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Macroeconomic Crisis and Individual Firm Performance:

The Mexican Experience

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Abstract

This paper considers financial, operational, solvency, and performance ratios, in order to detect when there were balance sheets' variations related to the 1994 Mexican currency crisis. Quarterly results for 88 non-financial Mexican companies that survived the crisis are used, and tests for structural change are performed. Findings show that generally firms' balance sheets deteriorated between the fourth quarters of 1993 and 1995, which points the possibility of corporate roots of the macroeconomic crisis. Although in most cases firms' balance sheets improved after the crisis, the recovery was partial and gradual, and overall this episode was prejudicial even for surviving companies.

JEL codes: F3, GO, G3

Key words: financial crisis, firm-level data

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1. Introduction

In the early 1990's, Mexico and other Latin American countries began to liberalize their financial sectors and the current account. Banks were privatized, and foreign investment increased considerably. These events generated a boom in the banking industry, as it gained access to more funds. New banks started operating, and services and credit were expanded. In Mexico, credit controls and lending restrictions were abolished, as well as minimum reserve requirements. However, the credit expansion, together with bad credit analysis and poor regulation of the banking system, evolved in banks financing more risky projects. This increased banks' fragility to internal and external economic shocks.

The Mexican crisis began with political tensions during 1994. Substantial capital outflows were generated as the response to the Chiapas conflict and the assassination of Luis Donaldo Colosio. These events, together with a growing external current account deficit (which in percent of GDP grew on average 1 percentage point per year during 1989-1994, reaching 7% in 1994) brought about a large devaluation of the peso at the end of the year. In a two-month period, the peso's devaluation was more than 100% (see Kalter et al.,1999).

Interest rates were subsequently increased in order to avoid further devaluation of the peso. This caused economic recession and banks' insolvency: depositors were taking away their money from banks, banks were paying higher interest rates, non-performing loans increased, and credit was reduced. Real GDP declined by 10% during 1995 and inflation reached 52% during the same year. During the end of 1997 real GDP completely recovered from the sharp decline of 1995.

As expected, the macroeconomic crisis had a significant impact on individual firms. Due to the previous expansion of foreign capital inflows, Mexican companies had attained more access to dollar denominated debt. Although the exchange rate was quasi-fixed (band fluctuation) at the time, it seemed that the favorable macroeconomic conditions diminished the concerns of the exchange rate risk implicit in this debt. The high level of investment was financed mainly by bank loans and to a lesser degree by trade credit and equity; therefore, debt levels were high. With the 1994 peso devaluation, firms faced a considerable increase in the peso value of their dollar denominated debt. In addition, the higher internal interest rates increased the cost of peso denominated debt. This, together with a reduction in credit options and internal demand, caused many firms to go bankrupt or at least seriously distressed.

The main purpose of this paper is to determine the timing and magnitude of surviving firms' balance sheets variations (both downturn and recovery), related to the December 1994 Mexican currency crisis. For this reason, different financial, operational, solvency, and performance ratios are examined for these type of companies, and tests for structural change are performed on groups of firms formed according to characteristics such as relative size and industry. Firms that continued operating after the currency crisis bound the sample, in order to identify the overall ex-post impact of this crisis on balance sheets.

A significant number of papers have been published on the topics of financial contagion and the Mexican 1994 crisis. However, there are still several gaps in financial crises' research. First of all, most of the studies on contagion deal with the question of how a financial crisis in one country affects other countries from a macroeconomic point of view, ignoring the direct effects on domestic companies. There are only few firm-level analyses; a notable exception is Forbes (2002, 2004),

who studied how financial crises affect firms inside and outside the crisis region, testing for the different contagion channels put forward in the literature. In addition, a considerable amount of research has considered corporate performance during financial crises; nevertheless, this is a rather new topic for Mexico[1]. Four hypotheses have been tested in the recent literature to explain the relationship between the 1997 East Asian financial crisis and corporate performance (e.g., Claessens et al., 2000). These can be summarized as: 1) aggregate macroeconomic shocks causing firms' downturns; 2) weak balance sheets prior to the crisis making firms vulnerable when the latter takes place; 3) financial markets' imperfections resulting in credit crunches at the time of the crisis; and 4) inefficiency of debt resolution facilities. Although the purpose of this paper is not to test these hypotheses, there is some insight concerning the first three.

There is still a theoretical and empirical gap on how firms' balance sheets deteriorate and recover from a crisis: Which are the relevant variables to consider? Do the timing of the downturn and recovery varies systematically according to firms' characteristics? What are the important relationships between companies that can help explain contagion between them? On the other hand, although the literature on contagion is abundant, there is still no consensus on what contagion exactly is (on this issue refer to Claessens et al., 2001). Definitions of contagion range from general aspects such as shocks spreading throughout countries, to more specific concepts such as considerable increases in cross-market linkages after a perturbation.

For the purpose of this paper, Mexican corporate performance prior, during, and after the December 1994 currency crisis is considered. There are immediate

[1] For a sample of papers on the Mexican crisis, see Calvo et al., 1996; Carstens et al., 1998; Kalter et al., 1999; Kaminsky et al., 1999, and Martinez et al., 2001. With regard to papers on contagion and corporate performance during financial crises, see Allen et al., 2000; Chan et al., 2002; Claessens et al., 2000; Edwards et al., 2002; Edwards et al., 2001; Hernandez et al., 2001; Kaminsky et al., 2000; Kim et al., 1999; Krugman (1999); Sachs et al., 1996.

effects on firms at the time of the crisis, which can be positive or negative, as some firms may benefit from the latter. However, balance sheets' changes with certain lags before (and after) the crisis are also of interest, as these would suggest corporate roots of the crisis (and interconnections between the initially affected firms and the rest could result in contagion between firms). The main findings show that there are multiple directions of the Mexican crisis' cause and effect framework: firms' decisions influenced the macroeconomic outcome, the currency crisis had negative impacts on companies' balance sheets, and firms' interconnections evolved in contagion between them.

The paper is organized in the following way. Section 2 describes the data. Fourteen ratios are extracted from quarterly balance sheets of 88 private, non-financial Mexican companies that survived the crisis. The methodology used to examine balance sheets' variations is explained in Section 3. Tests for parameter instability and structural change are applied to individual ratios (which are then grouped into four principal components) for each industry and size of firms. The empirical model used take into account seasonality, autocorrelation, and heteroskedasticity present in the series. Results are presented and discussed in Section 4, showing evidence for corporate roots of macroeconomic crises. In addition, recovery was only partial and gradual, and overall the crisis episode was prejudicial even for these surviving firms. Section 5 points out the main conclusions of the research.

2. Data Description

The data used is extracted from quarterly balance sheets (from the first quarter 1993 (93.1) to the first quarter 2001 (01.1)) of 88 private, non-financial Mexican firms that survived the 1994 crisis and were still operating in 2001. The databases were obtained through INFOSEL, a Mexican information enterprise, whose original source of data is the Bolsa Mexicana de Valores (Mexican Stock Market). Historic data was completed with microfilms found in the Mexican Stock Market, which makes the data unique. All firms are listed on the stock exchange, and are considered as large companies. The information on the 88 firms corresponds to a balanced panel, in constant Mexican pesos.

The following ratios were constructed for the analysis:

1. Leverage (LEV), which is calculated as total debt / equity.
2. Debt ratio (DR), measured as total debt / total assets.
3. Liquidity (LIQ), which refers to short-term debt / total debt.
4. Foreign debt/ total debt (FD/TD), which indicates the importance of dollar denominated debt in the firms' capital structure, and signals vulnerability to exchange rate risk.
5. Foreign short-term debt/ total foreign debt (FSTD/TFD). This ratio is also used to measure corporate vulnerability.
6. Interest payment coverage (IPC), which is computed as earnings before interest and taxes (adding back depreciation, which is the same as EBITDA or operational cash flow) / interest expenses.

7. Internal financing (IF), which results as the sum of social capital, selling of stock, and reserves for future capital expansions, minus paid dividends / total debt.
8. Short-term assets / short-term debt (STA/STD), which is an indicator for solvency.
9. Bill payment rotation (BPR), which is calculated as total sales / average bills unpaid.
10. Inventory rotation (IR), which refers to costs of goods sold / average inventory.
11. Exports / total sales (X/Sales), which refers to the proportion of products sold outside the national borders, and gives an idea of the importance of the international markets for a firm.
12. Operational margin (OM), which refers to operational earnings / total sales.
13. Rate of return on assets (ROA), which is defined as earnings before interest and taxes (EBIT) / total assets.
14. Rate of return on equity (ROE), computed as EBIT / equity.

