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 specification is parsimonious, as we focus on the effect of growth in the US, EU, and Japan on the prospects for recovery in emerging market economies 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 model successfully predicts the bouncing back of most emerging market economies hit by the Asian crisis, and confirms the importance of external factors in recovery processes.

JEL Codes: C1; E3; F4.

Keywords: Emerging markets; recessions; duration; IS-LM.

1 Introduction

The beginning of the Asian financial 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 effects 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 indefinitely, based on the dynamism of their export sectors. The financial 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 affected the real and financial sectors of the economy, and has been identified 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 first 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 effect (Rodrik (1998), Kho and Stulz (1999), Radelet and Sachs (1998)). For instance, Rodrik (1998) has questioned the desirability of fully liberalising the capital account in countries whose financial systems are not yet mature. 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)). These papers identified a series of common causes for these crises: current account deficits, large flows of short-term "hot money", rising inflation, rising budget deficits, and exchange rate overvaluation. Some of these disequilibria are generated by internal factors, while others are the results of developments in the world economy. Contagion effects 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 influenced 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 pa-

pers, 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 specific 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 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. In this exercise, we check for region or time specific fixed effects.

Throughout the analysis, the focus is on the exogenous factors that may influence recovery processes. We explicitly recognise that all policy responses on the part of emerging market governments are endogenous to an incipient recovery. In addition, we assume that the same "tools" are available to policy

makers across emerging market economies. Thus, the standard "technology to engineer a recovery" is freely available for all countries in our sample. This assumption is probably close to the mark, given the high degree of homogeneity of macro policies characteristic of stabilisation plans (see Corbo and Fisher (1995) for a thorough analysis). Consequently, we capture the effect of these endogenous policies through the inclusion of the crisis' duration as a regressor. The advantage of this approach is that it allows us to obtain direct estimates of the effect of exogenous factors using standard econometric techniques.

As the nature of our analysis is exploratory, 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 different 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". 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 motivates the exercise and sketches the underlying theoretical framework. Section 3 describes how we have defined recessions for the emerging market economies of East Asia and Latin America. We also check for the presence of geographic and/or time fixed effects. Section 4 presents the econometric specification

and explains how the variables were constructed. Section 5 contains the results and their interpretation. Section 6 carries out of sample predictions, while section 7 provides some concluding comments.

2   Motivation

Save for the existence of trading Martians in financial 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 fiscal situation in Brazil *may* worry foreign investors who *may* adopt strategies which *may* have an effect on the valuation of Wall Street stocks. This *may* in turn affect consumers' perception of their own wealth (in the US and elsewhere), which *may* feed through savings decisions, and *may* affect 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* affect 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 qualified. First, there are purely exogenous technology shocks. Second, some of the economic relations in the world economy are very weak, and can be safely assumed to have second order effects. For instance, while it is true that the rest-of the-world's health affect US growth prospects in the short to medium term, the same cannot be said of, say, the Ecuadorian economy. This statement 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 affect the potential for emerging market recoveries. The latter statement is self-evident; our contribution consists in trying 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 specific assumptions pertaining to the exchange rate (fixed, flexible, or crawling peg), or balance of payments regime (full, limited, or prohibited, movements in capital flows). In all these cases, 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.

The aim is to assess the extent to which growth in large economies affect recoveries. To this end, we estimate a parsimonious reduced form. Indeed, endogeneity problems prevent the use of variables that are known to affect recoveries. For instance, country specific risk premia, financial flows, or trade policy variables are all endogenous to an incipient recovery. These policy dependent variables, could, in principle, be instrumentalised. In practice, the task is too complex. The diversity of recessions and policy variables we are dealing with imply that valid and well performing instruments are simply not

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

available. Thus the choice of a simple, readily interpretable, reduced form.

3   Variable definition and data analysis

The first hurdle is to define recessions and recoveries in emerging market economies. The main data sources are the Penn World Tables on real 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 GDP growth in the large economies (US, EU, and Japan) from the same sources and Eurostat.[3]

The way we define a recession, or crisis, is the following: an economy is deemed to enter into a recessionary cycle if it fulfills two conditions. The latter are that 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 define 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 filter to the GDP

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[2]The exception is Taiwan which is not included in our database, though series exist. The reason is that, given our definition of recessions and Taiwan's hitorical growth rates, 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 defined "Europe" as the fifteen countries currently forming the EU. Including all Western European economies did not result in any significant differences.

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

series, using a smoothing factor of 1600.[5] Graph 1 below illustrates how we have identified recession *cum* recovery cycles.

Insert Graph 1 about here

Table 1 lists the countries that are included in our sample and the recessions we have identified. These definitions are simple, transparent, and concur with generally accepted recessionary periods. Indeed, this taxonomy properly identifies 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.[6] Last, our estimation of the trends generate business cycles of 4 to 8 years, well in line with existing empirical evidence.

