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External Shocks, Financial Distress and Debt Renegotiation: The Case of Argentina

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Abstract

The Argentinean crisis of 2001 has incited a large body of literature seeking to explain its causes and dynamics. Although there was much debate on this topic, little effort has been invested in understanding the causes and consequences of the crisis at the microeconomic or firm level. In this sense, the present study is an attempt to fill this gap by studying the behavior of corporate defaults and restructuring processes for the years that followed the economic crisis in Argentina (2001-2005). The paper provides basic stylized facts on the causes of default as well as the characteristics of the firms that restructured their debts. The findings show that stock variables (like liquidity ratio, leverage and equity) matter when a firm defaults, but not flow variables (such as ROA or revenues from sales). Conversely, evidence shows that when firms restructure their debts, their decision is based in both types of variables. Finally, the study confirms the adverse effect of a nominal devaluation in the presence of firm-level currency mismatch (the so-called "balance sheet" effect).

1. Introduction

The Argentinean crisis of 2001 has incited a large body of literature seeking to explain its causes and dynamics. However, much of these works try to explain the causes and consequences of the crisis at a macroeconomic level without investigating the consequences at a microeconomic or firm level. In this sense, the present study is an attempt to fill this gap.

In this paper, we explore empirically two topics: the cause of defaults and the processes of restructuring that followed those defaults, both, in the context of economic crisis and exogenous shocks. Regarding the causes of distress, the distinction between financial and economic distress is of fundamental importance. The event of default by one firm can be triggered by financial or firm-specific causes like poor operating performance, inappropriate capital structure, liquidity shortages and weak governance or can be triggered by economic (exogenous) reasons, like external aggregate shocks, such as the decline in domestic and external demand, interruption of capital inflows and the devaluation of the local currency.

In trying to characterize the behavior of the corporate sector under circumstances of economic crisis, we examine the behavior of the corporate sector using a unique and novel methodology for this class of applied research. We combine firm-level or micro-level data on firm performance, default and restructuring with country, or macro-level data, on economic conditions. This approach allows us to derive robust behavioral implications regarding the relationship between firm-level financial distress and aggregate-level economic shocks.

This paper relates to a growing literature on corporate distress and bankruptcy. However, literature of corporate distress has centered generally on restructurings, and relies heavily on U.S. data. For example, Gilson, John, and Lang (1990) study the characteristics of 169 financially distressed U.S. firms, focusing on the firms' incentives to choose between private renegotiations and formal bankruptcy procedures. Their findings suggest that firms are more likely to restructure privately when they have more intangible assets, a relatively high going-concern value, and owe more to banks and to fewer lenders. Chatterjee, Dhillon, and Ramírez (1996) analyze the choice of restructuring methods including prepackaged bankruptcy, and

investigate the sample cross sectional determinants of these choices. Studies for emerging markets can be found but in a lesser extent. Examples of papers in this area are Claessens, Djankov, and Klapper (1999), and for specific country analysis of the Czech Republic, Lízal (2002). Claessens, Djankov, and Klapper argue that differences in legal enforcement and judiciary efficiency on East Asian countries affect the resolution of financial distress, whereas Lízal links the characteristics of the privatization process of companies in the Czech Republic with their probability of bankruptcy.

The methodology and analysis of this paper is related to that of Gilson, John, and Lang (1990). Like them, we study the characteristics of restructuring firms, but also, we analyze the determinants of default among firms. Within this framework, the findings show that only stock variables (in opposition of flow variables), are relevant in explaining defaults at the firm level. Conversely, flow variables (in opposition to stock variables), matter when explaining debt restructurations. Additionally, the analysis confirms the adverse effect of a nominal devaluation in the presence of firm-level currency mismatch (the so-called "balance sheet" effect). We find that the devaluation of the Argentinean peso against the U.S. dollar, together with the growing cost of funding and risk perception (measured -as a proxy- by the Emerging Markets Bond Index developed by JPMorgan), played a significant role in spreading distortions to the corporate sector.

The paper is organized as follows. Section 2 briefly describes the Argentinean 2001 financial crisis and its effects to the corporate sector. Section 3 describes the data, methodology and presents key summary statistics. Section 5 presents our empirical findings. Finally, section 6 concludes.