Firms are grouped according to their size and industry. The classification includes seven industries: Telecommunications (Tel-4 firms), Manufacturing (Man-35 companies), Commerce (Com-15 firms), Construction (Const-11 enterprises), Services (Serv-6 companies), Conglomerates (Congl-10 firms), and Mining (Min-7 companies). Firms were also arranged into three different groups according to their relative sizes: Big (more than $10, 000, 000 in assets – 28 firms), Medium (Med-

between \$1, 000, 000 and \$10, 000, 000 in assets – 38 firms), and Small (less than \$1, 000, 000 in assets – 22 companies).

For industry X, the value of ratio K for a particular period corresponds to a weighted average of these values registered for all firms belonging to this industry. The weight that is given to each firm corresponds to the proportion of its assets with respect to the industry's total assets. The same procedure was used in order to construct ratios for the different firm size groups.

3. Methodology

The main assumption underlying this research is that deterioration and recovery manifest themselves through significant changes in the level of a firm's financial, operational, solvency, and performance ratios. Therefore, for the sample of 88 Mexican firms, tests for structural change have been performed to establish the occurrence and significance of these events. Specifically, the techniques developed in Andrews (1993) and Bai et al., 1998 are employed to test the null hypothesis of no change against the alternative of two instantaneous breaks in the level of a particular ratio, where the break dates as treated as unknown.[2,3]

The basic structural change regression model is given by

$$Y_t = a_1 + a_2(D_{1t} - D_{4t}) + a_3(D_{2t} - D_{4t}) + a_4(D_{3t} - D_{4t}) + b_1 I(t \geq t_1) + b_2 I(t \geq t_2) + e_t, \quad (1)$$

[2] An excellent non-technical survey of the literature on the econometrics of structural change can be found in Hansen (2001).

[3] Note that this analysis is univariate, in the sense that it is tested for structural changes in each ratio individually. An alternative approach is to test for common breaks in multiple ratios simultaneously, as in Bai et al., 1998.

where Y_t denotes the ratio under consideration, D_{st}, s=1,…,4, are quarterly dummy variables taking the value 1 if quarter t corresponds with season s and 0 otherwise, and $I(A)$ is an indicator function for the event A. In the model in (1), t_1 and t_2 are the break dates for a ratio's downturn (or upturn) and recovery, respectively, which are treated as unknown. The quarterly dummy variables are included to account for the pronounced seasonal patterns that can be observed in many of the ratios. Most ratios also display substantial autocorrelation, which has been accommodated by using heteroskedasticity and autocorrelation-consistent (HAC) standard errors and test statistics.[4] Initially the analysis is performed using individual ratios; they are then classified into performance (ROE, ROA, and OM), solvency (LEV and STA/STD), operational (BPR, IR, and X/Sales), and financial ratios (DR, IPC, LIQ, FD/TD, FSTD/TFD, and IF), for which a principal components' analysis is conducted.

Estimates of the break dates, along with the remaining parameters are obtained by minimizing the sum of squared residuals in (1), where an exhaustive grid search is performed over all possible combinations of t_1 and t_2 such that each sub-period contains at least 15% of the available observations. Confidence intervals for the break dates are computed using the methods developed in Bai (1997).[5] Conditional on the break date estimates, the remaining parameters can be estimated by least squares, and Newey-West HAC standard errors are obtained in the usual fashion. An interesting hypothesis to examine in (1) is $b_1 = -b_2$, which implies that the ratio Y_t returns to its pre-crisis level after recovery occurs. If $|b_1| > |b_2|$, recovery was only partial, while, on the other hand, if $|b_1| < |b_2|$, the particular group of firms not only recovered, but in fact benefited from the crisis.

[4] Because of the small sample size (T=33 observations), it was decided not to include lagged Y_t's in (1).
[5] When computing these confidence intervals, the variance of the error term in the regression (1) is allowed to be different before and after the break. This results in asymmetric confidence intervals, with less uncertainty about the break date in the high than the low volatility period.

To test for the presence and significance of the structural changes, the following procedure has been used. Let $W(t_1, t_2)$ denote the HAC Wald test of the null hypothesis $b_1=b_2=0$ in the regression model (1). As noted above, these break dates are treated as unknown. The supremum Wald statistic (denoted Sup$W$) is then employed, which is obtained as the maximum of the pointwise Wald statistics $W(t_1, t_2)$ using the same grid of values for t_1 and t_2 as in the estimation of (1) discussed above. Given the small sample size (T=33), it is not appropriate to rely upon the (non-standard) asymptotic distribution of the Sup$W$ statistic to determine its significance. Hence, the bootstrap is used as recommended in Hansen (2000).[6]

Whereas the crisis' effects on balance sheets may occur instantaneously, it is reasonable to argue that recovery might not be sudden, but rather may appear gradually. Therefore, due to the possibility of gradual recovery, modifying equation 1 as follows has specified a gradual recovery model:

$$Y_t = a_1 + a_2(D_{1t} - D_{4t}) + a_3(D_{2t} - D_{4t}) + a_4(D_{3t} - D_{4t}) + b_1 I(t \geq t_1) + b_2 G(t;g,t_2) + e_t, \quad (2)$$

where the function G(t; g, t_2) is given by

$$G(t;g,t_2) = \begin{cases} 0, & if \quad t \leq t_1 \\ (1+\exp(-g(t-t_2)))^{-1}, & if \quad t \succ t_1 \end{cases}, \quad (3)$$

The function (3) thus is equal to 0 until the first structural change (crisis) occurs, then jumps to $(1+\exp(-g(t-t_2)))^{-1}$ in the period following the break, and continues to increase gradually towards 1 as t increases. The parameter g determines the

[6] Specifically, the stationary bootstrap of Politis et al., 1995 has been employed to accommodate the autocorrelation in Y_t. The number of bootstrap replications is set equal to 999.

smoothness of the recovery: when $\gamma \longrightarrow \infty$, the function (3) becomes an indicator function I($t \geq \tau_2$). Hence, the gradual recovery model in (2) nests the instantaneous recovery model in (1) as a special case. τ_2 refers to the moment when recovery is halfway through, as (3) is equal to 0.5 when $t = \tau_2$.

Note that in (2), a_1 measures the average level of the ratio before the first structural change, while b_1 and b_2 indicate the effects of the first and second breaks, respectively. The average level of the ratio after the first break is given by $a_1 + b_1$, while the sum $a_1 + b_1 + b_2$ gives the average level after recovery has been completed (in the sense that the function $G(t;\gamma,\tau_2)$ is equal to 1).

4. Firms' performance

This section starts with a basic preliminary data analysis, examining the ratios' average values during the pre-crisis, crisis, and post-crisis periods. Then the results from the structural change tests and the corresponding regression models are described.

4.1 General results

4.1.1 Descriptive analysis

The first column of Table A1 in the appendix shows the average values for the 14 ratios under consideration, averaged across all firms during the pre-crisis, crisis, and post-crisis periods. During the pre-crisis period (from 93.1 till 94.3), the debt structure of Mexican firms reflected high levels of financial vulnerability. Short -

term debt on average represented almost half of total debt. In addition, foreign-denominated debt corresponded to more than 50% of the debt (with 41% being short-term). It was clear that the peso devaluation would be devastating; however, firms continued obtaining dollar-denominated debt as it was cheaper and there was confidence in the Mexican economy and the exchange rate regime. During the pre-crisis episode, peso loans were charged with average interest rates of 18.6%. Inflation during this time reached 7.5%, resulting in real interest rates of approximately 10.3%. During the same period, companies were able to obtain dollar denominated loans at a cost of less than 6%. This made dollar denominated credit more attractive. During the crisis period (94.4 to 97.3) the situation was reversed, as peso interest rates increased to 42.5%, inflation boosted to 40%, and the real interest rate was just 1.8%. Dollar rates for this period were much higher, so peso denominated debt was obviously preferred. However, the strict credit policy did not allow for an expansion of this type of debt as reflected in the higher proportion of foreign debt in the firms' total debt. The firms' indebtedness grew considerably, especially with respect to dollar-denominated debt, which increased the possibility of going bankrupt. During the post-crisis period, peso interest rates were on average 21% and prices increased 12% on an average annual base. The real peso interest rates became then approximately 8% and the dollar interest rates that applied to these companies were on average 6.5%. Once more dollar denominated debt became more attractive.

Most of the debt indicators (except for the debt ratio) improved after the crisis, although pre-crisis levels were not reached anymore; in this sense, recovery from the crisis (which was possible due to the growth in exports, good liquidity indicators and internal financing, as well as governmental programs that delayed the payment of

interests[7], and network considerations) was just partial. Leverage increased during all periods, which is attributed mostly to increments in total debt (21.89% on average), as EBIT and equity did not decline significantly.