Insert Table 1 about here

The number of recessions we identified since the late 1950's is fairly similar across countries, and ranges from 5 to 9 episodes. Global crises are clearly identified by our method. For instance, 19 of the 22 countries experienced a recession during the first half of the 1970's. Moreover, the debt crisis is reflected 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 identified, 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

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[5]Using a different value for the smoothing factor did not alter in any significant way our taxonomy of recessions and recoveries.

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

indicates that emerging market recessions can not be solely explained by the evolution of the world economy.[7]

For the sample as a whole, the average duration is of 1.90 years and the incidence ratio stands at 0.53.[8] These summary statistics for each country are given in Table 2.

Insert Table 2 about here

Before turning to estimation, we checked whether time or region specific fixed effects were discernible in the data. To this end we have estimated non-parametric survival functions for each of the four decades present in 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:

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

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

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[7]It is important to stress that the results we present below depend on our definition 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 identifying 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 definition we end-up using was the most reasonable.

[8]The incidence ratio is defined as the average occurence of recoveries in our sample.

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 confidence intervals overlap substantially. As a result, a χ^2 test does not reject the hypothesis of equality of the survival functions.[9] In other words, we cannot detect a time specific fixed effect 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 specific effect. Indeed, a standard χ^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 differences in terms of potential growth rates, no significant difference 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 fixed effects, 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 effect of growth in the three large economies (EU, US, and Japan) on the recovery prospects of the economies present in our sample.

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[9]This is true even if we take the two extermes of the distribution, namely the 1950's and 1990's. The two decades are not significantly distinct with respect to recovery processes.

4 Specification

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 influence 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.[10] 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).

<center>Insert Table 5 about here</center>

We cannot reject the hypothesis of weak exogeneity, save for Japanese growth with respect to the Asian region.[11] In the fourth and fifth columns, we present the results for Granger's Lagrange multiplier causality test (Charemza and Deadman 1997). The first 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.[12] The results are that exogeneity is only rejected in the case of Japan with respect to Asia. One avenue is to eliminate Japan from our reduced form estimation,

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[10]Real interest rates in the EU, US, and Japan are defined in the next section.

[11]We carried out the same exogeneity tests with respect to each individual emerging market economy. At the 5% confidence level, we only rejected the null of weak exogeneity in 7 out of 132 cases. As for Japanese growth, weak exogeneity was rejected at the 5% level only in the case of Singapore, i.e. 1 out 22 cases. We take these results as evidence that endogeneity only appears when Asian economies are grouped together.

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

and only include growth in the EU and the US. However, this would yield blurred results, as we would capture both the direct effect of growth in the EU and US, plus the indirect effect of Japanese growth. Instead, we chose to instrument Japanese growth using growth in the EU and US, Japanese public spending, and dummies for election years.[13] We then used the estimated values as regressors.

4.2 Econometric specification

We focus on duration models, and attempt to assess the effect of growth in the three large economies on the recovery prospects of Asian and Latin American countries. We estimated four distinct specifications: linear, probit, Cox, and Weibull. To this end, we have constructed two distinct databases. For the dichotomous dependent variable models (linear and probit), 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 are not included in our sample. We call this database 1. In the Cox and Weibull specifications, our dependent variable is the length of the entire recession *cum* recovery cycle. As a result, we have fewer observations, which reduces the precision with which we estimate our coefficients. In the latter exercise, we condition the probability of recovery on the length of time that the economy has been in recession. We call this database 2. To illustrate how the dependent variable were constructed, suppose that country X has been in recession for two years, and recovers during the third year. In database

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[13]In addition to these election year dummies, we introduced one for 1993, the first time since the 1950's that Liberal Democratic Party lost power.

1, this recession would appear thrice and the value taken by the dependent variable would be $(0, 0, 1)$. By contrast, only one observation would appear in database 2 with the dependent variable taking value (3). Therefore, this variable indicates the year in which the economy recovers.

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 define the random variable T as the time that the 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 economies are homogeneous with respect to the factors that affect 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:

$$\Pr(t \quad T < t + dt \mid T \geq t, x) \tag{2}$$

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

$$h(t, x) = \lim_{dt \to 0} \frac{\Pr(t \quad T < t + dt | T \geq t, x)}{dt}. \tag{3}$$

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 t periods. Therefore, $h(t, x)$ must be restricted to non-negative values. Using database 2, we estimate two hazard functions. The first is the Cox hazard function that is represented by an exponential of the following form:

$$h(t, x) = h_1(t) \exp(\beta' x) \tag{4}$$

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 β.

