the GDP deflator to the (annualised) three month interest rates.[12] Both series were retrieved from the IMF statistics. In the final specification, we only included US rates, as the Japanese and German rates did not prove significant (while the US one always was). Apart from possible issues of multicolinearity, this probably reflects the overwhelming proportion of borrowing in US dollars on the part of the economies in our sample during the time period under consideration.[13]

We also included a time trend in order to capture the effect of potential long term changes, such as the increasing globalisation of the world economy. We denote this regressor as TT. In addition, we specified the inverse of the duration of the recession. This variable, which is used only in the discrete time specification, is defined as:

$$DUR^{i\,1} = \begin{cases} \dfrac{1}{(\text{years of recession})} \end{cases}$$

This variable reflects one of the few universal rules in economics for cyclical variables: what goes down must go back up. As countries do not dis-

[12] We took the three month Treasury Bill for the US and the three-month interbank rates for Germany. For Japan, we used the rates of bonds traded with three-month repurchase agreements until 1989, and the rates of three-month certificate of deposit thereafter.

[13] We also introduced lagged values for real interest rates in an attempt to identify inertia in the transmission of these monetary shocks. While current real rates were always significant, these lagged variables were not, and did not affect the point estimates of the other regressors. Consequently, they were droped from the final specification, as they were simply increasing noise.

appear because of economic ‡uctuations, recoveries always end-up materialising. This variable re‡ects the fact that, all else equal, the probability of bouncing back is higher the longer the country has been in recession.[14] In the Weibull speci…cation, the duration is parametrised in a polynomial form.

Our last independent variable are dummies to account for possible …xed e¤ects that may a¤ect the speed of recovery. These …xed e¤ects may be of diverse origin in our sample. For instance, they may be related to political developments, the ability of emerging market policy makers, demographic structure, our de…nition of recession cum recovery cycles, dependence on a particular commodity (e.g. oil or copper), or the size of the country.[15] The obvious solution is to introduce $n - 1$ country dummies (with $n = 22$). The drawback is that in our exercise, it is not clear what reference country (the n_{th} one, i.e. the constant) ought to be chosen. More importantly, the structure of our database results in potential multicolinearity problems when $n - 1$ dummies are introduced, thus substantially decreasing the accuracy of the estimates. Therefore, we attempted to group countries by objective criteria such as size, geographic area, levels of development (e.g., "Tigers" vs. "Dragons"), or membership to regional blocks (ASEAN, Mercosur). None of these aggregation procedures proved satisfactory in the sense that dummies did not seem to improve the accuracy of the estimates. This should come as no surprise, as the …xed e¤ects we are trying to unearth are likely to be very idiosyncratic. Instead, we ran our probit regression without a constant and

[14] The estimated coe¢cient for this variable is a¤ected by our de…nition of recessions and recoveries. We thus re-estimated our models by applying alternative de…nitions (see footnote X). The estimate for this variable turned out to be di¤erent, but the other estimated parameters remained unchanged.

[15] In the case of Indonesia, Sukarno's succession led to a long and protracted recession. Compared to other Latin American countries, Ecuador enters recessionary cycles with a lag. Korea appears to have a surprising ability to bounce back quickly. We are agnostic regarding the cause of these country idiosyncratic e¤ects.

with n country dummies. We then took the point estimates of these dummies and grouped them according to standard clustering procedures. Applying a square distance criteria, we obtained four clusters.[16] Thus, this procedure for generating our dummies groups the economies according to the speed with which they bounce back. We called these three dummies very slow, slow and fast, with the fourth cluster forming the reference group.[17] The latter, which contains economies recovering at "intermediate" speed, represents half the countries in our sample.

It is perhaps useful to point out that none of the results that we present below depend on the introduction of …xed e¤ects and the choice of clustering procedure.[18] Controlling for these e¤ects increases precision, but does not alter the essence of the results. A speci…cation without …xed e¤ects yields the same signs and orders of magnitude for the point estimates of the independent variables of interest. The di¤erence lies in the standard errors, that are larger when …xed e¤ects are ignored.

The descriptive statistics for our independent variables are presented in Table X.

Insert Table X about here

[16] We experimented with alternative clustering procedures and number of groups. In particular, we clustered the data into 2 to 6 groups. Simple iteration indicated that the 4 group clustering was the most appropriate (though the results were qualitatively similar with, say, 3 or 5 clusters).

[17] The "very slow" group is made-up of Brazil and Bolivia and the "slow" one of Indonesia, Hong-Kong, Singapore, and the Philippines. The "fast" cluster consists of Mexico, Korea, Argentina, Peru, and India. The remaining economies form the reference group.

[18] Estimation of alternative speci…cations (e.g., with a distinct number of clusters) are available upon request.