Mexican enterprises experienced a demand cut during the crisis, which is evidenced by the remarkable increase in the amount of days it took to sell inventories. In addition, as firms were suffering from the crisis, the amount of time given to pay back for trade credit increased (although not significantly), which also reduced the frequency of cash flows. In spite of this, due to the expansion of exports (as a result of the peso devaluation), returns were not seriously damaged. However, the crisis did not affect all firms in the same way; as shown in sections 4.2 and 4.3, some sectors even benefited.

4.1.2 Econometric results for univariate series

(INSERT TABLE 1)

Table 1 provides results for univariate series, for the gradual recovery model and the two-breaks model[8]. In general, the estimates of b_1 show the expected signs[9] and are significant at a 20% confidence level. According to the two-breaks model, only two ratios do not manifest the expected results: bill payment rotation, as the first break point takes place after the crisis era, and return on equity, given that there does not seem to be contagion at all. The gradual recovery model shows that bill payment

[7] Its effect can be seen in the improvement of the interest payment coverage indicator during the post-crisis period.
[8] The first column of tables A2 and A3 in the appendix gives further details.
[9] b_1 is expected to be positive for all ratios expect for interest payment coverage, internal financing, short-term assets / short-term debt, operational margin, ROA, and ROE. The opposite is expected for b_2.

rotation actually increased during the third quarter 1995, and continued increasing during the following periods. In this sense, the crisis had a permanent negative effect on this ratio. As for ROE, the gradual recovery model suggests it declined during the crisis and recovered rapidly (the value for g is relatively big, greater than 100).

With respect to recovery, as expected there are few significant recovery breaks for the two-breaks model, due to the fact that recuperation from the crisis was gradual. For recovery to occur, first there has to be a prior break point, b_1 and b_2 must show opposite signs, and recovery has to take place before the third quarter of 1998, given that in August 1998 there was another currency crisis (although not as important as the one in 1994)[10]. Consequently, for the following ratios there seems to be an initial break point, but not a recovery one: debt ratio, foreign debt as percentage of total debt, foreign short-term debt / total debt, internal financing, short-term assets / short-term debt, and exports / total sales. The gradual recovery model confirms that the crisis had a permanent effect on the debt ratio, internal financing, short-term assets / short-term debt, and exports / total sales (this being the only case where the effect is positive). With respect to the rest of the variables (foreign debt / total debt and foreign short-term debt / total debt), there seems to be gradual recovery.

The two-break points model fits accurately for leverage, liquidity, interest payment coverage, inventory rotation, operational margin, and ROA. In this sense, for these ratios the crisis' effect was temporary, as the initial negative shock is weakened by a second shock of opposite sign. Taking into account all ratios, balance sheets deteriorated between the fourth quarters of 1993 and 1995, which points out the possibility of corporate roots of macroeconomic crises (see Pomerleano, 1998[a,b]). It

[10] See Pratap et al., 2003.

seems that in general corporations recovered from the crisis between the first quarter of 1995 and the third quarter of 1997.

The first ratio that showed a decline was internal financing (the last one was operational margin); the first ratio to manifest recovery was ROA (the last one was liquidity). This suggests that financial ratios present downturns before performance ratios, and that the latter are the first to recover. However, inspecting the rest of the ordering, there does not seem to be a regular pattern. Instead, internal financing declined almost at the same time as did return on assets (93.4 and 94.1, respectively). As a result, one quarter before the crisis ratios such as debt ratio, foreign debt / total debt, interest payment coverage, and short-term assets / short-term debt already weakened. These suggests firms were in "bad shape" before the crisis took place, which provides evidence for the corporate roots of macroeconomic crises' hypothesis, and the second hypothesis regarding the relationship between financial crises and corporate performance in East Asia.

When the currency crisis took place (last quarter of 1994), there were some positive and negative results: exports immediately rose, which made possible return on assets' recovery (95.1); later in 1995 an aid program to delay interest payments was implemented by the government, which improved interest payment coverage. On the other hand, due to the crisis, companies experienced an increase in foreign short-term debt / total debt (95.1) and inventory rotation (95.2, because of shrinking internal demand). Nonetheless, the positive effect on exports and the government's support made possible a turn down in leverage (96.3). Between the end of 1996 and beginning of 1997, operational margin and inventory rotation showed recovery, as firms once more faced increasing demand for their products. Finally, by the third

quarter of 1997 there was some debt recomposition, reducing the percentage of short-termed debt with respect to total debt.

Considering the gradual recovery and two-breaks models together, this crisis improved interest payment coverage and exports' ratios. According to the gradual recovery model, there is also a post-crisis positive effect for foreign debt / total debt. Due to the rise in exports, ROA and ROE did not significantly deteriorate. However, both the two-breaks and gradual recovery models show that this crisis was prejudicial for most of the debt indicators and operational margin. Consistent with the two-breaks model, excluding interest payment coverage, the degree of weakening is seen to be greater than recuperation; therefore, although firms recovered from the 1994 currency crisis, the improvement was just partial (and overall the crisis episode was prejudicial for firms). Taking into account the alternative model, due to the adjustment for gradual recovery, it seems that the overall effect of the crisis was neutral. Nevertheless, during the transition from the crisis to full recovery, this crisis did have adverse consequences on firms.

4.2 Industry results

4.2.1 Descriptive analysis

Columns 2 to 8 of table A1 in the appendix show the accounting ratios' average levels during the pre-crisis, crisis, and post-crisis periods for the different industries. Taking into account pre-crisis debt variables, one can conclude that conglomerates, construction, and services were exposed to the highest levels of financial vulnerability. Together with mining, they had the greatest levels of foreign-

denominated debt with respect to total debt; as well, construction enterprises possessed the utmost debt ratio (almost 50%), followed closely by conglomerates and services sectors.

The less vulnerable industries (regarding debt indicators) were mining and commerce. The mining industry, although it had an important percentage of its debt in foreign-denominated currency, it also had the lowest debt ratio (followed by telecommunications and commerce). Similarly, even though commercial business had 84% of its debt as short-term debt, its level of foreign-denominated debt (with respect to total debt) was the lowest of all industries. This is the main reason why this sector was one of the few that after the crisis was able to reduce its debt ratio.

Due to the large amounts of dollar-denominated debt, when the peso devaluation took place, interest payments immediately increased. The interest payment coverage indicator declined over 20% for telecommunications, construction, and services. It is interesting to note, however, that this indicator increased by 97% for the mining industry, which reflects a significant improvement (seven times) in its earnings during the crisis period. This was possible mainly because mining exports increased by 115% during this time. During the post-crisis period, manufacturing, commerce, construction, and services revealed important progress in the interest payment coverage indicator, which relates to governmental policies to temporarily postpone interest payments. In fact, this indicator increased thirteen times for the services' industry; this was the worst performing sector during the crisis and therefore the one that needed governmental aid the most.

The services industry presents the worst financial and operational results during and after the crisis period. Leverage increased more than 5 times during the crisis, earnings declined by 187% during the same period, and it exhibited negative returns

on assets and on equity during both the crisis and post-crisis periods. In addition, prior to the crisis, values for ratios such as short-term assets / short-term debt, exports/total sales, and internal financing were much lower than for the majority of industries.

In contrast, the mining industry was the most robust sector prior to the crisis. It had comparatively the highest percentage of sales in foreign markets[11], which made it less vulnerable to internal shocks compared to the rest of industries. Instead of being injured by the crisis, it benefited, as its operational margin, earnings, returns on assets and on equity increased during that period. Other strengths it possessed prior to the crisis, which helped to survive, were that it had relatively the highest internal financing and liquidity indicators[12].

Taking into consideration the behavior of earnings, it can be argued that manufacturing, conglomerates, and commerce also benefited during the crisis. During this period, their earnings increased 90%, 62%, and 26%, respectively. Both conglomerates and the manufacturing sector showed increases in operational margin (although this is significant only for manufacturing), which could be seen as a strategy to overcome the crisis, assuming low price-elasticity for its goods. An alternative, and perhaps more accurate explanation for the rise in the operational margin is that the peso's devaluation was such that they could increase both the operational margin and exports. During the crisis period exports grew on average 104% for the manufacturing industry, and 180% for conglomerates.

Together with mining and construction, conglomerates and manufacturing had the highest exports / total sales ratio prior to the crisis, which made them less vulnerable.

[11] Not only it had the highest exports/sales ratio, but also the price of its goods is determined in international markets.

[12] These results for services and the mining industry support the second hypothesis on the relationship between financial crises and corporate performance in East Asia (see Claessens et al., 2000).

Manufacturing also showed one of the highest (after commerce) interest payment coverage ratios, and had adequate levels of internal financing and liquidity. As for conglomerates, this is the most diversified industry, which is an effective but expensive way (in terms of administrative and operative costs) to reduce risk. Commerce, on the other hand, was not only the least indebted industry together with mining and telecommunications, but it also had the lowest level of dollar-denominated debt in its debt structure.