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

$$h_1(t) = pt^{p-1} \tag{5}$$

Using database 1 (which is akin to a discrete time formulation), the hazard function takes the form:

$$h(t, x) = \Pr\left(T = t \mid T \geq t, x(t)\right) \tag{6}$$

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).

We have used these four distinct estimation techniques in order to check the robustness of our results. When we are using database 1, the two specifications are the linear and probit models in which the dependent variable is dichotomous. For the linear model we simply applied Generalised Least Squares (GLS), whilst we estimated the probit model by maximum likelihood. With database 2, we have estimated the two duration models presented above (Cox and Weibull) by maximum likelihood. Thus, our estimations are not only distinct in terms of specification; the databases used are different as well.

4.3   Variable definition

The independent variables are, first, the 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. This regressor is thus made-up of the product of three data, defined below.

Openness is specified as the ratio of imports plus exports over total GDP. In order to deal with possible problems of endogeneity, we took the average by decades for each country.[14] 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 endogeneity (see footnote 14). 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 $Japan$.

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

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

where t denotes time and $\Delta gdp_{i,t}$ is the 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}.

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[14]In the medium and long term, this variable is exogenous, as it is determined by the fundamentals of the economy (size, preferences, ressource base, location, etc.). However, in the short term, this variable may be influenced by policy choices (exchange rate or trade policies). Taking averages by decades thus alleviates the potential issue of endogeneity.

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.[15] 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.[16]

The process of economic globalisation has been held -partly- responsible for the virulence of the Asian crisis. It is however difficult to provide a clear-cut definition of what globalisation consists of. Nonetheless, most economists would agree that globalisation features, among other things, a deepening of

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

[16] 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.

multilateral trading relations as well as the progressive integration of new economies into the world economy. As globalisation is a multifaceted and complex phenomenon, no readily available indicator exists that can be used as a proxy. A solution to this measurement problem is to construct a composite indicator. To this end, we have gathered data on the value of world trade (expressed in deflated US dollars), the average tariff reductions stemming from successive GATT/WTO negotiations, and the total number of GATT/WTO members. All three series are available since the late 1950's. We applied a dynamic factor analysis to these three series in order to obtain a composite indicator of globalization, as in Quah and Sargent (1993).[17] The series and the composite index of globalisation, denoted $GLOB$, are presented in Appendix B. A cursory glance at the data indicates that this phenomenon, as measured by our index, has been a fairly constant and steady process.

In addition, we specified the inverse of the duration of the recession. This regressor, which is used only with database 1, is defined as:

$$DUR^{-1} = \frac{1}{\sum \text{ (years of recession)}}$$

This variable captures two effects. First, it reflects one of the few universal rules in economics for cyclical variables: what goes down must go back up. As countries do not disappear because of economic fluctuations, recoveries

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[17]The general dynamic factor model can be expressed as an observed segment of a random field, x_{it} (the observed series) that satisfies the relation

$$x_{it} = a_i(L) * u_t + \varepsilon_{it} \qquad \text{with } i = 1, 2, ..., N,$$

where u_t is a scalar unobserved nonstationary process common to all elements, $a_i(L)$ are lag polynomials, and ε_{it} is a disturbance term with the usual properties. Our empirical specification included three lags in the transference polynomials $a_i(L)$, and an ARIMA(1,1,0) model for the common unobserved trend u_{it}. The model is estimated using the EM algorithm. Convergence, defined by a change of the expected likelihood function smaller than 0.01%, was achieved after 23 iterations.

always end-up materialising. Second, it amounts to a reduced form that accounts for the effect of endogenous policy responses during a recession. Overall, it shows the fact that, all else equal, the probability of bouncing back is higher the longer the country has been in recession.[18] In the Weibull specification, the duration is parametrised in a polynomial form (while no structure is imposed in the Cox estimation).

Our last independent variable are dummies to account for possible country fixed effects that may affect the speed of recovery. These fixed effects 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 definition of recession *cum* recovery cycles, dependence on a particular commodity (e.g. oil or copper), or the size of the country.[19] 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, and most of these dummies

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[18]The estimated coefficient for this variable is affected by our definition of recessions and recoveries. We thus re-estimated our models by applying alternative definitions (see footnote 7). The estimate for this variable turned out to be different, but the other estimated parameters remained unchanged.

[19]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 effects.

were not significant. This should come as no surprise, as the fixed effects we are trying to unearth are likely to be very idiosyncratic. Instead, we ran our probit regression without a constant and 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 three clusters.[20] Thus, this procedure for generating our dummies groups the economies according to the speed with which they bounce back. We called these dummies *slow* and *fast*, with the third cluster forming the reference group.[21] 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 fixed effects and the choice of clustering procedure.[22] Controlling for these effects increases precision, but does not alter the essence of the results. A specification without fixed effects yields the same signs and orders of magnitude for the point estimates of the independent variables of interest. The difference lies in the standard errors, that are larger when fixed effects are ignored.