5 Results

Having four distinct model speci…cations allows us to check for consistency and robustness. As the variable measuring the changes in the terms of trade, ¢tot, only proved to be signi…cant in the discrete speci…cation, we re-ran the continuous regressions without this variable. None of the results change.

The estimations, presented in Table X, indicate that growth in Europe and the US positively a¤ect emerging market recoveries. Both these variables are highly signi…cant in the two discrete speci…cations. The signi…cance of these two variables is lower in the Cox and Weibull exercise, which, by construction, contain fewer observations, thus reducing the precision of the point estimates. However, applying one-tailed tests yields signi…cant estimates at 10% (or less) in the continuous time speci…cations. This last comment generally applies to the other variables as well.

Insert Table X about here

The positive signs for these two variables accords well with the theoretical predictions of a Mundell-Fleming model. What is perhaps surprising is that the e¤ect of Europe is larger than that of the US. Our prior was that the e¤ect ought to be of roughly equal size, but this did not prove to be the case. Moreover, this order of magnitudes systematically emerges from all the estimations we ran. However, we cannot reject equality of the two coe¢cients in a statistical sense.

The result for Japanese growth is surprising. The signi…cant negative sign indicates that, in the short run, weak Japanese growth facilitates emerging market recoveries. This …nding emerged from all the speci…cations we estimated. The most plausible explanation is that both Japan and emerging

market economies generally rely on the export sector to bounce back from a recession. A large share of these exports go to the US and Europe. In terms of composition, there is an overlap between the exports of emerging market economies and those of Japan. Thus, it would seem that, in the short term, Japan and these economies are direct competitors on export markets. Diwan and Hoekman (1999, p. 10) detect this phenomenon in their data (which only pertains to Asia). Analysing the evolutions of Japan's export performance and that of emerging market economies in Asia, these authors conclude that: "Japanese export growth tends to be negatively related." and further: "More important, the results corroborate the hypothesis of rising competition between Japan and the higher-end producers in the region, especially in the recent years". There are various (non-competing) explanations for this …nding. For instance, a strong yen weakens export industries in Japan, which in turn gives more room for expansion in the external sector of emerging market economies.[19] Given that Asian emerging market economies have a production structure closer to that of Japan compared to that of Latin American countries, we would expect the (short term) e¤ect of Japanese growth to be stronger with respect to the former. This is what we …nd in our data when we split the sample by geographic area. Re-running our discrete speci…cations for Asia and Latin America separately, we …nd that the e¤ect of Japanese growth is negative and highly signi…cant in the case of Asia, but that it is

[19] Though Diwan and Hoekamn (1999) focus on the build-up to the Asian crisis (and not recoveries), their focus on transmission mechanisms in the real economy is similar to ours. These authors note that during the period 1995-97 "The recent depreciation of the yen will have been good for users of Japanese-produced inputs, but will reduce the incentive for outward FDI (foreign direct investment), reduce Japanese demand for imports and increase the export competitiveness of Japanese …rms that produce similar goods to those of East Asian …rms". The conditions in 1999 have been exactly the opposite: a strong Yen and weak Japanese growth. By way of consequence, the above quote applies in our context.

not signi…cantly di¤erent from zero in the case of Latin America.[20]

A comment is nonetheless in order: this e¤ect is a short term one. Indeed, our exogeneity tests indicated that in the medium-term Japanese growth positively depends on Asian growth taken as a whole, and vice-versa. Thus, the sign of the Japanese variable has to be interpreted for what it is: a short-run, contemporaneous e¤ect, and certainly not as evidence that international trade is a zero sum game.

The real dollar interest rate appears with the expected sign and is signi…cant at 5% in the discrete speci…cation. The positive sign for the time trend indicates that structural change in the world economy enhances the speed of recovery. This probably re‡ects the fact that increasing world economic integration has fasten the pace of transmission mechanisms across the economies of our sample. The last variable, changes in the terms of trade, appears as signi…cant and with the expected sign. Our three dummies (and the constant) are also signi…cant. It should be noted that excluding them from the estimations reduces the precision of the point estimates, but does not change any of the main results.

Since we cannot directly compare the point estimates reported in Table 7, we present the hazard rates corresponding to our results in Table 8. The numbers indicate how the probability of recovery is a¤ected by one extra point in the growth rate of our three economic blocks. For instance, if, all else equal, the US economy grows 1% more, the probability of recovery increases by 11% for the "standard" emerging market economy in the probit

[20] Splitting the sample reduces the number of observations, and consequently, the degree of precision of our estimates (results available upon request). This is indeed the case for all our regressors in both speci…cations, save for Japanese growth in the Asian regression. It is also interesting to note that point estimate for real interest rates is higher and more precisely estimated for Latin America, re‡ecting the latter's heavier reliance on international capital markets.

speci…cation. The hazard rates clearly indicate that all models yield similar results pertaining to each of the three large blocks. This suggests that the results are quite robust.