The only industries that were seriously wounded during the crisis were services and to a lesser degree telecommunications. As for the telecommunications industry, prior to the crisis it possessed one of the lowest exports / total sales ratios (together with commerce and services). Therefore, the internal demand decline it suffered (as seen by the inventory rotation indicator that increased by 56 days) had a negative effect on its earnings, which declined 16% during the crisis period.

Taking into account the firms' performance during and after the crisis, it seems that external markets played a major role in explaining the survival of these companies, followed by the capital structure.

4.2.2 Econometric results for univariate series

Columns 2 to 8 of tables A2 and A3 in the appendix show the industry results for univariate series, for the two-breaks model and gradual recovery model. In general, the estimates of b_1 show the expected signs and are significant at a 20% confidence level. According to the first break point, apparently telecommunications and services were harmed at the time of the currency crisis. This is as expected, since

prior to this event they had the lowest exports / total sales ratios[13], making them more exposed than other industries to local macroeconomic conditions. The contrary occurred for the mining sector, as it did not depend as much as the rest on the Mexican economy[14]. Results show that the remaining industries were not significantly influenced by the crisis.

On an industry basis, there are not many differences for the timing of the first break point. However, the sector that most reflected the official timing of the macroeconomic crisis was services, whose balance sheets deteriorated between the third quarters of 1994 and 1995. Once more this is an expected outcome, as services represent the most vulnerable industry prior to the crisis, with less flexibility to react once this event took place.

When considering recovery in the two-breaks model, balance sheets for manufacturing, telecommunications, commerce, and services reveal improvements, and the opposite occurs for the mining industry. Overall, the crisis episode was favorable for manufacturing and commerce, which were also the first to recover (as shown by ROA). This can be partly explained by their pre-crisis high interest payment coverage ratios; in addition, manufacturing exported an important percentage of its products, and commerce possessed relatively the lowest foreign-denominated debt in its debt structure.

According to the two-breaks model, the crisis was harmful for telecommunications, construction, and services. With regard to construction, it had one of the greatest debt ratios prior to the crisis, and much of its debt was denominated in US dollars. Construction was the last industry to recover from the currency crisis, between the third quarter of 1997 and the second quarter 1998. This

[13] Excluding commerce.
[14] This provides evidence in favor of the first hypothesis on the relationship between financial crises and corporate performance in East Asia (see Claessens et al., 2000).

coincides with the Mexican GNP's recuperation during the third quarter 1997; it is not surprising for construction being especially sensible to macroeconomic fluctuations. The gradual recovery model points out telecommunications being the only industry to be permanently (and negatively) influenced by the crisis.

Finally, results show that conglomerates and mining did not benefit nor weakened from this episode. As for the mining sector, the initial boom it experienced from the devaluation was a temporary effect; regarding conglomerates, they were efficient reducing risk, as they represent the most diversified industry of all.

4.3 Size results

4.3.1 Descriptive analysis

The last three columns of Table A1 in the appendix show the values of ratios when firms are grouped according to size. Regarding debt structure, at first glance it seems that prior to the crisis small companies were the least vulnerable. As they are less likely to obtain dollar denominated debt, the percentage of foreign debt to total debt was the lowest for all firms. However, it is also true that due to their small size and high-risk levels, they have more difficulties in obtaining long-term credit. Their short-term debt represented more than 70% of their total debt, higher than for medium and big companies. Small firms also had the highest debt ratios for all periods considered, which reflects the importance of bank credit compared to other (cheaper) types of financing such as internal financing and trade credit.

Prior to the crisis, big companies were less leveraged than smaller ones; this relationship changed during the crisis period, when small firms became the least

leveraged. Looking at the leverage data and considering that small firms' equity declined on average 16% during the time, there is evidence of an important credit crunch for small companies. This provides evidence for the third hypothesis of the relationship between corporate performance and the East Asian financial crisis. After the crisis leverage increased for small companies, however it remained lower than for the rest of firms.

Small firms were the most vulnerable companies prior to the crisis, as their exports represented less than 3% of their total sales during the pre-crisis period, their liquidity and internal financing indicators were lower than for larger firms, and they were facing negative returns on assets and on equity. Also, their operational margin was negative during the pre-crisis and crisis periods, which could reflect an aggressive sales strategy, sacrificing profit in order to gain liquidity and overcome the immediate difficulties.

The higher returns on assets and on equity during the post-crisis era show that in general the crisis favored small firms. This can be attributed to the peso devaluation, which made possible a significant growth in exports, operational margin, and sales (as suggested by lower inventory rotation values). With respect to medium and big companies, there is no evidence of important changes in returns, even though for both types of firms, exports increased significantly (comparing the pre-crisis and post-crisis periods). A tentative explanation could be that sales declined considerably due to the internal demand cut, as shown by the increase in the number of days it took to sell the inventory and the big companies' reduced operational margin.

4.3.2 Econometric results for univariate series

The last three columns of tables A2 and A3 in the appendix show the size results for univariate series, for the two-breaks model and gradual recovery model. In general, the estimates of b_1 show the expected signs and are significant at a 20% confidence level. The first break point for both small and medium firms took place between the fourth quarter of 1993 and the first quarter of 1996. However, contrary to medium enterprises, small companies reveal for the most part balance sheets' improvements. As for big companies, this break point came about later in time: between the third quarter 1994 and the same quarter 1995. Therefore, one could argue that medium enterprises were financially and operationally unhealthy before the devaluation occurred, partly infecting big companies, and providing evidence for the corporate roots of macroeconomic crises' hypothesis[15].

Contagion between medium and big firms can be explained by the operational margin and inventory rotation. A tentative explanation is that, due to competition between companies and goods' substitutability, two quarters after medium firms' operational margin declined (95.1) big firms experienced the same. But the effects do not end here, as during 1996 big firms' poorer performance seems to have had consequences on medium companies. Trade links might have influenced contagion, as medium enterprises experienced an increment in their inventory rotation three quarters later (during 96.1) than bigger firms. As big companies were suffering from a demand cut, their claims for medium firms' products declined as well, in part increasing the latter's inventory rotation. Small firms were the first to manifest a rise in this indicator, however almost two years before the rest.

[15] It is worthwhile to notice that big companies' balance sheets also weakened before the macroeconomic crisis took place.

With respect to recovery dates, there are no significant differences between medium and big businesses (there is just a one-period lag in favor of medium firms). According to the two-breaks model, overall the currency crisis was beneficial for small companies and prejudicial for big ones; medium enterprises seem to be in between, since they were not favored nor damaged by this crisis. With respect to the gradual recovery model, the crisis was beneficial for small firms, and had a neutral effect on medium and big companies.

4.4 Robustness check: Principal components analysis

To examine the possibility of joint structural change in multiple ratios, a principle components analysis is conducted. Four components are constructed, which relate to the different kinds of ratios under study: 1) Performance (ROE, ROA, and OM), 2) Solvency (LEV and STA/STD), 3) Operational (BPR, IR, and X/Sales), and 4) Financial (DR, IPC, LIQ, FD/TD, FSTD/TFD, and IF). The analysis is applied to normalized variables, such that they all have mean 0 and variance 1. The results for normalized variables are more meaningful because the variance of the original variables differs widely across ratios. The first principal component is considered, which in general explains more than 60% of the variance. For each component the gradual recovery model in (2) is estimated[16]. Results are shown in table A4 in the appendix.

Consistent with the prior analysis, results show that the overall effect of the crisis is positive for small firms and negative for telecommunications. In general the currency crisis did not deteriorate nor improved firms' balance sheets; however, there

[16] Only results from the gradual recovery model are considered, as it seems that corporations smoothly recovered from the crisis.

are negative effects on solvency and operational ratios (see graphs 2 and 3). In contrast, financial and performance ratios were not seriously influenced by the crisis (see graphs 1 and 4). In fact, there seems to be a significant smooth recovery of the financial component after the crisis, which relates to the favorable outcome of interest payment coverage. As for the performance component, due to the rise in exports, returns did not strongly declined.

Regarding the break date, it seems there are two crisis effects: the first one is a negative effect taking place at the time of the currency crisis (94.4), and the second one is a positive effect during the third quarter 1995. All components were damaged during the crisis era, except for financial ratios, due to the great increment of interest payment coverage early 1995. Afterwards, operational ratios continued deteriorating, solvency ratios adjusted to a slightly lower level than prior to the crisis, and there was improvement in performance indicators. However, it is not possible to establish a single recovery date, as it took place gradually between 1995 and 2000. Nevertheless, the last industries to recover were telecommunications and services, which as stated in previous sections, were most seriously wounded by the crisis.