Finally, the use of instruments for Japanese growth may influence the magnitude of our estimated standard errors. In order to correct for this potential bias, a bootstrap procedure was applied to retrieve consistent standard errors. This involves resampling 500 times, explicitly taking into account: a)

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

[21]The "slow" group is made-up of Bolivia, Brazil, the Philippines, Indonesia, Hong-Kong, and Singapoore, while the"fast" group is made-up of Argentina, India, Korea, Mexico, and Peru. The remaining economies form the reference group.

[22]Estimation of alternative specifications (e.g., with a distinct number of clusters) are available upon request.

the unbalanced panel structure of our data, and b) the fact that we use a two stage procedure.

The descriptive statistics for our independent variables are presented in Table 6.

<center>Insert Table 6 about here</center>

5 Results

Having four distinct model specifications and two databases allows us to check for the robustness of our results in a stringent manner. As the variable measuring the changes in the terms of trade, Δtot, only proved to be significant with database 1, we also ran the regressions without this variable when using database 2.

The estimations, presented in Table 7, indicate that growth in Europe and the US positively affect emerging market recoveries. Both these variables are highly significant in the linear and probit specifications. The significance 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, for most variables, applying one-tailed tests yields significant estimates at 10% in the Cox and Weibull specifications. This last comment generally applies to the other variables as well. Moreover, the key finding is not so much the significance levels (which are satisfactory in the case of database 1), but the similarity of the point estimates once they are transformed into hazard rates (see Table 8 below).

<center>Insert Table 7 about here</center>

The positive signs for these two variables accords well with the theoretical

<center>20</center>

predictions of a Mundell-Fleming model. Although the point estimate for the effect of Europe is larger than that of the US, we cannot reject equality of the two coefficients in a statistical sense.

The result for Japanese growth is surprising. The significant negative sign indicates that, in the short run, weak Japanese growth facilitates emerging market recoveries. This finding emerged from all the specifications 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 evolution 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 to export growth in the rest of Asia", and further: "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 finding. 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.[23] This argument would

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[23]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 firms that produce similar goods to those of East Asian firms". 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

indicate that we ought to introduce the bilateral exchange rate vis-à-vis the Yen. However, this avenue is not open to us, as the exchange rate is clearly an endogenous policy variable, whose main effect is captured by our duration variable. We thus attempted to capture any additional influence in an indirect manner by introducing the yen and D-mark exchange rate against the dollar in our regressions. Although the estimates were of the expected sign, none of them turned out to be significant, even at the 50% confidence level. We thus dropped these variables from the final specification, as the other coefficients were unaffected by this exclusion.

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) effect of Japanese growth to be stronger with respect to the former. This is what we find in our data when we split the sample by geographic area. Re-running the linear and probit specifications for Asia and Latin America separately, we find that the effect of Japanese growth is negative and highly significant in the case of Asia, but that it is not significantly different from zero in the case of Latin America.[24]

A comment is nonetheless in order: this effect 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 effect, and certainly not as evidence that international

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context. In addition, there are a number of sectoral case studies that analyse the "direct competition effect" (see for instance, Yoon 1992).

[24]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 specifications, 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, reflecting the latter's historical reliance on international capital markets.

trade is a zero sum game.

The real dollar interest rate appears with the expected sign and is clearly significant when we use database 1, but less in the case of database 2. The positive sign for the globalisation index indicates that structural change in the world economy enhances the speed of recovery. This probably reflects 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 significant and with the expected sign (for database 1). Our two dummies (and the constant) are also significant. It should be noted that excluding the dummies 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. These numbers indicate how the probability of recovery is affected by an extra point in the growth rate of each of our three economic blocks. If, all else equal, the US economy grows 1% more, the probability of recovery increases by 4% for the "standard" emerging market economy in the linear specification. The hazard rates indicate that all models and databases yield similar results. This shows that our approach is robust to different model specifications and estimation procedures.

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 almost equal. This reflects 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 confident that the estimates are robust. We thus 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 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 1998 and 1999, and available predictions for 2000 and 2001. For emerging market economies, we used data on realised growth from the World Bank and the International Development Agency. For 2000 and 2001, we made use of central forecasts made available in June 2000 (the latter are simply the average between the highest and lowest growth forecasts for 1999 and 2000).[25] These central forecasts are well in line with developments during 2000.