Last, the hazard rates shed additional light on the relative importance of the US and the EU. While the point estimates pertaining to growth for the EU are larger than those relative to the US, the hazard rates are not. This re‡ects the fact that, throughout the entire time period, the US has been, on average, a larger export outlet for the economies under study.

6 Predictive capacity

We are surprised by our results, particularly those pertaining to Japan, but con…dent that the estimates are robust. Given the exploratory nature of this exercise, we attempted to check the validity of our estimates by applying a stringent test: out-of-sample predictions. Ultimately, this is what is requested from a time dependent model: information from the past ought to shed some light on current and future developments. As our results somewhat depart from conventional wisdom, we thought that this may provide convincing corroborating evidence.

As mentioned above, we did not include the Asian crisis in our sample in order to be able to undertake out-of-sample predictions. Recent publication of data allowed us to carry out that task. For the three large blocks, we used the IMF's latest published statistics on realised growth for 1997 and 1998, and the predictions for 1999 and 2000 (World Economic Outlook, September 1999). For emerging market economies, we used data on realised growth from the World Bank and the International Development Agency. For 1999 and 2000, we collected central forecasts (the latter are simply the average

between the highest and lowest growth forecasts for 1999 and 2000).[21] These central forecasts are well in line with developments in the …rst three quarters of 1999.

We applied our de…nition of recessions and recoveries to this new data. We were thus able to identify which economies entered in recession in 1998 and those that were forecasted to recover in 1999 and 2000.[22] We then used our estimated parameters to assess the proportion of recoveries the model predicts for 1999 and 2000 (recall that our sample used for estimation does not include the Asian crisis). The results are presented in Table 9. Of the emerging market economies that entered recession in 1998, between 57% and 66% of them recover in 1999, and the remainder will do in 2000 (based on observed and forecasted values).[23] The 57%-66% per cent range is due to the classi…cation of Hong-Kong. The British hand over to China may have generated a one-o¤ e¤ect. Using estimated coe¢cients, our model predicts that, for the average emerging market economy in recession, 59% (linear speci…cation) or 63% (probit) would bounce back by 1999. For the same economies and the year 2000, the respective proportions are 83% and 72% (while the forecasted value is 100%).

Insert Table 9 about here

This is in sharp contrast to the predictions of an unconditional duration model in discrete time that includes only a constant and the duration of

[21] These "central forecasts" were obtained from Oxford Analytica, a specialist provider of country studies and data.

[22] Although the …nancial crisis began in the late summer of 1997, its e¤ect on real growth was felt as of 1998.

[23] Applying our de…nition of recession and recovery, o¢cial data and forecasts indicate that Indonesia, Paraguay, Hong-Kong, Korea, Malaysia, Singapore, and Thailand will have experienced a recession in 1998. The last four will have recovered by the end of 1999. Argentina, Brazil, Colombia, Ecuador and Venezuela are in recession in 1999, and all are forecasted to recover by 2000, save for Colombia.

recessions.[24] For instance, an unconditional probit would predict only 38% recoveries in the …rst year after the beginning of the recession, and 57% in the second. With this information, it is possible to construct a success index. The latter re‡ects the improvement that our model provides relative to a benchmark speci…cation that only includes a constant and the duration of the recessions. The value for the success by the probit model stands at 89.3% and 60.5% for recoveries in 1999 and 2000 respectively. By this standard, our conditional models appear as having strong predictive powers.

7 Some speculative thoughts as concluding remarks

We started thinking about emerging market recoveries a bit more than a year ago. Our concern was quite simple: we thought that the arrival of the Euro may coincide with a global recession. These fears proved to be unfounded, and our empirical model sheds some light on this misguided perception. First, US growth during 1999 has been ba - ing: the latest quarterly data indicated that the economy was steaming ahead at a (quarterly) rate above 5%. A year ago, few would have ventured into such optimistic predictions, particularly in view of the savings position of the private sector (household as well as corporate). Thus, the …rst factor that helps explain the quick emerging market recoveries has been the -largely unexpected- performance of the US economy. The second factor is the performance of Japan. A priori, we did not expect the short term e¤ect of Japanese growth to be negative; we thus thought that this economy's performance was increasing the incipient risk of a global recession. The unexpected e¤ect unearthed by our estimation is

[24] Stricto sensu, an unconditional speci…cation would not even include the duration (thus strengthening our results).

the second element that has contributed to the recovery. Last, a word is in order with respect to the performance of the EU economy. During this last crisis, its e¤ect has been neutral, as EU growth has been average by historic standards.