(INSERT GRAPHS 1-4)

5. Conclusions

The causality between the 1994 Mexican currency crisis and corporates' performance is mixed. Although this crisis had immediate negative consequences even on survival companies (which are reflected in ratios such as foreign short – term debt / total foreign debt and inventory rotation), and a positive direct effect on exports, it is also true that most financial indicators weakened right before this episode took place. During the third quarter of 1994, ratios such as the debt ratio, foreign debt / total debt, interest payment coverage, and short-term assets over short – term debt were deteriorated. This could be attributed to a prior decline in internal financing and return on assets, for which firms increased their dollar claims (being these less expensive than peso loans). Therefore, there is evidence for corporate roots of the Mexican currency crisis, as firms were demanding more dollar-denominated debt.[17]

In addition to the above, there is some indication of contagion between firms. This effect is difficult to determine at an industry level; however, under a size approach it seems that medium and big businesses could have influenced each other's balance sheets. Contagion is better perceived through performance and operational ratios, such as the operational margin and inventory rotation, rather than financial and solvency ones.

Summarizing, the prior analysis provides evidence for multiple directions of the crisis' cause and effect framework: firms' decisions influenced the

[17] It is interesting to notice that overall, on an annual basis, investment rose during the third quarter of 1994. During that time, big and medium firms' total assets increased 5% and 14%, respectively, and only small firms experienced a 6% decline on this variable. This supports the general belief that the 1994 crisis was a surprising event.

macroeconomic outcome, the currency crisis had negative impacts on companies' balance sheets, and firms' interconnections evolved in contagion between them.

The principal components analysis points out that financial and performance ratios for survival companies were not seriously influenced by the crisis, which relates to the favorable outcomes of interest payment coverage and exports. As a result of the significant rise in exports, the peso devaluation had a positive impact on financially strong companies. Furthermore, the lesser were the initial dependencies on the Mexican economy, the better the conditions for firms during the crisis, as revealed clearly by the mining sector. The last industries to recover were telecommunications and services, which were most seriously wounded by the crisis, as prior to this event they possessed the lowest exports / total sales ratios. According to this experience, conglomerates were efficient reducing currency risk, which might justify their existence in economically unstable countries.

Appendix

Table A1
General results

	All FIRMS	Man	Tel	Com	Const	Serv	Congl	Min	Small	Med	Big
LEV (times)											
Pre-crisis	0.8	0.9	0.7	0.7	1.1	0.8	0.9	0.6[1]	1.2	1.0	0.8
Crisis	1.1	0.9	0.6	0.5	1.2	5.9	1.1	0.7[2]	0.0	1.0	1.1
Post-crisis	1.2[3]	1.1	0.9	0.7	1.2	2.2[3]	1.6[3]	1.1[3]	0.9	1.2	1.2[3]
DR (%)											
Pre-crisis	41.7[1]	42.7[1]	35.5[1]	36.4	49.9[1]	45.0[1]	46.5[1]	32.5[1]	44.5[1]	42.8[1]	41.6[1]
Crisis	45.9[2]	44.6	33.0[2]	35.6	53.2[2]	78.9[2]	57.4	37.5[2]	53.5[2]	47.1	45.7[2]
Post-crisis	48.5[3]	44.3	43.8[3]	35.5	55.0[3]	61.0[3]	58.4[3]	47.6[3]	60.6[3]	44.9	48.9[3]
LIQ (%)											
Pre-crisis	46.0[1]	47.4	25.5[1]	84.2	36.6[1]	40.2[1]	56.4	59.0[1]	71.9	61.0	43.6[1]
Crisis	49.2[2]	48.2	40.6	83.6[2]	32.1[2]	63.3[2]	59.3[2]	47.0[2]	69.4	61.7[2]	47.3
Post-crisis	47.2	46.6	45.1[3]	74.5[3]	42.1[3]	44.3	47.3[3]	35.5[3]	69.4	48.2[3]	46.9[3]
FD/TD (%)											
Pre-crisis	52.9[1]	50.0[1]	47.3[1]	11.7[1]	66.8[1]	68.4	64.0[1]	69.2[1]	29.2	40.0[1]	54.9[1]
Crisis	62.8[2]	62.1[2]	58.6[2]	18.7[2]	75.5	69.2[2]	68.5	77.2[2]	25.6[2]	54.2[2]	64.2[2]
Post-crisis	53.8	52.2	41.8[3]	14.8	73.1[3]	49.1[3]	66.0	69.0	20.4[3]	46.3[3]	55.2
FSTD/TFD (%)											
Pre-crisis	41.4[1]	44.5	18.7[1]	69.8[1]	30.2	34.6[1]	59.6	52.7[1]	65.9	57.4	38.9[1]
Crisis	44.7	45.8	31.9	82.5[2]	26.3[2]	58.4[2]	59.1[2]	38.3	66.7	54.7[2]	43.2
Post-crisis	43.2	47.1	29.9[3]	79.1[3]	42.3[3]	40.1	41.9[3]	31.6[3]	66.3	46.6[3]	42.5[3]
IPC (times)											
Pre-crisis	9.8	13.6	9.8[1]	36.1	2.5[1]	1.5[1]	1.5	2.3[1]	8.8[1]	6.1[1]	10.3
Crisis	8.8[2]	13.4[2]	7.2[2]	38.6[2]	1.9[2]	0.0[2]	1.7	4.6[2]	3.7[2]	4.6[2]	9.4[2]
Post-crisis	11.5[3]	18.1[3]	4.8[3]	50.7[3]	4.2[3]	12.9[3]	2.4	1.3[3]	10.3	10.6[3]	11.7[3]
IF (times)											
Pre-crisis	2.6[1]	2.3[1]	2.2[1]	1.9[1]	1.6[1]	1.0[1]	1.1[1]	16.3[1]	1.6	7.7[1]	1.8
Crisis	2.2[2]	2.6	2.7[2]	2.5	1.3[2]	0.4[2]	0.9	5.1[2]	1.5	4.1[2]	1.9[2]
Post-crisis	1.7[3]	2.4	1.6[3]	2.2	1.4[3]	3.4[3]	0.9[3]	1.4[3]	1.5	2.6[3]	1.6[3]
STA/STD(times)											
Pre-crisis	2.2[1]	1.9	3.1[1]	1.4	1.6[1]	1.5[1]	1.3[1]	7.7	1.6[1]	3.8[1]	2.0[1]
Crisis	1.7	1.8[2]	2.2	1.3[2]	1.3[2]	0.6[2]	1.1[2]	3.1	2.2[2]	1.6[2]	1.7
Post-crisis	1.8[3]	2.1[3]	2.0[3]	1.6[3]	1.2[3]	1.1[3]	1.2[3]	2.9[3]	1.9[3]	2.3[3]	1.7[3]
BPR (days)											
Pre-crisis	5.0	5.4	2.3	22.0	2.2	1.3	2.8	3.8	4.6	4.3	5.1
Crisis	5.5	5.7	2.5	29.4	2.5	1.3[2]	3.0	3.8	5.4[2]	4.7	5.6
Post-crisis	6.0	6.3	2.6	26.4	3.2	2.9[3]	3.2	2.8	9.2[3]	4.5	6.2

Table A1
General results (continue)

	All FIRMS	Man	Tel	Com	Const	Serv	Congl	Min	Small	Med	Big
IR (days)											
Pre-crisis	4.4[1]	2.4	6.6[1]	4.1	7.3	5.3	2.6	2.8	9.0	4.8	4.3[1]
Crisis	16.4	2.8	62.3[2]	4.4	6.1	4.5[2]	3.1	3.6[2]	6.8[2]	6.0[2]	17.9
Post-crisis	19.0[3]	3.2	78.1[3]	4.0	5.2	7.6[3]	3.1	4.7[3]	4.8[3]	7.3[3]	20.9[3]
X/Sales (%)											
Pre-crisis	12.5[1]	12.1[1]	11.5[1]	0.0[1]	12.5[1]	2.3	15.1[1]	34.1[1]	2.5[1]	9.7[1]	13.0[1]
Crisis	25.2	21.5	16.4[2]	0.2[2]	44.1	4.2[2]	28.7	47.3	10.3	19.5[2]	26.1
Post-crisis	24.6[3]	21.6[3]	10.0	0.7[3]	43.5[3]	8.8[3]	30.2[3]	48.0[3]	9.7[3]	17.4[3]	25.8[3]
OM (%)											
Pre-crisis	18.5	8.5[1]	37.0[1]	4.0[1]	24.8[1]	24.3[1]	13.1	7.7[1]	-5.5	8.8	21.0
Crisis	17.4	14.0	29.4[2]	2.8[2]	19.4[2]	-0.7	13.9	21.9[2]	-1.1	8.5	20.2
Post-crisis	17.0[3]	14.0[3]	31.9[3]	5.0[3]	22.3[3]	10.7[3]	12.2	10.2	0.1[3]	12.4[3]	19.3[3]
ROA (%)											
Pre-crisis	3.8	1.9	8.0	2.9	3.9	2.6[1]	2.7	1.6[1]	-0.3	2.1	4.1
Crisis	4.1	3.3	5.6	4.0	4.0	-2.6	3.7	6.7[2]	0.1[2]	2.0	4.4
Post-crisis	3.6	3.6[3]	5.9	4.5	3.2	-0.4	2.9	2.1	2.1[3]	3.4	3.7
ROE (%)											
Pre-crisis	6.2	2.7	11.7	4.0	8.3	4.6	4.5	3.3[1]	-7.7	1.8	6.9
Crisis	5.6	3.2	7.9	6.5	10.3	-34.0	7.8	10.6[2]	-3.1[2]	3.6	6.6
Post-crisis	6.6	6.2	10.5	7.8[3]	6.3	-0.5	6.4	2.8	10.4[3]	4.9	6.8

This table refers to the average values for the 14 ratios under consideration, during the pre-crisis (93.1 till 94.3), crisis (94.4 till 97.3), and post-crisis (97.4 till 01.1) periods. Firms are grouped according to their industry and relative size.
1/ Pre-crisis and crisis values are significantly different at 10% confidence level.
2/ Crisis and post-crisis values are significantly different at 10% confidence level.
3/ Pre-crisis and post-crisis values are significantly different at 10% confidence level.