We applied our definition 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, 2000 and 2001.[26] We then used our estimated parameters to assess the proportion of recoveries the model predicts for 1999, 2000, and 2001. The results are presented in Table 8. Of

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

[26]Although the financial crisis began in the late summer of 1997, its effect on annual real growth was felt as of 1998.

the emerging market economies that entered recession in 1998, 50% of them recover in 1999, 83.3% will have done so by 2000, and the remainder by 2001 (based on observed and forecasted values).[27] Using estimated coefficients, our model predicts that, for the average emerging market economy in recession, 67% (linear specification) or 76% (probit) would bounce back by 1999.[28] For the same economies and the year 2000, the respective proportions are 86% and 95% (while the forecasted value is 83.3%).

Insert Table 8 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 recessions.[29] For instance, an unconditional probit would predict only 38% recoveries in the first 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 reflects the improvement that our model provides relative to a benchmark specification that only includes a constant and the duration of the recessions. The value for the success index of the linear model stands at 57% and 53% for recessions that occured in 1998 and 1999 respectively. The probit specification yields similar values for the success index. By this standard, our estimations appear as having strong predictive powers.

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[27]Applying our definition of recession and recovery, official data and the latest forecasts indicate that Indonesia, Paraguay, Hong-Kong, Korea, Malaysia, and Thailand will have experienced a recession in 1998. The last three have recovered by the end of 1999, and the remainder is forecasted to do so in 2000. Brazil, Colombia, Ecuador, Argentina, Turkey, and Venezuela entered recession in 1999. All are forecasted to recover by 2000, save for Colombia and Ecuador that expected to do so in 2001.

[28]Predictions are carried for the results pertaining to database 1. Apart from the better reliability of these results (in terms of significance levels), our estimates using database 2 cannot be (directly) used for forecasting. This is due to the fact that we estimate densities and not discrete probabilities.

[29]*Stricto sensu*, an unconditional specification would not even include the duration (thus strengthening our results).

7 Some speculative thoughts as concluding remarks

We started thinking about emerging market recoveries in 1998. The motivation 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 and 2000 has been baffling. A couple of years 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 first 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 effect 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 effect unearthed by our estimation is 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 effect 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 significance and sign of our globalisation index), 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 engulfing the "Dragons" and "Tigers", that spreads to Latin America, coupled with strong US growth and recession in Japan. This variable constellation has not been observed since World War II. Despite this, our estimations permit a precise identification of recoveries' time path .

Two years may seem like an eternity when dealing with financial crises. It is thus interesting to recall what the predictions and the general mood were in late 1998. Basing 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 definitely on the gloomy side.[30] Protectionist pressures were also on the rise.[31] 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.

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

[31]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

Appendix A.1

The theoretical foundations of our estimations are those of a simple Mundell-Fleming model. As pointed out by Blanchard and Fischer (1989, p. 531), an IS-LM framework is appropriate for the study of short-run adjustments. In what follows, we frame the discussion in the context of free capital movements. All conclusions carry-over to a situation where capital flows are restricted.

Assuming that prices at home and abroad are fixed (exogenous) for each emerging market economy, the simplest version IS-LM model is described by two equations. The LM relationship (liquidity preference equals money) represents asset market equilibrium:

$$i = i\left(\frac{M}{P}, y\right), \; i_1 < 0, \; i_2 > 0 \tag{A.1.1}$$

where i is the nominal interest rate, $\frac{M}{P}$ is real money, and y is the economy's final output. Since prices are fixed, the inflation rate is taken to be equal to zero at home and abroad.[32] If the exchange rate is constant and the uncovered interest parity condition holds, the nominal interest rate at home, i, must equal the world rate, i^*, so that

$$i^* = i\left(\frac{M}{P}, y\right) \tag{A.1.2}$$

Therefore, money supply accommodates growth. This is a schematic, but useful, description of emerging markets economies' monetary conditions, as

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[32]This implies that real and nominal interest rates are equal. In this expectation-free context, introducing inflation would not change any of the model's predictions. The only (computational) difference would involve introducing real interest rates in goods markets.

these countries have experienced both high growth rates and a secular decline in money velocity since the 1960's.

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

$$x = \overline{x} + \beta \frac{P^X}{P^M}, \beta < 0 \tag{A.1.3}$$

$$m = m(y) + \alpha \frac{P^X}{P^M}, \alpha > 0 \tag{A.1.4}$$

so that

$$y = A\left(i^*, y, m(y) + \alpha \frac{P^X}{P^M}, \overline{x} + \beta \frac{P^X}{P^M}\right) \tag{A.1.5}$$

Given that $A_{i^*} < 0$, $A_m < 0$, $A_x > 0$, output can be expressed as a function of fundamentals:

$$y = f\left(i^*, \frac{P^X}{P^M}, \overline{x}\right) \tag{A.1.6}$$

where

$$\begin{aligned}
\frac{\partial f}{\partial i^*} &< 0, \tag{A.1.7} \\
\frac{\partial f}{\partial \frac{P^X}{P^M}} &< 0, \\
\frac{\partial f}{\partial \overline{x}} &> 0.
\end{aligned}$$

During the last four decades, emerging market economies maintained both fixed and flexible exchange rate regimes, as well as some interesting intermediate cases (ranging from "crawling pegs" to currency boards). Note that under flexible exchange rates, $f\left(i^*, \frac{P^X}{P^M}, \overline{x}\right) = y$ can be interpreted as the equilibrium loci of the goods' market. On the other hand, an expansion in exports under fixed exchange rates is automatically accommodated by an

expansion in money due to the exchange rate policy, and no further assumptions on monetary and fiscal policy are required.