While the Asian crisis seemed to herald a new breed of recessions because of its virulence and contagious nature, our model shows that, with respect to recoveries, the basic rules of the game have not changed. Though it seems that the pace of transmission have quickened (as evidenced by the signi…cance and sign of the time trend), emerging market recoveries following this last run of crises have followed the same historical pattern. Indeed, the experience of the last 35 years allows us to make accurate out-of-sample predictions. The latter exercise is particularly demanding, as the unfolding of events has been unique by historical standards: a regional crisis engul…ng the "Dragons" and "Tigers", that spreads to Latin America, coupled with strong US growth and recession in Japan. This parameter constellation has not been observed since World War II. Despite this, our estimations permit a precise identi…cation of recoveries' time path .

Eighteen months may seem like an eternity when dealing with …nancial crises. It is thus interesting to recall what the predictions and the general mood were a year and a half ago. Basing our ourselves on accepted sources such as IMF reports, and press articles published in the Financial Times (FT) by respected policy makers and columnists, we can safely state that mood was de…nitely on the gloomy side.[25] Protectionist pressures were also

[25] The IMF's "World Economic and Global Policy Challenges" (28/9/1998) stated in its introduction that "International economic and …nancial conditions have deteriorated considerably in recent months as recessions have deepened in many Asian emerging market economies and Japan, and as Russia's …nancial crisis has raised the specter of default" (the latter did occur) and further "Chances of any signi…cant improvement in 1999 have also diminished and the risks of a deeper, wider, and more prolonged downturn have

on the rise.[26] In this context, it seems valid to query whether the EU could potentially have acted as an importer of last resort, should the US economy have shown signs of fatigue.

escalated". See also "Can we bounce back?", Paul Volcker, FT, 7/10/1998, "A brief crisis guide", Samuel brittan, FT, 15/10/1998, or "Complacency trap", Martin Wolf, FT, 18/11/1998.

[26] See for instance "Al Gore's foreign policy", Gerard Baker, FT, 19/11/1998, "Melting point", Guy de Jonquières, FT, 23/10/1998, or "US asks EU to curb import curbs", Guy de Jonquières, FT, 19/10/1998.

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Appendix

A.1

The theoretical motivations of our estimations are those of a simple Mundell-Fleming model applied to an emerging market economy. Extending the …xed price IS-LM model, the simplest Mundell-Fleming model assumes …xed prices levels at home and abroad. The LM relationship (liquidity preference equals money) represents asset markets equilibrium:

$$i = i\left(\frac{M}{P}; y\right); \; i_1 < 0; \; i_2 > 0$$

where i is the nominal interest rate, $\frac{M}{P}$ is real money, and y is the economy's …nal output. Since prices are …xed, the in‡ation rate is taken to be equal to zero at home and abroad in what follows. Thus, real and nominal interest rates are equal. Nonetheless, the same conclusions can be drawn assuming that in‡ation rates at home and abroad are the same at equilibrium. In that case, only real interest rates will be relevent in the goods markets. If the exchange rate is contant, under UIP the nominal exchange rate at home, i, must equal the world rate, i¤, so that

$$i^{¤} = i\left(\frac{M}{P}; y\right)$$

and, therefore, money supply must accomodate growth. For emerging markets economies, this has been the basic monetary policy framework since they have experienced both high growth rates and a secular decline in money velocity in the last decades.

The IS curve (investment equals saving) must account for the e¤ect of the export and import price levels, $\frac{P^X}{P^M}$, on exports and imports:

$$x = \bar{x} + -\left(\frac{P^X}{P^M}; -\right) < 0$$

$$m = m(y) + \alpha\frac{P^X}{P^M}; \alpha > 0$$

so that

$$y = A\left(i^{\ast}; y; m(y) + \alpha\frac{P^X}{P^M}; \bar{x} + \beta\frac{P^X}{P^M}\right)$$

and given that $A_{i^{\ast}} < 0$, $A_m < 0$, $A_x > 0$, then output can be expressed as a function of fundamentals:

$$y = f\left(i^{\ast}; \frac{P^X}{P^M}; \bar{x}\right)$$

where

$$\begin{aligned} \frac{\partial f}{\partial i^{\ast}} &< 0; \\ \frac{\partial f}{\partial \frac{P^X}{P^M}} &< 0; \\ \frac{\partial f}{\partial \bar{x}} &> 0: \end{aligned}$$

In the last four decades, emerging market economies have lived under both …xed and ‡exible exchange rate regimes as well as some interesting intermediate cases. Note that under ‡exible exchange rates, $f\left(i^{\ast}; \frac{P^X}{P^M}; \bar{x}\right)$ can be interpreted as the equilibrium loci. On the other hand, an expansion in exports under …xed exchange rates is automatically accomodated by an expansion in money due to the exchange rate policy, and no further assumptions on monetary and …scal policy are required.