Table A2
Two-breaks model: timing and effect

	First break-point										
	ALL FIRMS	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
LEV	95.3/ -	95.4/+	NO	95.3/+	NO	95.3/-	NO	NO	95.2/+	95.3/+	95.3/-
DR	94.3/ -	96.4/+	NO	NO	94.3/ -	94.4/ -	94.3/-	NO	94.4/ -	NO	94.3/ -
LIQ	95.3/ -	NO	95.3/-	NO	93.4/+	95.3/ -	94.3/ -	93.4/+	95.4/+	NO	95.3/ -
FD/TD	94.3/ -	94.3/ -	94.4/ -	93.4/ -	94.3/ -	95.1/ -	95.1/ -	93.4/ -	93.4/+	94.3/ -	94.4/ -
FSTD/TFD	95.1/ -	NO	96.4/ -	93.4/ -	93.4/+	95.3/ -	93.4/+	95.3/+	NO	NO	95.1/ -
IPC	94.3/ -	96.2/+	94.4/ -	95.4/+	NO	NO	NO	95.1/+	94.1/ -	NO	94.3/ -
IF	93.4/ -	95.4/+	NO	95.1/+	94.3/ -	NO	94.4/ -	93.4/ -	NO	93.4/ -	95.1/+
STA/STD	94.3/ -	94.3/ -	95.1/ -	93.4/ -	94.3/ -	94.3/ -	94.3/ -	93.4/ -	96.1/+	93.4/ -	94.3/ -
BPR	NO	95.4/ -	NO	95.2/ -	95.4/ -	NO	93.4/+	NO	NO	95.2/ -	NO
IR	95.2/ -	95.4/ -	95.2/ -	95.2/ -	94.4/+	94.3/+	94.4/ -	94.1/+	93.4/ -	96.1/ -	95.2/ -
X/Sales	94.4/ +	94.4/+	94.4/+	94.4/+	94.4/+	NO	94.4/+	95.1/+	94.4/+	94.4/+	94.4/ +
OM	95.4/ -	94.4/+	94.4/ -	95.1/ -	95.1/ -	95.3/ -	94.1/+	94.4/+	94.1/+	95.1/ -	95.3/ -
ROA	94.1/ -	94.1/ -	94.3/ -	94.1/ -	96.4/ -	94.3/ -	95.4/+	95.1/+	95.4/+	94.3/ -	95.1/ +
ROE	NO	94.1/ -	93.4/ -	94.2/ -	NO	95.3/ -	95.4/+	95.1/+	95.1/+	94.3/ -	NO
Interval / sign	93.4-95.4/-	94.1-96.4/0	93.4-96.4/ -	93.4-95.4/0	93.4-96.4/0	94.3-95.3/ -	93.4-95.4/0	93.4-95.3/+	93.4-96.1/+	93.4-96.1/ -	94.3-95.3/-

	Recovery break-point										
	ALL FIRMS	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
LEV	96.3/ +	NO	NO	97.2/ -	NO	96.3/+	NO	NO	96.2/ -	97.3/ -	96.3/ +
DR	NO	NO	NO	NO	NO	97.4/+	NO	NO	NO	NO	NO
LIQ	97.3/ +	NO	NO	NO	NO	97.3/+	97.3/+	NO	97.3/ -	NO	97.3/ +
FD/TD	NO	NO	98.1/+	NO	NO	97.2/+	NO	NO	NO	NO	NO
FSTD/TFD	NO	NO	NO	96.1/+	98.2/ -	97.3/+	NO	NO	NO	NO	NO
IPC	95.4/ +	NO	95.4/+	NO	NO	NO	NO	97.4/ -	97.1/ +	NO	95.4/ +
IF	NO	NO	NO	NO	97.3/+	NO	NO	NO	NO	NO	NO
STA/STD	NO	96.3/+	NO	96.2/+	NO	97.4/+	97.2/+	NO	97.1/ -	97.2/+	NO
BPR	NO	NO	NO	96.3/+	NO	NO	NO	NO	NO	96.4/+	NO

Table A2 (continue)
Two-breaks model: timing and effect

	Recovery break-point										
	ALL FIRMS	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
IR	97.2/ +	NO	96.4/+	96.3/+	NO	97.2/ -	NO	96.1/ -	94.4/ +	NO	97.2/ +
X/Sales	NO	95.4/ -	97.4/ -	NO	NO	NO	NO	NO	NO	NO	NO
OM	96.4/ +	NO	98.2/+	96.4/+	97.4/+	NO	NO	95.4/ -	NO	96.1/+	NO
ROA	95.1/ +	95.1/+	95.4/+	95.1/+	NO	NO	97.4/ -	97.4/ -	NO	95.4/+	97.4/ -
ROE	NO	96.1/+	NO	95.2/+	NO	96.3/+	96.4/ -	97.4/ -	NO	95.3/+	NO
Interval / sign	95.1-97.3/ +	95.1-96.3/+	95.4-98.2/+	95.1-97.2/+	97.3-98.2/0	96.3-97.4/+	96.4-97.4/0	95.4-97.4/ -	94.4-97.3/ 0	95.3-97.3/+	95.4-97.4/ +

	Overall effect										
	Average	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
LEV	0	+	0	0	0	0	0	0	+	0	0
DR	-	+	0	0	-	-	-	0	-	0	-
LIQ	0	0	-	0	+	0	+	+	+	0	-
FD/TD	-	-	+	-	-	+	-	-	+	-	-
FSTD/TFD	-	0	-	-	-	-	+	+	0	0	-
IPC	+	+	-	+	0	0	0	0	0	0	+
IF	-	+	0	+	-	0	-	-	0	-	+
STA/STD	-	+	-	0	-	-	-	-	+	-	-
BPR	0	-	0	-	-	0	+	0	0	0	0
IR	-	-	-	+	+	-	-	-	+	-	-
X/Sales	+	+	-	+	+	0	+	+	+	+	+
OM	-	+	-	+	-	-	+	0	+	+	-
ROA	0	+	-	+	-	-	0	0	+	+	0
ROE	0	+	-	+	0	0	+	0	+	+	0
Overall effect	-	**+**	**-**	**+**	**-**	**-**	**0**	**0**	**+**	**0**	**-**

This table deals with initial breaking points and recovery dates (two-breaks model), for each of the 14 ratios under consideration. No significant presence of breaking points is described with a NO. Positive (negative) effects on balance sheets are shown with a + (-) sign. Considering all 14 ratios, no predominating effects (70% or more) are described with a 0. The overall effect of the crisis is identified according to the sign and magnitude of the first and second breaking points (b_1 and b_2) for each individual ratio. The null hypothesis $b_1 = -b_2$, which implies that the ratio Y_t returns to its pre-crisis level after recovery occurs, has been tested using the heteroskedasticity and autocorrelation consistent version of the Wald test (10% significance level).