2. The Argentinean crisis and the corporate sector

By the end of 2001, and after three years of recession, Argentina collapsed into one of its worst economic and financial crisis ever. The crisis was triggered by a combination of external shocks and internal inconsistencies in the economic policies that took place between the last quarter of 1997 and the spring of 2001. Among the

external shocks were the economic and financial crises in Asia, Russia and Brazil and the rising of the worldwide interest rates. Domestic factors also contributed to the crisis, such as the country's recurrent trade and fiscal deficits, its currency board rate system (known as the Convertibility regime[1]), its escalating external debt and its restrictive access to the international capital markets and other sources of financing.

These factors resulted in a deep contraction of the economy together with a banking crisis and a rapidly capital outflow from the country. Between December 2001 and February 2002, the Argentine authorities abandoned the Convertibility regime[2], devaluated the peso against the U.S. dollar, defaulted on nearly U.S. 100 billion dollar in foreign debt and adopted a series of emergency measures including the freeze on term and demand deposits, capital controls, a freeze on utility tariffs, and an asymmetric conversion of domestic dollar contracts into pesos at subsidized rates (known as "pesification").

As a result of these strict restrictions the economic activity declined dramatically. During 2002, real GDP fell by about 11% and gross investment and private consumption decreased by 36.4% and 15.0%, respectively. Following the collapse of the Convertibility regime, the peso lost significant value, both against foreign currencies and in terms of domestic purchasing power. In the first six months of 2002, the peso lost approximately 74.2% of its value against the U.S. dollar (Figure 1) and the international reserves of the Central Bank dropped by 50%. During the same period, inflation increased at 30.5% as measured by the consumer price index (Figure 3), the unemployment rate reached 21.5% and more than half of the population subsisted below the poverty line.

For the corporate sector, the crisis was equally affecting. During the nineties, several firms accumulated substantial amounts of foreign-currency debt. The reason was simple: even though Argentina was under a currency board, the risk of devaluation always existed. Consequently, debt in U.S. dollars and Euros was a

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[1] In 1991 the Congress enacted the Convertibility Law, which established a fixed exchange rate regime (ARS 1=US$ 1) as a mechanism of inflation stabilization. This was accomplished by requiring that the monetary base be fully backed by the Central Bank's gross international assets (that is, by restraining the Central Bank's ability to pursue monetary policy by issuing additional pesos).
[2] In January 2002, Congress passed the Public Emergency and Reform Law of 2002, which abolished the parity between the peso and the U.S. dollar and brought to an end the Convertibility regime.

cheaper way to finance operations since creditors were more eager to provide financing in hard currency. When the Government devaluated the peso, the debt burden of foreign-currency denominated borrowings increased sharply. While firms generated revenues in pesos, the debt services continued to be in U.S. dollars which led to what is known as a currency mismatch between revenues and expenditures. As a consequence of that, many of the firms which have been accumulating significant amounts of foreign-currency debt during the nineties were unable to pay their obligations[3] and eventually defaulted their debts. The situation was aggravated since the private sector had no opportunities of refinancing those liabilities as the access of funds in the capital markets, either international or domestic, was completely close after the suspension of debt payments by the Government. Hence, the corporate sector could not escape from a massive default.

From October 2001 to December 2005, the corporate sector experienced a record of bond defaults and corporate bankruptcies. During that period, 38 non-financial firms defaulted in at least one term of their outstanding debt, which represents almost 68% of the total number of companies analyzed in this study. To give a rough idea of the size of the stock market in Argentina, in the last quarter of 2001, around 119 companies were listed at the Buenos Aires Stock Exchange with a market capitalization of US$ 192.5 billion (or 72% of GDP). As shown in Table 3 (this table will be discussed in more detail in the next section), most of the defaults corresponded to firms which missed an interest or principal payments (payment defaults), whereas only a few percentage of firms defaulted on a covenant [4] (technical default). As expected, the period also experienced a substantial number of debt restructurings. Until the end of 2005, 45% of the firms in our sample started a restructuring process. As the reader might notice, the number of restructurings exceeds the total number of

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[3] To illustrate how negative exchange rate shocks can negatively affect a firm's net worth, suppose Argentina's exchange rate against the US dollar devaluates from 1 peso per dollar to 2 pesos per dollar. Now, consider an Argentinean firm whose debt is denominated in dollar terms, i.e., whose debt payments are specified as fixed dollar amounts. For concreteness, suppose the Argentinean firm is obliged to make a US$ 1,000 debt payment at the end of the year. This debt payment will now cost the Argentinean corporation 2,000 pesos rather than 1,000 pesos as before the devaluation. Consequently, all else equal, a devaluation of a country's domestic exchange rate will increase the real debt burden (hence the real liabilities) of any corporation whose debt is denominated in foreign currencies.