Appendix A.2

Our population is made up of emerging market economies that are in recession or are in their first year of recovery. Let y_t be real GDP of an emerging market economy at period t. Define an economy in recession when both (A.2.1) and (A.2.2) hold:

$$y_t < y_t^{LT} \qquad \qquad \text{(A.2.1)}$$

and

$$\Delta y_t \quad \Delta y_t^{LT} \qquad \qquad \text{(A.2.2)}$$

where the superscript LT stands for local trend and Δ is the rate of growth. The first year of recovery is identified as:

$$\Delta y_t > \Delta y_t^{LT} \qquad \qquad \text{(A.2.3)}$$

subject to the restriction that the economy was in recession at time $t-1$. We can thus define a variable "recession *cum* recovery cycle" as:

$$
\begin{aligned}
r_t &= \text{ 1 if the economy is in a recovery at time } t. \qquad \text{(A.2.4)} \\
r_t &= \text{ 0 if the economy is in a recession at time } t.
\end{aligned}
$$

We further assume that the economy's gap with respect to its potential growth depends on a vector of exogenous variables, x_{1t}, the evolution of the US, EU and Japan real GDP growth rate, Δgdp_t^{US}, Δgdp_t^{EU}, Δgdp_t^{JAP}, and a disturbance term.[33] Thus:

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[33]Recall that we have assumed that policy makers in all emerging market recoveries face the same menu of policy options when attempting to engineer a recovery.

$$\Delta y_t - \Delta y_t^{LT} = f_1(x_{1t}, \Delta gdp_t^{US}, \Delta gdp_t^{EU}, \Delta gdp_t^{JAP}) + u_{1t} \qquad \text{(A.2.5)}$$

An additional difficulty lies with the endogeneity of Japanese growth with respect to Asia. Our exogeneity tests indicated that the Japanese economy depends on the situation in the rest of Asia, a number of exogenous factors, x_{2t}, and a disturbance term. Therefore:

$$\Delta gdp_t^{JAP} = f_2(x_{2t}, \Delta y_t) + u_{2t} \qquad \text{(A.2.6)}$$

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

Conditions for identification of the two structural equations are the usual ones. We directly model the probability of recovery at any time conditional on all exogenous variables and the exogenous part of Japanese growth:

$$\Pr(r_t = 1 | x_{1t}, \Delta gdp_t^{US}, \Delta gdp_t^{EU}, \Delta gdp_t^{JAP}, r_{t-1} = 0), \qquad \text{(A.2.7)}$$

Equation (A.2.7) is then estimated using a linear, probit, Cox, or Weibull specification. A two-stage procedure is required to avoid simultaneity biases in the estimations due to the endogeneity of Japanese growth. The standard errors computed directly in the two-stage procedure are downward biased. We thus obtained unbiased estimates by applying the bootstrap procedure described in the text.

In order to compute the contribution of our exogenous variables to the recovery prospects of emerging market economies, we define the following three hazard rates:

$$\lambda^{US} = \frac{\Pr(r_t = 1 | \overline{x}_{1t}, \overline{\Delta gdp_t}^{US} + 1, \overline{\Delta gdp_t}^{EU}, \overline{\Delta gdp_t}^{JAP}, r_{t-1} = 0)}{\Pr(r_t = 1 | \overline{x}_{1t}, \overline{\Delta gdp_t}^{US}, \overline{\Delta gdp_t}^{EU}, \overline{\Delta gdp_t}^{JAP}, r_{t-1} = 0)} \qquad \text{(A.2.8)}$$

$$\lambda^{EU} = \frac{\Pr(r_t = 1 | \overline{x}_{1t}, \overline{\Delta g d p}_t^{US}, \overline{\Delta g d p}_t^{EU} + 1, \overline{\Delta g d p}_t^{JAP}, r_{t-1} = 0)}{\Pr(r_t = 1 | \overline{x}_{1t}, \overline{\Delta g d p}_t^{US}, \overline{\Delta g d p}_t^{EU}, \overline{\Delta g d p}_t^{JAP}, r_{t-1} = 0)}$$

$$\lambda^{JAP} = \frac{\Pr(r_t = 1 | \overline{x}_{1t}, \overline{\Delta g d p}_t^{US}, \overline{\Delta g d p}_t^{EU}, \overline{\Delta g d p}_t^{JAP} + 1, r_{t-1} = 0)}{\Pr(r_t = 1 | \overline{x}_{1t}, \overline{\Delta g d p}_t^{US}, \overline{\Delta g d p}_t^{EU}, \overline{\Delta g d p}_t^{JAP}, r_{t-1} = 0)}$$

where the bar superscript stands for the average operator.