Table A3
Gradual recovery model: timing and effect

		Breaking point									
	ALL FIRMS	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
LEV	95.3/-	93.4/-	93.3/-	95.1/-	93.4/+	95.3/-	94.4/-	94.4/-	95.3/+	95.1/-	95.3/-
DR	94.4/-	93.4/-	94.4/+	95.3/+	93.4/+	95.1/-	94.4/-	94.4/-	94.4/-	94.3/-	94.4/-
LIQ	95.3/-	94.4/-	95.1/+	95.3/+	93.4/+	95.3/-	93.3/+	93.3/+	95.1/-	95.2/-	93.4/+
FD/TD	95.1/-	94.4/-	95.1/-	93.4/-	94.4/-	95.2/-	95.2/-	93.3/-	93.3/+	94.4/-	95.1/-
FSTD/TFD	95.2/-	95.3/+	95.3/-	94.1/-	93.4/+	95.3/-	93.3/+	93.3/+	93.4/+	93.4/+	95.2/-
IPC	95.1/-	95.1/-	95.1/-	94.4/-	95.1/-	94.1/-	95.1/-	95.2/+	94.2/-	94.4/-	95.1/-
IF	93.4/-	95.3/+	95.2/+	95.2/+	94.4/-	94.4/-	95.1/-	93.4/-	95.3/+	93.3/+	95.2/+
STA/STD	94.4/-	94.4/-	95.2/-	94.1/-	93.4/+	94.4/-	94.4/-	93.3/-	95.3/+	93.3/-	94.4/-
BPR	95.3/-	94.2/+	94.4/+	95.3/-	94.4/+	94.3/+	94.1/+	93.4/-	94.4/+	95.3/-	95.2/-
IR	95.3/-	95.1/-	95.3/-	95.3/-	94.4/-	94.4/+	94.4/+	93.3/+	94.2/-	93.3/-	95.3/-
X/Sales	93.4/+	95.1/+	95.1/+	94.4/+	93.4/+	94.2/-	95.1/+	93.3/+	93.3/-	95.1/+	93.4/+
OM	95.1/+	95.1/+	95.1/-	95.1/-	95.2/-	95.3/-	93.3/+	95.1/+	94.2/+	95.3/-	95.3/-
ROA	94.4/-	94.4/-	93.4/+	94.4/-	95.2/+	94.1/-	94.4/-	95.2/+	94.4/-	94.3/-	94.4/-
ROE	94.4/-	94.2/-	94.1/-	94.4/-	95.2/+	95.3/-	94.4/-	95.2/+	95.1/-	94.4/-	94.4/-
Interval / sign	93.4-95.3/ -	93.4-95.3/0	93.3-95.3/0	93.4-95.3/-	93.4-95.2/0	94.1-95.3/-	93.3-95.2/0	93.3-95.2/0	93.3-95.3/0	93.3-95.3/-	93.4-95.3/-

		t_2									
	ALL FIRMS	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
LEV	96.4/+	00.1/-	00.3/-	95.3/+	94.4/-	96.4/+	00.3/-	99.3/-	96.2/-	95.3/+	96.4/+
DR	00.1/-	00.1/-	00.3/-	00.1/-	94.4/-	98.1/+	96.1/-	99.3/-	98.3/-	00.1/-	00.1/-
LIQ	97.3/+	00.1/+	95.3/-	99.4/+	98.3/-	98.4/+	97.3/+	95.4/+	95.3/+	00.2/+	95.1/-
FD/TD	99.2/+	99.3/+	98.1/+	98.4/+	00.1/+	97.3/+	99.3/+	99.3/+	96.1/+	99.4/+	99.2/+
FSTD/TFD	99.1/+	99.4/-	99.2/+	96.2/+	99.2/-	98.1/+	97.3/+	95.4/+	00.1/-	97.1/+	99.1/+
IPC	95.3/+	99.4/+	95.3/+	96.4/+	98.4/+	98.1/+	95.2/+	97.4/-	97.4/+	97.3/+	95.3/+
IF	99.4/-	00.1/-	00.2/-	99.4/-	97.2/+	97.4/+	00.1/-	96.2/-	00.2/-	93.4/-	00.1/-
STA/STD	00.1/-	96.4/+	00.1/-	96.3/+	94.4/-	97.4/+	97.2/+	99.2/-	98.1/-	94.1/-	00.1/-
BPR	00.3/-	00.3/-	95.1/-	96.3/+	96.2/-	97.4/-	00.1/-	97.2/+	98.1/-	97.2/+	00.2/-

Table A3 (continue)
Gradual recovery model: timing and effect

	t_2										
	ALL FIRMS	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
IR	00.3/+	99.3/-	96.4/+	96.2/+	95.1/+	96.4/-	95.1/-	96.2/-	94.4/+	96.2/-	00.3/+
X/Sales	94.4/+	96.1/-	97.4/-	99.3/+	95.1/+	97.1/+	00.1/+	94.4/+	95.1/+	00.3/-	94.4/+
OM	95.2/-	99.1/-	98.2/+	98.4/+	97.4/+	97.1/+	99.4/-	98.1/-	00.2/+	96.2/+	00.2/-
ROA	95.1/+	95.1/+	94.1/-	95. 1/+	97.1/-	99.2/+	95.1/+	98.1/-	99.2/+	96.1/+	95.1/+
ROE	95.1/+	96.2/+	00.3/+	95.2/+	98.1/-	96.4/+	95.1/+	98.1/-	00.3/+	95.3/+	95.1/+
Interval / sign	94.4 – 00.3 / 0	95.1-00.3/0	94.1-00.3/0	95.1-00.1/+	94.4-00.1/0	96.4-99.2/+	95.1-00.3/0	94.4-99.3/0	94.4-00.3/0	93.4-00.3/0	94.4-00.3/0

	Overall effect										
	Average	**Man**	**Tel**	**Com**	**Const**	**Serv**	**Congl**	**Min**	**Small**	**Med**	**Big**
LEV	0	-	-	+	+	0	-	-	+	0	0
DR	-	-	-	-	-	-	-	-	-	-	-
LIQ	0	+	-	+	-	0	+	+	+	0	0
FD/TD	+	+	+	-	0	+	+	0	+	0	+
FSTD/TFD	0	-	+	-	0	0	+	+	0	+	0
IPC	+	+	-	+	+	+	+	0	0	+	+
IF	-	-	0	-	-	+	-	-	-	0	-
STA/STD	-	+	-	0	-	-	-	-	+	-	-
BPR	-	0	0	-	-	-	-	+	-	0	-
IR	0	-	-	+	+	-	-	-	+	-	0
X/Sales	+	+	-	+	+	+	+	+	+	0	+
OM	-	+	-	+	-	-	-	0	+	+	-
ROA	0	+	-	+	0	0	0	0	0	+	0
ROE	0	+	+	+	0	0	0	0	0	+	0
Overall effect	**0**	**0**	**-**	**0**	**0**	**0**	**0**	**0**	**+**	**0**	**0**

This table deals with the first breaking point and half-through recovery dates (t_2), according to the gradual recovery model, for each of the 14 ratios under consideration. For this model, the first break point is bounded between 1993 and 1995. This has been done since the two-breaks model shows that balance sheets deteriorated between the fourth quarters of 1993 and 1995. Positive (negative) effects on balance sheets are shown with a + (-) sign. Considering all 14 ratios, no predominating effects (70% or more) are described with a 0. The overall effect of the crisis is identified according to the sign and magnitude of the first breaking point and t_2 (b_1 and b_2) for each individual ratio. The null hypothesis $b_1 = -b_2$, which implies that the ratio Y_t returns to its pre-crisis level after recovery occurs, has been tested using the heteroskedasticity and autocorrelation consistent version of the Wald test (10% significance level).

Table A4
Principal components analysis
Gradual recovery model

Break point date and sign

	ALL FIRMS	Man	Tel	Com	Const	Serv	Congl	Min	Small	Med	Big	Mode	Interval
Fin. ratios	95.1/-	95.3/+	95.3/+	95.1/+	93.4/+	95.3/-	93.3/+	93.4/+	93.3/+	95.1/-	94.1/+	95.3/+	93.3-95.3/+
Solv. ratios	94.4/-	95.3/+	95.3/-	95.1/-	93.4/+	94.4/-	94.4/-	93.3/-	95.3/+	93.4/-	94.4/-	94.4/-, 95.3/+	93.3-95.3/-
Oper. ratios	93.4/-	94.4/+	95.3/-	95.3/-	95.1/+	94.4/+	95.1/-	93.4/-	93.3/-	95.1/-	93.4/-	95.1/-	93.3-95.3/-
Perf. ratios	94.4/-	94.4/-	94.4/-	94.4/-	95.2/+	95.1/-	94.4/-	95.1/+	95.2/+	94.4/-	94.4/-	94.4/-	94.4-95.2/-
Mode	94.4/-	94.4/0 95.3/+	95.3/0	95.1/0	93.4/+	94.4/0	94.4/-	93.4/0	93.3/0	95.1/-	94.4/-	**94.4/-, 95.3/+**	
Interval	93.4-95.1/ -	94.4-95.3/+	94.4-95.3/-	94.4-95.3/-	93.4-95.2/+	94.4-95.3/-	93.3-95.1/-	93.3-95.1/0	93.3-95.3/+	93.4-95.1/-	93.4-94.4/-	94.4-95.3/0	**93.3-95.3/-**