A.2

Our population is made up of emerging market economies that are in recession or are in their …rst recovery year. Let y_t be real per capita GDP of an emerging market economy at period t. We say that an economy is in a recession when:

$$y_t < y_t^{LT} \tag{1}$$

and

$$¢y_t \cdot ¢y_t^{LT} \tag{2}$$

where the LT superscript stands for local trend and ¢ stands for growth rates. We say that the economy is in a recovery if

$$¢y_t > ¢y_t^{LT} \tag{3}$$

given that the economy was at recession at $t - 1$. We can thus de…ne a variable "recovery" as

r_t = 1 if the economy is in a recovery at time t.

r_t = 0 if the economy is in a recession at time t.

We further assume that the economy's gap with respect to its potential growth depends on a number of exogenous variables, x_{1t}, the evolution of the US, EU and Japan real per capita GDP growth rate, $¢gdp_t^{US}$, $¢gdp_t^{EU}$, $¢gdp_t^{JAP}$, plus a disturbance term:

$$¢y_t - ¢y_t^{LT} = f_1(x_{1t}; ¢gdp_t^{US}; ¢gdp_t^{EU}; ¢gdp_t^{JAP}) + u_{1t}$$

At the same time, the Japanese economy depends on the evolution of the emerging market economy, a number of exogenous factors, x_{2t}, and a disturbance term:

$$¢gdp_t^{JAP} = f_2(x_{2t}; ¢y_t) + u_{2t}$$

We do not need to assume that $corr(u_{1t}; u_{2t}) = 0$.

Conditions for identi…cation of the two structural equations are the usual ones. We directly model the probability of recovery at any time conditional on all exogeneous variables plus the Japanese growth rate,

$$Pr(r_t = 1jx_{1t}; ¢gdp_t^{US}; ¢gdp_t^{EU}; ¢gdp_t^{JAP}; r_{t¡1} = 0);$$

as a linear, probit, Cox, or Weibull model. A two-stage procedure is required to avoid simultaneity bias in the estimations due to endogeneity of Japanese growth. The standard errors computed directly in the two-stage procedure are downward biased but unbiased estimates can be obtained with the bootstrap.

In order to compute the contribution of any of the large economies to the recovey in an emerging market, we de…ne three hazard rates:

$$,^{US} = \frac{Pr(r_t = 1jx_{1t}; \overline{¢gdp_t}^{US} + 1; \overline{¢gdp_t}^{EU}; \overline{¢gdp_t}^{JAP}; r_{t¡1} = 0)}{Pr(r_t = 1jx_{1t}; \overline{¢gdp_t}^{US}; \overline{¢gdp_t}^{EU}; \overline{¢gdp_t}^{JAP}; r_{t¡1} = 0)}$$

$$,^{EU} = \frac{Pr(r_t = 1jx_{1t}; \overline{¢gdp_t}^{US}; \overline{¢gdp_t}^{EU} + 1; \overline{¢gdp_t}^{JAP}; r_{t¡1} = 0)}{Pr(r_t = 1jx_{1t}; \overline{¢gdp_t}^{US}; \overline{¢gdp_t}^{EU}; \overline{¢gdp_t}^{JAP}; r_{t¡1} = 0)}$$

$$,^{JAP} = \frac{Pr(r_t = 1jx_{1t}; \overline{¢gdp_t}^{US}; \overline{¢gdp_t}^{EU}; \overline{¢gdp_t}^{JAP} + 1; r_{t¡1} = 0)}{Pr(r_t = 1jx_{1t}; \overline{¢gdp_t}^{US}; \overline{¢gdp_t}^{EU}; \overline{¢gdp_t}^{JAP}; r_{t¡1} = 0)}$$

where the bar superscript stands for the average operator.

Table 1: Emerging market economies and recession years	
Country	Years in which the economy is in recession
Argentina	1959, 1962:1963, 1966:1967, 1982, 1985, 1988:1990, 1995
Bolivia	1958:1961, 1964, 1969, 1972, 1984:1990
Brasil	1959:1969, 1983, 1990:1992
Chile	1958:1959, 1975:1976, 1982:1983, 1990:1991
Colombia	1958:1959, 1962:1963, 1965, 1967, 1975, 1977, 1983:1985, 1989:1991
China	1968:1969, 1976, 1981:1982, 1986:1987, 1989:1991
Costa Rica	1959:1962, 1964, 1967, 1969, 1982:1983, 1985, 1988, 1991
Ecuador	1958:1963, 1965, 1968, 1970, 1986:1987, 1989:1990, 1992
Philippines	1960:1961, 1963:1966, 1970, 1984:1986, 1991:1993
India	1966, 1972:1974, 1976, 1979, 1984, 1987, 1991
Indonesia	1967:1972, 1976, 1985:1988, 1991:1992
Korea	1964:1965, 1967, 1972, 1975, 1980:1982, 1985
Hong Kong	1968, 1970:1972, 1974:1975, 1982:1983, 1985
Malaysia	1966:1969, 1971, 1975, 1985:1987, 1992
Paraguay	1960, 1963:1966, 1968:1970, 1972, 1975, 1983, 1985:1986, 1988:1989, 1993
Mexico	1958:1959, 1961:1962, 1965, 1969, 1971, 1976:1977, 1983, 1986:1987
Peru	1956:1959, 1968, 1972, 1978, 1983, 1989:1990, 1992
Singapore	1966:1968, 1970:1971, 1974, 1976:1978, 1982:1983, 1985:1986, 1992
Thailand	1972, 1974:1975, 1980:1982, 1984:1986
Turkey	1960:1962, 1964:1965, 1967, 1969:1970, 1973, 1980:1983, 1985, 1988:1989, 1991, 1994
Uruguay	1959, 1963, 1965, 1967:1968, 1972, 1974, 1983:1985, 1988:1990, 1995
Venezuela	1960:1961, 1966, 1972:1973, 1982:1985, 1989, 1994, 1996