[4] Debt covenants are restrictions on the borrower's financial performance such as the maintenance of certain financial ratios (e.g. interest coverage ratios).

defaulted firms. This is because firms that have avoided defaulting their debts still sought better terms for their debt through a restructuration or debt exchange.

3. Data description

This section describes the sample and methodology used. The database consists of three blocks of data, two at the micro level and one at the macro level, from 2001 to 2005. Since accounting information is different for financial companies[5], we restrict the sample to cover only non-financial firms.

The first block of data consists of information on financial distress and restructuring at the level of the firm. Since our focus is on bonded debt, our definition of financial distress is very specific and somewhat restricting. A firm is financially distressed if it has defaulted or was unable to meet the conditions on any payment of capital or interest of any bonded debt. In the same line, we define a debt restructuring similarly to Gilson et al. but restricted to bonded debt. A debt restructuring is defined as a transaction in which an existing bond is exchanged by a new issue with one of the following consequences: (i) the required interest and/or principal payments are reduced; (ii) the maturity of the bond is extended; and/or (iii) the currency denomination of the new bond is changed.

The procedure to identify default and restructurings events is fairly straightforward but involves a lengthy and tedious process. Our primary source of data is from the Buenos Aires Stock Exchange (BCBA, for its Spanish acronym) compiled by Bolsar[6]. Defaults and restructurings events were identified by searching manually, firm by firm, through the company news section of Bolsar for any reference to an event of default or restructuring.

For our second block of data, we use firm-level accounting information to describe the firms' operating performance and capital structure. Accounting data is

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[5] For example, a high level of indebtedness is not seen as an unbearable risk for a bank or financial institution (as it is sometimes considered for an ordinary company) but rather on the contrary: a high level of liabilities allows the bank to carry on with its business and achieve higher levels of returns. Also, banks were affected by the crisis in a particular way as the banking system witnessed an unprecedented bank run that ended up in the establishment of a deposit freeze (called the "corralito") by the end of 2001.

[6] Bolsar is a web-based information service provided by The Buenos Aires Stock Exchange.

obtained directly from the companies' balance sheets published by Bolsar. We base our analysis in five performance indicators: liquidity, leverage, equity, revenues from sales and return over assets (ROA). An explanation of why we chose these variables can be found in section 4.2. and a description and sources of the variables can be found in Table 1. In summary, the liquidity ratio is defined as cash-in-hand over total debt, leverage as debts over assets, and equity as total assets over total liabilities. Sales denotes net sales over total assets (computed as trailing) and ROA represents return over assets (computed as trailing).

Finally, we use country-level data to measure the effects of exogenous shock. Within this group, we use the change in the exchange rate measured as Argentinean pesos per U.S. dollar (US$/AR$, so an increase in the exchange rate signifies a depreciation of the peso), the log of YPF 9 1/8% 2009 Bond yield (proxy of cost of funding and risk perception), and the change in the GDP (seasonally adjusted, quarterly change). As stated above, we use the yield of a bond that was not defaulted during the crisis as a proxy of the marginal cost of funding. This is because, the inclusion of a variable like the yield of a defaulted bond (sovereign Global Bonds, for example) as proxies of cost of funding has the problem that, as they were defaulted, their yield represents the recovery value instead of the current cost of funding. Also, we use the yield of a dollar denominated bond because it is not exposed to currency risk and therefore reflects only risk premium (in this way we avoid the yield to be correlated with the change in the exchange rate).

By using these three blocks of data we were able to construct a wide, though unbalanced, panel for 56 non-financial firms from 1Q-2001 to 4Q-2005 (quarterly data). The variables' definitions and sources are presented in Table 1.