Appendix B. Globalisation indicators TBW

Graph 1: Identification of recession *cum* recovery cycles
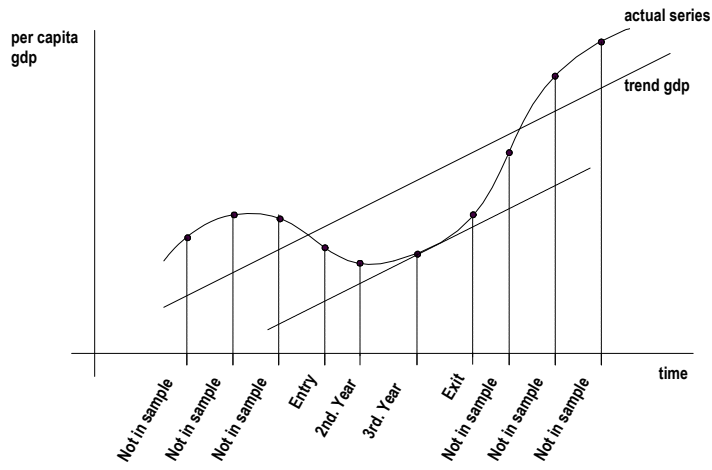
Table 1: Emerging market economies and recession years	
Country	Years in which the economy is in recession
Argentina	1959, 1962:1963, 1966:1967, 1982, 1985, 1988:1990, 1995
Bolivia	1958:1961, 1964, 1969, 1972, 1984:1990
Brasil	1959:1969, 1983, 1990:1992
Chile	1958:1959, 1975:1976, 1982:1983, 1990:1991
Colombia	1958:1959, 1962:1963, 1965, 1967, 1975, 1977, 1983:1985, 1989:1991
China	1968, 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, 1995
Peru	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

Table 2: Recessions' duration by country

Country	Number	Mean	Std. Dev.	Minimum	Maximum	Incidence rate[a]
Total	139	1.90	1.41	1	11	0.53
Argentina	7	1.57	0.79	1	3	0.64
Bolivia	5	3.20	3.03	1	7	0.31
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
Costa Rica	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	6	1.17	0.41	1	2	0.86
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	6	1.83	1.17	1	4	0.55

[a]The incidence rate is defined 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	139	0	1.00	.	.	.
2	139	73	0.47	0.04	0.39	0.55
3	66	35	0.22	0.04	0.16	0.30
4	31	19	0.09	0.02	0.05	0.14
5	12	7	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	39	0	1.00	.	.	.
2	39	20	0.49	0.08	0.32	0.63
3	19	12	0.18	0.06	0.08	0.31
4	7	2	0.13	0.05	0.05	0.25
5	5	3	0.05	0.04	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	27	0	1.00	.	.	.
2	27	14	0.48	0.10	0.29	0.65
3	13	6	0.26	0.08	0.11	0.43
4	7	6	0.04	0.04	0.00	0.16
8	1	1	0.00	.	.	.

χ^{2b} : 3.15 (Pr$>\chi^2$:0.3684)

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[a]Kaplan-Meier estimators of the survival function
[b]χ^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	139	0	1.00	.	.	.
2	139	73	0.48	0.04	0.39	0.55
3	66	35	0.22	0.04	0.16	0.30
4	31	19	0.09	0.02	0.05	0.14
5	12	7	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	81	0	1.00	.	.	.
2	81	46	0.43	0.06	0.32	0.54
3	35	21	0.17	0.04	0.10	0.26
4	14	7	0.09	0.03	0.04	0.16
5	7	3	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	.	.	.