Table 2: Recessions' duration by country

Country	Number	Mean	Std. Dev.	Minimum	Maximum	Incidence rate[a]
Total	141	1.91	1.41	1	11	0.52
Argentina	7	1.57	0.79	1	3	0.64
Bolivia	5	3.20	3.03	1	7	0.32
Brasil	3	5.00	5.29	1	11	0.20
Chile	4	2.00	0.00	2	2	0.50
Colombia	8	1.75	0.89	1	3	0.57
China	5	1.80	0.84	1	3	0.56
CostaRica	8	1.50	1.07	1	4	0.67
Ecuador	7	2.00	1.83	1	6	0.50
Phillipines	5	2.60	1.14	1	4	0.38
India	7	1.29	0.76	1	3	0.78
Indonesia	4	3.25	2.22	1	6	0.31
Korea	6	1.50	0.84	1	3	0.67
HongKong	5	1.80	0.84	1	3	0.56
Malaysia	5	2.00	1.41	1	4	0.50
Paraguay	9	1.78	1.09	1	4	0.56
Mexico	9	1.44	0.53	1	2	0.69
Peru	7	1.57	1.13	1	4	0.64
Singapore	7	2.00	0.82	1	3	0.50
Thailand	4	2.25	0.96	1	3	0.44
Turkey	10	1.80	1.03	1	4	0.56
Uruguay	9	1.56	0.88	1	3	0.64
Venezuela	7	1.71	1.11	1	4	0.58

[a]The incidence rate is de…ned as the ratio of the number of recoveries over the total number of periods.

Table 3: Survival functions by decades

Time	Cases	Exits	S(t)[a]	Std. Dev.	Conf. Int. (95%)	
Entire sample						
1	141	0	1.00	.	.	.
2	141	74	0.48	0.04	0.39	0.55
3	67	35	0.23	0.04	0.16	0.30
4	32	19	0.09	0.02	0.05	0.15
5	13	8	0.04	0.02	0.01	0.08
7	5	3	0.01	0.01	0.00	0.05
8	2	1	0.01	0.01	0.00	0.04
12	1	1	0.00	.	.	.
1960 decade						
1	40	0	1.00	.	.	.
2	40	20	0.50	0.08	0.34	0.64
3	20	12	0.20	0.06	0.09	0.33
4	8	2	0.15	0.06	0.06	0.28
5	6	4	0.05	0.03	0.01	0.15
7	2	2	0.00	.	.	.
1970 decade						
1	39	0	1.00	.	.	.
2	39	25	0.36	0.08	0.21	0.51
3	14	7	0.18	0.06	0.08	0.31
4	7	4	0.08	0.04	0.02	0.19
5	3	1	0.05	0.04	0.01	0.15
7	2	1	0.03	0.03	0.00	0.12
12	1	1	0.00	.	.	.
1980 decade						
1	34	0	1.00	.	.	.
2	34	14	0.59	0.08	0.41	0.73
3	20	10	0.29	0.08	0.15	0.45
4	10	7	0.09	0.05	0.02	0.21
5	3	3	0.00	.	.	.
1990 decade						
1	28	0	1.00	.	.	.
2	28	15	0.46	0.09	0.28	0.63
3	13	6	0.25	0.08	0.11	0.42
4	7	6	0.04	0.04	0.00	0.15
8	1	1	0.00	.	.	.