4. Empirical findings

4.1. Sample characteristics

Prior to 2002, corporate defaults had remained low, occurring mainly in firms with weak financial performance and depressed potential of growth. Only four firms

defaulted in 2001 versus 38 companies in 2002. Table 3 describes the distribution of the sample for 2001-2005. From a total of 56 firms, 38 firms defaulted their debts during the relevant period, that is, almost 68% of the whole universe of firms incurred in some kind of failure to pay in time and manner. Of the total of firms defaulting, only 18% of them incurred in technical default, defined as the failing to fulfill on a covenant of the firm's debt contract, while 84% of the firms experienced payment default, defined as a default on an interest or principal payment. The sum of technical defaults and payment defaults exceeds the total number of firms defaulting due the fact that a few firms incurred in both, technical and payment default.

In terms of restructurings, only 3 firms used the formal reorganization proceeding (*concurso preventivo*) provided by the Argentinean Law (similar to Chapter 11 in the U.S. Law) and around 42 firms started any process, formal and informal, of restructuring of their debts. We identify a restructuring event as formal when an exchange of debt has been offered. In this sense, 19 firms started a formal process of debt restructuring offering an exchange of debt which represents a 45% of the universe of firms restructuring their debts. With respect to informal restructuring processes, they can be of two types: extension of maturity refers to those restructurings where the creditors and lenders agreed to deferral promised interest or principal payments. A change in covenants refers also to an informal agreement between the two parties, where they agree in changing the original covenant of the firm's debt. It is worth mentioning that these statistics take into account the restructuring processes started before December 2005. This is important because a substantial number of firms restructured their debts during 2006, after the government presented the restructuring proposal for the country's sovereign debt to investors, which was taken as a starting point and guideline for the corporate sector.

Table 3 about here

A bird's eye look at the data reflects that the crisis had different effects depending on which industries or economic activities we are considering. Table 4 provides a first and rough idea of the financial performance of different industries in the period of analysis.

Table 4 about here

As we mentioned above, examining on a period-by-period basis the sample reveals some clustering in terms of industry-performance. Not surprisingly, the non-tradable sector (those sectors receiving revenues only in local currency) were the most affected by the crisis. The economic crisis and devaluation immediately eroded the value of this sector's assets, increased substantially the level of debt and reduced its sales and earnings. For example, all sectors related with public and private services such as electricity, gas, services and telecommunications show a substantial drop in both, their equity and earnings during 2002. Earnings in the services sector fell by 63%, followed by telecommunications (61%) and the gas sector (51%). On the other hand, export oriented industries like agricultural, iron and steel and petroleum showed a positive performance. Further evidence of this phenomenon can be found in the annex (Figure 4).

Finally, in the same spirit of Gilson et al., we contrast selected firm's characteristics by whether or not they are survivors or defaulters and whether or not they have restructured their debt. The median statistics[7] are presented and significance tests performed to assess whether or not observed differences among two groups are statistically significant[8]. By this means, we carry out a non-parametric test used to test the median difference in paired data. The Wilcoxon sum rank test, also known as the Mann-Whitney test, is based on the rank order of the differences rather than the actual value of the differences.

As Table 5 demonstrates, firms that have survived the crisis (not defaulted) were those with lower leverage ratios and higher equity, sales and earning levels preceding the crisis. In all these cases, we can reject the null hypothesis of identical distributions ($p < 0.1$), so the medians of this variable are statistically different between sub samples. Overall, more solid firms in terms of financial performance were those that could avoid defaulting on their debts. Similarly, firms that restructure their debt were

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[7] Although the mean and median are both measures of the "typical" value of the data, the median is better to use in skewed (or unbalanced) distributions because it is not affected by outliers.

[8] The significance test performed helps to determine if an observed value of a statistic, in this case the median (or mean), differs enough from a hypothesized value (the "null hypothesis") of the parameter. In this case, we test if the median (mean) values of two sub-samples (e.g. survivors and defaulters) are reliably different.

more liquid but were those firms that faced a relatively lower debt burden. The medians of both variables are significantly different between firms that have or not started their restructuring process. It is relatively simple to explain that more liquid firms started their restructuring processes during the considered period, but it is not very straightforward to explain the second result. One explanation could be that more constrained firms waited until the government restructured the sovereign debt as a starting point to offer to their creditors.