χ^{2^b} : 1.82 (Pr>χ^2 :0.1779)

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[a]Kaplan-Meier estimators of the survival function

[b]χ^2 test of equality of the survival functions

Table 5: Exogeneity tests

	Weak exogeneity[a]		Strong exogeneity[b]	
	t	Prob>|t|	χ^2	Prob>|χ^2|
Exogeneity with respect to Latin America's growth				
Δgdp_{US}	0.65	0.53	4.22	0.96
Δgdp_{EU}	1.04	0.31	2.66	0.99
Δgdp_{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				
Δgdp_{US}	-0.91	0.37	5.23	0.92
Δgdp_{EU}	1.32	0.20	2.00	0.99
Δgdp_{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
Dataset 1					
ΔGDP^a_{US} [a]	400	0.58	0.68	-1.64	4.12
ΔGDP^a_{EU} [a]	400	0.43	0.42	-0.49	2.24
ΔGDP_{JAP} [a]	400	0.37	0.52	-0.40	3.68
r^{US}	400	1.95	1.90	-3.60	5.70
Δtot	400	-1.03	14.29	-53.97	59.05
DUR^{-1}	400	0.60	0.30	0.08	1
$GLOB$	400	20.85	7.55	6.06	37.74
Dataset 2					
ΔGDP_{US} [a]	139	0.70	0.71	-0.68	4.12
ΔGDP_{EU} [a]	139	0.47	0.46	-0.37	2.24
ΔGDP_{Jap} [a]	139	0.35	0.47	-0.18	2.62
r^{US}	139	1.79	1.89	-3.60	5.70
Δtot	139	1.31	15.36	-53.67	57.68
$GLOB$	139	22.10	7.50	7.64	37.74

[a] $\Delta GDP_{i,t} = \Delta gdp_{i,t} * Exports_{j,i,t} * Open_{j,D}$

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

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]

	Probit	Linear	Cox (1)	Cox (2)	Weibull (1)	Weibull (2)
DUR^{-1}	-4.06	-0.83	.	.	.	.
	(0.39)	(0.05)				
ΔGDP_{US}	0.47	0.09	.158	.160	.274	.281
	(0.15)	(0.03)	(.093)	(.087)	(.140)	(.140)
ΔGDP_{EU}	0.56	0.13	.292	.288	.592	.588
	(0.23)	(0.05)	(.168)	(.162)	(.283)	(.294)
ΔGDP_{JAP}	-0.23	-0.04	-.174	-.179	-.143	-.167
	(0.17)	(0.04)	(.145)	(.138)	(.140)	(.117)
r_{US}	-0.21	-0.04	-.059	-.061	-.090	-.097
	(0.06)	(0.01)	(.039)	(.039)	(.051)	(.058)
Δtot	0.01	0.001	-.001	.	-.005	.
	(.005)	(.001)	(.006)		(.005)	
$GLOB$	0.056	0.012	.015	.016	.036	.039
	(.012)	(.003)	(.009)	(.009)	(.015)	(.017)
$slow$	-0.90	-0.18	-.508	-.506	-1.131	-1.128
	(0.23)	(0.05)	(.216)	(.212)	(.509)	(.486)
$fast$	0.68	0.14	.381	.380	.671	.676
	(0.22)	(0.05)	(.144)	(.141)	(.306)	(.318)
$constant$	-0.57	-0.61	.	.	-3.788	-3.812
	(0.34)	(0.08)			(1.620)	(1.639)
$ln(\ p\ )$[b]	.	.	.	.	.923	.912
					(.403)	(.394)
Obs.	400	400	139	139	139	139
χ^2	156.16	.	12.49	27.49	45.06	43.86
F	.	36.99	.	.	.	.
R^{2}[c]	37.32	35.55	.	.	.	.

[a]In parenthesis: Bootstrapped standard errors with 500 replications.

[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 100 corresponds to a perfect prediction and 0 to a model which only includes a constant.

Table 8: Hazard rates[a][b]

	Linear	Probit	Cox		Weibull	
			(1)	(2)	(1)	(2)
United States	5.0	13.0	3.2	5.6	3.2	5.8
Europe	5.3	11.5	4.5	9.2	4.4	9.2
Japan	-0.8	-2.1	-1.2	-0.9	-1.2	-1.1

[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 defined as: $\left(\frac{h(t,x,z+1)}{h(t,x,z)} - 1\right) * 100$ where $h(t,x,z) = \Pr(t|T > t, x, z)$. x are all regressors except Δgdp_{US}, Δgdp_{EU}, and Δgdp_{JAP}. z stands for any of these variables.

[b]See Table 7 for the models' specifications.

Table 9: Out-of-sample predictions for the Asian crisis

	1999	2000	2001
Start of recession:1998			
Observed frequency[1]	0.50	0.83	1
Pred[2]: linear model	0.67	0.85	0.88
Pred: probit model	0.76	0.95	0.96
Pred: unconditional probit[3]	0.38	0.57	0.66
Start of recession:1999			
Forecasted frequency[4]	.	0.60	1
Pred: Linear model	.	0.72	0.81
Pred: Probit model	.	0.83	0.91
Pred: unconditional probit[3]	.	0.38	0.57

[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 distinct consultancies/institutes and the IMF.

[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 various consultancies/institutes and the IMF.