$Â^{2b}$: 3.17 (Pr>$Â^2$:0.3656)

[a] Kaplan-Meier estimators of the survival function
[b] $Â^2$ test of equality of the survival functions

Table 4: Survival functions by geographical area						
Time	Cases	Exits	S(t)[a]	Std. Dev.	Conf. Int. (95%)	
Entire sample						
1	141	0	1.00	.	.	.
2	141	74	0.48	0.04	0.39	0.55
3	67	35	0.23	0.04	0.16	0.30
4	32	19	0.09	0.02	0.05	0.15
5	13	8	0.04	0.02	0.01	0.08
7	5	3	0.01	0.01	0.00	0.05
8	2	1	0.01	0.01	0.00	0.04
12	1	1	0.00	.	.	.
Latin American countries						
1	83	0	1.00	.	.	.
2	83	47	0.43	0.05	0.33	0.54
3	36	21	0.18	0.04	0.11	0.27
4	15	7	0.10	0.03	0.05	0.17
5	8	4	0.05	0.02	0.02	0.11
7	4	2	0.02	0.02	0.00	0.08
8	2	1	0.01	0.01	0.00	0.06
12	1	1	0.00	.	.	.
Asian countries						
1	58	0	1.00	.	.	.
2	58	27	0.53	0.07	0.40	0.65
3	31	14	0.29	0.06	0.18	0.41
4	17	12	0.09	0.04	0.03	0.18
5	5	4	0.02	0.02	0.00	0.08
7	1	1	0.00	.	.	.

$Â^{2b}$: 1.62 (Pr>$Â^2$:0.2032)

[a]Kaplan-Meier estimators of the survival function
[b]$Â^2$ test of equality of the survival functions

Table 5: Exogeneity tests

	Weak exogeneity[a]		Strong exogeneity[b]	
	t	Prob>jtj	Â²	Prob>jÂ²j
Exogeneity with respect to Latin America's growth				
¢gdp$_{US}$	0.65	0.53	4.22	0.96
¢gdp$_{EU}$	1.04	0.31	2.66	0.99
¢gdp$_{Jap}$	-0.07	0.94	1.22	0.99
r$_{US}$	-0.68	0.50	5.20	0.39
r$_{EU}$	0.30	0.77	3.60	0.61
r$_{Jap}$	-0.46	0.65	0.04	0.99
Exogeneity with respect to Asia's growth				
¢gdp$_{US}$	-0.91	0.37	5.23	0.92
¢gdp$_{EU}$	1.32	0.20	2.00	0.99
¢gdp$_{Jap}$	2.03	0.05	.	.
r$_{US}$	-0.97	0.34	2.16	0.83
r$_{EU}$	-0.71	0.48	3.56	0.61
r$_{Jap}$	-0.52	0.61	8.80	0.14

[a]Engle's weak exogeneity test.

[b]Granger's causality test.

Table 6: Descriptive statistics

Variable	# of Obs.	Mean	Std. Dev.	Minimum	Maximum
Data for binary models					
$¢GDP^{a}_{US}$ [a]	401	58.16945	68.01018	-163.9578	412.0433
$¢GDP^{a}_{EU}$ [a]	401	43.27494	42.38119	-49.19273	224.3142
$¢GDP_{JAP}$ [a]	401	36.44117	51.47791	-40.25202	367.9143
r^{US}	401	1.956955	1.900105	-3.599999	5.7
¢tot	401	-.9983292	14.29063	-53.97	59.05
DUR^{i1}	401	.6053607	.3059243	.0833333	1
Data for duration models					
$¢GDP_{US}$ [a]	139	70.17705	71.46091	-67.65855	412.0433
$¢GDP_{EU}$ [a]	139	46.67413	46.02283	-37.44179	224.3142
$¢GDP_{Jap}$ [a]	139	35.15473	47.0449	-17.62591	262.1264
r^{US}	139	1.788446	1.887021	-3.599999	5.7
¢tot	139	1.312734	15.36246	-53.67	57.68

[a] $¢GDP_{i;t} = ¢gdp_{i;t} ¤ Exports_{j;i;t} ¤ Open_{j;D}$

Where $Open_{j;D} = Mean_{D} \frac{X_j + M_j}{GDP_j}$

and $Exports_{j;i} = \frac{X_{j;i}}{X_{j;US} + X_{j;EU} + X_{j;Jap}}$

Table 7: Estimation results of the duration models[a]