Table 5 about here

4.2.   Estimation and Results

The empirical model is meant to test for partial correlations and links between financial distress and micro and macro level characteristics, but it is not an attempt to identify causal effects between these variables. The problem of endogeneity clearly arises with certain variables, for example, with our proxy for the cost of funding and risk perception (log of YPF 9 1/8% 2009 Bond yield).[9]

The regression analysis estimates robust partial correlations to assess the relative importance of financial versus economic factors for both, defaults and restructurings in a context of systemic crisis. If there were no measurement errors in any of the variables, standard regression models would suffice to estimate partial correlations. The analysis consists of a logistic model (Logit model) which extends the principles of generalized linear models (for example OLS regressions) to better treat the case of dichotomous and categorical variables.[10]

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[9] A higher risk perception translates into financing constraints and higher cost of funding which increases the probability of default for the private sector but also because companies default their debts risk perception increases.

[10] Regression analysis in the form of the linear probability model has been used in default risk studies. The major problem with the linear probability model is that the linear functions are inherently unbounded, while the actual probability is bounded between 0 and 1 (Greene, 2003). Using the Logit model solves the problem of bounded dependent variables by transforming the probability so that it is no longer bounded, which makes the Logit model the most suitable regression analysis for this research (Greene, 2003). This model is also estimated using a Fixed Effects Logit model on panel data.

Within this framework, we estimate the following two models with the data described in section 4, in which the event of default for firm *f*, in period *t* is determined by,

$$\text{Pr}ob(Default_{f,t} = 1) = \beta_0 + \beta_1 \cdot External_t + \varepsilon_{f,t} \qquad (1)$$

$$\text{Pr}ob(Default_{f,t} = 1) = \beta_0 + \beta_1 \cdot FirmSpecific_{f,t} + \varepsilon_{f,t} \qquad (2)$$

where *External* represents those variables that are exogenous to the firm, such as the variation of the exchange rate, the proxy of country risk and cost of funding, and the change in the GDP (all these variables have been described in the Data Description section). Correspondingly, *FirmSpecific* is a vector of variables that represents firm-specific factors that may affect a firm's proclivity to default. All these variables were carefully chosen; as stressed in Lízal (2005) "adopting too many financial measures introduces a severe multicollinearity and the model becomes too sensitive, and consequently, useless". Fortunately, there is a rich source of research that has identified many ratios that are important in predicting financial bankruptcy. Altman (1991), for example, found that ratios of liquidity, leverage, solvency and profitability tend to serve as the most important indicators of imminent bankruptcy[11]. These four measures are included in our data: liquidity (cash-in-hand over short term debt), leverage or debt ratio (debts over total liabilities), solvency proxied by equity (total assets over total liabilities) and profitability (return over assets or simply ROA). An additional variable (sales over assets) for performance is added, which has a low correlation with ROA. Also, within this regression, we control for firms' specific characteristics, in this case, the firm's size.

A natural question that might arise at this point is why we estimate the probability of default and restructurations using macroeconomic and financial regressors separately? The reason is quite simple: when running all the independent variables together, macroeconomic factors dominate financial variables as the explanation of defaults and restructurings. Even though the correlation between macroeconomic and financial variables is not high, the effect of macro conditions seems more important in describing corporate behavior in Argentina. So, in order to get a sense of the

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[11] Other papers on this issue are Ohlson (1980) and Shumway (2001).

importance of different financial measurements at the firm level is that we finally decided to run different regressions and isolate both effects separately.

We estimate a Logit version of equation 1 and 2 using different specifications to test the robustness of the results. The model is also estimated using the fixed effects Logit model on panel data.[12] In each group of regressions, we first run each individual variable by itself (simplest specification), which indicates the simple correlation between the independent and dependent variable. Next, the full set of variables are included to reveal their joint contribution to the probability of default and to test for robustness.

Since the dependent variable equals one if the firm defaulted during the period and zero otherwise, a positive coefficient on an independent variable in the regression implies that firms for which this variable takes on a higher value are more likely to default their bonded debt.