t_2 and sign

	ALL FIRMS	Man	Tel	Com	Const	Serv	Congl	Min	Small	Med	Big	Mode	Interval
Fin. ratios	00.3/+	00.1/-	99.3/-	99.4/-	98.3/-	97.4/+	98.1/+	95.4/+	00.3/+	97.2/+	00. 3/-	00.3/0	95.4-00.3/0
Solv. ratios	00.2/-	00.1/-	00.3/-	95.3/+	94.4/-	96.4/+	96.3/+	99.3/-	97.3/-	95.3/+	00.2/-	95.3/+	94.4-00.3/0
Oper. ratios	95.2/-	00.3/-	97.3/+	96.2/+	97.4/-	97.1/-	00.1/-	96.2/-	95.1/+	96.1/-	95.2/-	96.2/0	95.1-00.3/-
Perf. ratios	95.2/+	95.1/+	00.3/+	95.2/+	97.3/-	98.3/+	95.1/+	98.1/-	00.3/+	95.2/+	95.1/+	95.1/+	95.1-00.3/+
Mode	95.2/0	00.1/-	00.3/0	ALL/+	ALL/-	ALL/+	ALL/+	ALL/-	00.3/+	ALL/+	ALL/-	**ALL/0**	
Interval	95.2-00.3/0	95.1-00.3/-	97.3-00.3/0	95.2-99.4/+	94.4-98.3/-	96.4-98.3/+	95.1-00.1/+	95.4-99.3/-	95.1-00.3/+	95.2-97.2/+	95.1-00.3/-	95.1-00.3/0	**94.4-00.3/0**

Overall effect

	ALL FIRMS	Man	Tel	Com	Const	Serv	Congl	Min	Small	Med	Big	Final effect
Fin. ratios	0	-	-	-	-	+	+	+	+	+	0	**0**
Solv. ratios	-	-	-	+	0	-	-	-	+	-	-	**-**
Oper. ratios	-	0	-	-	+	-	-	-	+	-	-	**-**
Perf. ratios	0	+	0	+	0	0	0	0	0	+	0	**0**
Final effect	**0**	**0**	**-**	**0**	**0**	**0**	**0**	**0**	**+**	**0**	**0**	**0**

This table refers to the principal components' analysis (first principal component-gradual recovery model), for the four types of ratios under consideration. Positive (negative) effects on balance sheets are shown with a + (-) sign. Considering the four kinds of ratios, no predominating effects (70% or more) are described with a 0. The overall effect of the crisis is identified according to the sign and magnitude of the breakpoint and t_2, for each ratio category. The null hypothesis $b_1 = -b_2$, which implies that the ratio Y_t returns to its pre-crisis level after recovery occurs, has been tested using the heteroskedasticity and autocorrelation consistent version of the Wald test (10% significance level).

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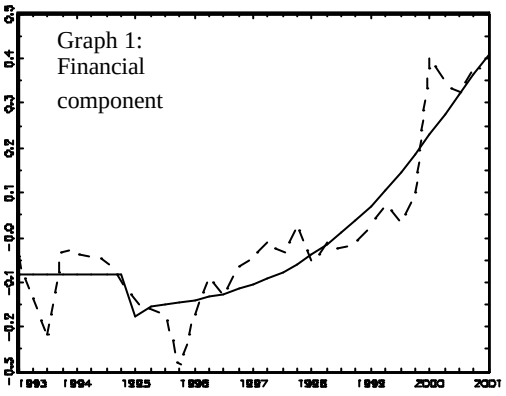
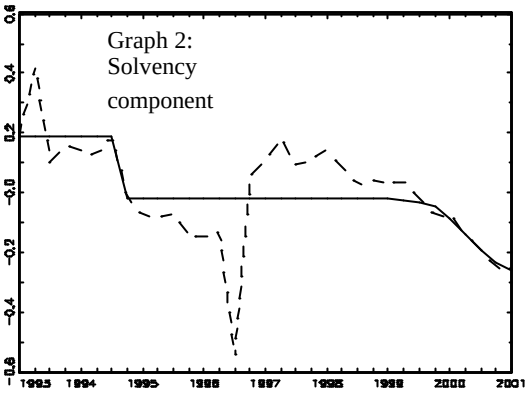
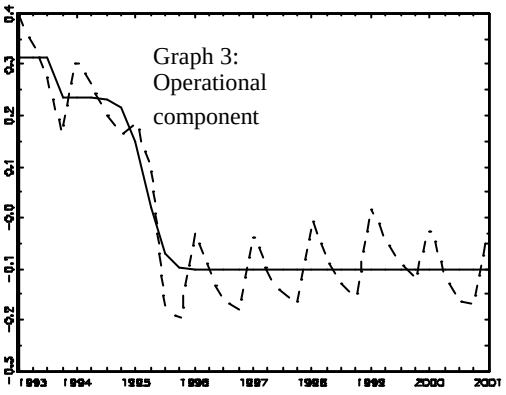
Table 1
Results from the gradual recovery and two-breaks models: All firms

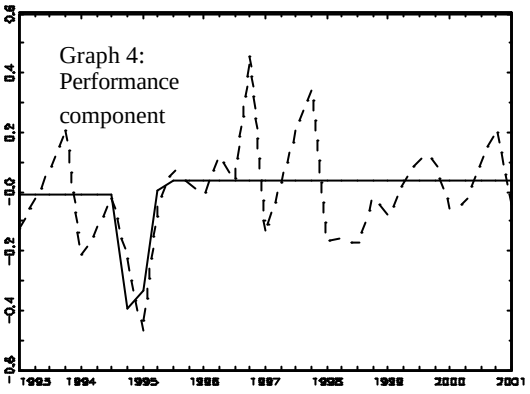
	Gradual Recovery Model		***Two-Breaks Model***	
	First break	t_2	**First break**	**Recovery**
LEV	95.3 b_1= 0.68	96.4 b_2= -0.62 g = 200.0	95.3 b_1= 0.85 (0.20)	96.3 b_2= -0.79
DR	94.4 b_1= 0.04	00.1 b_2= 0.10 g = 14.3	94.3 b_1= 0.04 (0.00)	NO
LIQ	95.3 b_1= 0.04	97.3 b_2= -0.03 g = 138.3	95.3 b_1= 0.04 (0.20)	97.3 b_2= -0.03
FD/TD	95.1 b_1= 0.10	99.2 b_2= -0.17 g = 6.6	94.3 b_1= 0.09 (0.40)	NO
FSTD/TFD	95.2 b_1= 0.04	99.1 b_2= -0.03 g = 116.2	95.1 b_1= 0.04 (0.80)	NO
IPC	95.1 b_1= -5.32	95.3 b_2= 7.68 g = 2.4	94.3 b_1= -3.08 (0.20)	95.4 b_2= 4.40
IF	93.4 b_1= -0.86	99.4 b_2= -1.06 g = 11.9	93.4 b_1= -0.72 (0.00)	NO
STA/STD	94.4 b_1= -0.40	00.1 b_2= -0.27 g = 146.2	94.3 b_1= -0.41 (0.00)	NO
BPR	95.3 b_1= 0.49	00.3 b_2= 1.07 g = 132.9	NO	NO
IR	95.3 b_1= 16.46	00.3 b_2= -5.13 g = 1.2	95.2 b_1= 15.99 (0.00)	97.2 b_2= -1.44
X/Sales	93.4 b_1= 0.04	94.4 b_2= 0.11 g = 44.4	94.4 b_1= 0.04 (0.30)	NO
OM	95.1 b_1= 0.03	95.2 b_2= -0.05 g =11.7	95.4 b_1= -0.04 (0.10)	96.4 b_2=0.02
ROA	94.4 b_1= -0.05	95.1 b_2=0.05 g = 143.1	94.1 b_1= -0.03 (0.10)	95.1 b_2= 0.02
ROE	94.4 b_1= -0.13	95.1 b_2= 0.13 g = 137.4	NO	NO

This table refers to initial break points, half-through recovery dates (t_2, gradual recovery model), and recovery dates (two-breaks model), for each of the 14 ratios under consideration. No significant presence of breaking points is described with a NO. For the gradual recovery model, the first break point is bounded between 1993 and 1995. This has been done since the two-breaks model shows that balance sheets deteriorated between the fourth quarters of 1993 and 1995. Values for b_1 (effect of first break point), b_2 (effect of second break point), and g (smoothness of recovery) are shown, as well as bootstrap p-values of the SUPW test (in parenthesis) for the two-breaks model. Asymptotic p-values of the SUPW test for the two-breaks model are all smaller than 0.01.









The dotted lines in graphs 1-4 show the actual principal components values. The solid lines are the fitted values (abstracting from seasonality): $\hat{a}_1 + \hat{b}_1 I(t \geq \hat{t}_1) + \hat{b}_2 G(t;\hat{g},\hat{t}_2)$