			Cox		Weibull	
	Probit	Linear	(1)	(2)	(1)	(2)
DUR^{i1}	-4.12	-0.85	.	.		
	(.46)	(.0557)				
$¢GDP_{US}$	$0.43x10^{i2}$	$0.08x10^{i2}$	$0.12x10^{i2}$	$0.13x10^{i2}$	$0.16x10^{i2}$	$0.16x10^{i2}$
	$(.16x10^{i2})$	$(.034x10^{i2})$	$(.11x10^{i2})$	$(.97x10^{i2})$	$(.16x10^{i2})$	$(.14x10^{i2})$
$¢GDP_{EU}$	$0.59x10^{i2}$	$0.13x10^{i2}$	$0.27x10^{i2}$	$0.27x10^{i2}$	$0.48x10^{i2}$	$0.49x10^{i2}$
	$(.24x10^{i2})$	$(.056x10^{i2})$	$(.18x10^{i2})$	$(.19x10^{i2})$	$(.31x10^{i2})$	$(.32x10^{i2})$
$¢GDP_{JAP}$	$-0.32x10^{i2}$	$-0.07x10^{i2}$	$-0.27x10^{i2}$	$-0.28x10^{i2}$	$-0.38x10^{i2}$	$-0.41x10^{i2}$
	$(.17x10^{i2})$	$(.042x10^{i2})$	$(.14x10^{i2})$	$(.14x10^{i2})$	$(.30x10^{i2})$	$(.24x10^{i2})$
r_{US}	-0.2260	-0.0453	-0.0597	-0.0608	-0.0858	-0.0953
	(.0626)	(.0113)	(.0419)	(.0402)	(.0799)	(.0753)
¢tot	0.0099	0.0023	-0.0008	.	-0.0046	.
	(.0058)	(.0013)	(.0064)		(.0118)	
TT	0.0356	0.0076	0.0081	0.0083	0.0169	0.0193
	(.0087)	(.0021)	(.0061)	(.0069)	(.0098)	(.0114)
very slow	-1.2573	-0.2819	-0.9730	-0.9728	-2.0057	-2.0043
	(.4099)	(.0841)	(.5929)	(.5614)	(.9125)	(.8873)
slow	-0.6480	-0.1185	-0.2629	-0.2603	-0.4207	-0.4035
	(.2735)	(.0606)	(.1993)	(.1719)	(.3101)	(.3391)
fast	0.6963	0.1439	0.3754	0.3753	0.6528	0.6652
	(.2280)	(.0495)	(.1526)	(.1530)	(.2976)	(.2939)
constant	-68.61	-14.19	.	.	-36.39	-41.24
	(17.23)	(4.13)			(19.46)	(22.63)
ln(p)[b]	.	.	.	.	0.9896	0.9801
					(.0700)	(.0762)
Obs.	401	401	139	139	139	139
$Â^2$	148.56	32.31	27.33	27.49	34.10	34.66
R^{2c}	37.39	38.68	.	.	.	.

[a]Boostrap standard errors with 200 replications in parenthesis.

[b]ln(p) stands for the logarithm of the Weibull duration parameter.

[c]For the probit estimates, the R^2 is the (scaled) value of the likelihood function whereby 1 corresponds to a perfect prediction and 0 to a model which only includes a constant.

Table 8: Hazard rates[ab]

	Linear	Probit	Cox		Weibull	
			(1)	(2)	(1)	(2)
United States	1.04	1.11	1.03	1.03	1.03	1.03
Europe	1.05	1.11	1.04	1.04	1.07	1.04
Japan	0.99	0.97	0.98	0.98	0.98	0.97

[a]Hazard rates measure the variation in the probability of recovery when one of the large economies increases its growth rate by 1%.

It is de…ned as: $\frac{h(t;x;z+1)}{h(t;x;z)}$ where $h(t;x;z) = Pr(tjT > t;x;z)$. x are all the regressors except $¢gdp_{US}$, $¢gdp_{EU}$, and $¢gdp_{JAP}$. z stands for any of these three variables

[b]See Table 7 for the models' speci…cations.

Table 9: Out-of-sample predictions for the Asian crisis				
Year of recovery	1999	2000		
	(a)	(b)	(c)	(d)
Start of recession:1998				
Observed frequency[1]	0.57-0.66	.	1	.
Pred[2]: probit model	0.63	0.81	0.83	0.87
Pred: linear model	0.59	0.70	0.72	0.76
Pred: unconditional probit[3]	0.38	0.57	0.57	0.57
Start of recession:1999				
Forecasted frequency[4]	.	.	0.80	.
Pred: Probit model	.	0.58	0.61	0.67
Pred: Linear model	.	0.56	0.58	0.62
Pred: unconditional probit[3]	.	0.38	0.38	0.38

(a): Observed and predicted recoveries in 1999.

(b): Predicted recoveries in 2000 assuming 2% growth for the EU.

(c): Forecasted and predicted recoveries in 2000 assuming 2.7% growth for the EU. 2.7% growth for the EU is the latest IMF forecast available.

(d): Predicted recoveries in 2000 assuming 4% growth for the EU.

[1]The observed frequency indicates the percentage of countries that enter in recession in 1998 and are forecasted to recover by 1999. Central forecasts are arithmetic means of the forecasts provided by 13 distinct consultancies/institutes.

[2]Pred: prediction generated by our estimations.

[3]Unconditional model: predictions obtained with a probit model that includes only a constant and the duration of the recession as regressors.

[4]The forecasted frequency indicates the percentage of countries that enter in recession in 1999 and are forecasted to recover by 2000. Central forecasts are arithmetic means of the forecasts provided by 13 distinct consultancies/institutes.