Table 6 presents the results for the importance of economic factors in the probability of default. In both, the general Logit specification (Panel A) and the fixed effects Logit regressions (Panel B), the estimated coefficients on exchange rate devaluation (*ER_chng*), the proxy for cost of financing (*Ln_Yield*) and GDP growth (*GDP_chng*) are highly significant and their effects are as expected. The devaluation of the local currency increased the probability of default as the capacity to pay debt in external currency got eroded by the decrease of value of the currency. The change in the exchange rate is highly significant (at 1%) in the both regressions and specifications. There is systematic quite substantial role of the cost of financing (proxied by the index of country-risk). The significance and positive sign of *Ln_Yield* is consistent with the economic theory of information asymmetry: negative shocks to the firms' real net worth aggravate adverse selection and moral hazard problems in financial markets and make lenders less willing to lend increasing interest rates. The effect is twofold as higher interest rate not only increases the cost of all new borrowing, but also the cost of servicing outstanding debt. Consequently, the restriction to obtain external financing (i.e. high interest rates leads to a credit crunch),

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[12] The fixed effects model is more suitable for company-specific factors (not controlled by time-varying variables) such as management, shareholder distribution, geographical distribution, etc.

together with the larger burden of debt (i.e. higher interest rates increase the cost of servicing outstanding debt), decreases the firms' probability to meet their financial obligations. Corporate default performance is consistently affected by GDP growth, suggesting that the sharp slump in economic activity, and therefore in sales and revenues, led to a relatively higher number of default events (GDP growth is significant in both individual specification, but not in the general Logit and FE Logit regressions).

These findings suggest that macroeconomic conditions do play an important role in explaining default events among firms. At least it matters when the corporate sector faces a systemic crisis as the one that hit Argentina in 2001-2002.

Table 6 about here

In the second set of regressions, we investigate the impact of endogenous variables for the firm such as liquidity, leverage, equity, ROA and sales. We also control for firm size. In terms of financial variables, as expected, the level of short term indebtedness (*Leverage*) is consistently significant and has the correct sign in both specifications. The level of liquidity (*Liquidity*) has the correct sign, but it is only significant in individual regression of the general specification. This result indicates that the higher the firm's liquidity, the lower the probability the firm would default. The firm's equity (*Equity*) is also significant and has the desired sign in both specifications meaning that the higher the level of equity, the less the harmful impact of the devaluation on the firm's balance sheet due to a higher "cushion" of assets over liabilities. It is interesting to notice that either the earning history or the liquidity of the firm have no explanatory power in our specifications. These results suggest that stock variables played the main role in explaining default among firms.

Table 7 about here

At this point, it is worth mentioning that the overall explanatory power of the regressions is small (the same result is mentioned in Gilson et al.) The Pseudo R-square indicates that the Logit regressions explain up to 8 percent of the total variation in the dependent variable. We argue, in the same line of Gilson et al., that the lack of

overall explanatory power can be justify by the relatively small size of the sample, the use of panel data and the possible omission of other factors that might explain the default among firms.

We now turn to the second set of regressions, those describing the link between economic/financial variables on debt restructuring. Again, in order to estimate this, we consider two models in which the probability of a debt restructuring by a firm f, in period t is given by,

$$\mathrm{Prob}(Debtrest_{f,t} = 1) = \eta_0 + \eta_1 \cdot External_t + \varepsilon_{f,t} \qquad (3)$$

$$\mathrm{Prob}(Debtrest_{f,t} = 1) = \eta_0 + \eta_1 \cdot FirmSpecific_{f,t} + \varepsilon_{f,t} \qquad (4)$$

Again, *External* characterizes those variables that are exogenous to the firm and *FirmSpecific* represents the vector of firm's characteristics and balance sheet variables.

Similarly to the previous set of regressions, we estimate different specifications of equation 3 and 4 to test the robustness of our results. Table 8 reports the results for the regressions using as independent variables economic factors that operate as drivers of restructurings. Since the dependent variable equals one if the firm restructured by means of an exchange offer during the period of study and zero otherwise, a positive coefficient on an independent variable in the regression implies that firms for which this variable takes a higher value are more likely to restructure their bonded debt.

Some interesting and intuitive results emerge from these estimations. Firstly, the exchange rate played an important role in the restructurings decisions. The effect of the exchange rate variation (*ER_chng*) is significant and, as expected, with negative sign in both specifications. This result suggests that restructurings are associated with periods of decreasing exchange rates. In other words, firms engaged in restructuring their debts when the exchange stabilized after the overshooting generated by the devaluation. Another intuitive result comes from the *Ln_Yield* variable. As Table 8 suggest, the lower the country risk, the higher the probability of restructuring. This reflects the fact that the normalization of interest rates (that is, the decrease in the cost of funding) was the result of improved market sentiment which would allow firms to

renegotiate their debts in better terms. Finally, economic growth seems to be significant and with the correct sign in the general and fixed effects regressions under both specifications. This result indicates that first started restructuring their debts when economic activity was on a recovery path.

Table 8 about here

When analyzing the effect of financial variables in the restructuring processes we find, contrary to our findings in the default regressions, some mixed evidence. Broadly speaking, flow variables played a more fundamental role than stock variables. Table 9 shows that after controlling for firms characteristics, ROA is significant in the general specification in the all-in variable regression. The positive sign on ROA indicates that firms with higher earnings over assets had a higher probability to start a process of restructuring. The coefficient of sales is also significant only in the full regular Logit regression. The sign of this coefficient might look counterintuitive: higher sales result in lower probability of restructuring? As a matter of fact, after default and big slump in economic growth during 2001 and 2002, economic activity recovered very fast in 2003. This, together with higher inflation, improved significantly the value of sales within companies. So, this result suggests that firms, not only looked at the improvement of sales, but also at its relationship with the costs firms were facing. That explains why ROA appears with the correct sign. Finally, in the fixed effects estimation, Liquidity is significant and with a positive sign, which suggests that firms with enough liquid assets were able to enter to a restructuration process.

Table 9 about here

Even though our primary objective was to analyze of the importance of macroeconomic and financial factors separately, as a last exercise and for the sake of completeness we run all the independent variables (macroeconomic and financial) together. As we mentioned before, when running all the independent variables together, macroeconomic factors dominate financial variables as the explanation of defaults and restructurings. This is true in part because we have some colineality

among financial variables. Table 2 shows that *Liquidity* and *Equity*, and *Sales* and *ROA*, have some correlation. So, to assess the effect of macroeconomic and financial variables together, we conduct a principal component analysis in each of these pair-wise variables and create two new variables that are estimates (propensity score) of the factors produced by this analysis (one for the stock variables -*Liquidity* and *Equity*- and the other for the flow variables -*Sales* and *ROA*-).

The results, not reported here, show that in both specifications (Logit and fixed effects Logit), the macro variables are significant and have the correct signs and only the stock variable created from the propensity score (*Liquidity* and *Equity*) is significant and with the correct sign. This confirms that stock variables were important in explaining defaults among firms. Now turning to the analysis of restructuring processes, we find that none of the two variables are significant meaning that the determinants of the restructuring processes were only macroeconomic.

5. Conclusions

The paper studies the behavior of corporate defaults and restructuring processes for the years that followed the sovereign default and economic crisis of 2001-2005 in Argentina. In general terms, the paper provides basic stylized facts on the causes of default as well as the characteristics of the firms that restructured their debts.

In an attempt to asses the relative contribution of economic factors to corporate default, we confirm the adverse effect of a nominal devaluation in the presence of firm-level currency mismatch (the so-called "balance sheet" effect). The "balance sheet" theory clearly plays a role: due to currency mismatches, a devaluation may have huge "balance sheet effects", increasing the likelihood of default. Also, other economic factors were central in the systemic default event occurred during 2002. As expected, the heighten "country-risk" or cost of funding perception increases the probability of default as well as a slowdown in economic activity. In terms of restructurings, firms restructured the most when the exchange rate stabilized at lower values.

The econometric analysis also helped us to determine what types of firms (characterized by their financial variables) were more prone to default their debts. In this regard, evidence shows that stock variables, like the liquidity ratio, leverage and equity, matter when a firm defaults, but not flow variables, such as ROA or revenues from sales. Conversely, evidence shows that flow variables matter the most when firms restructure their debts.

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Figure 1. Exchange Rate Dynamics
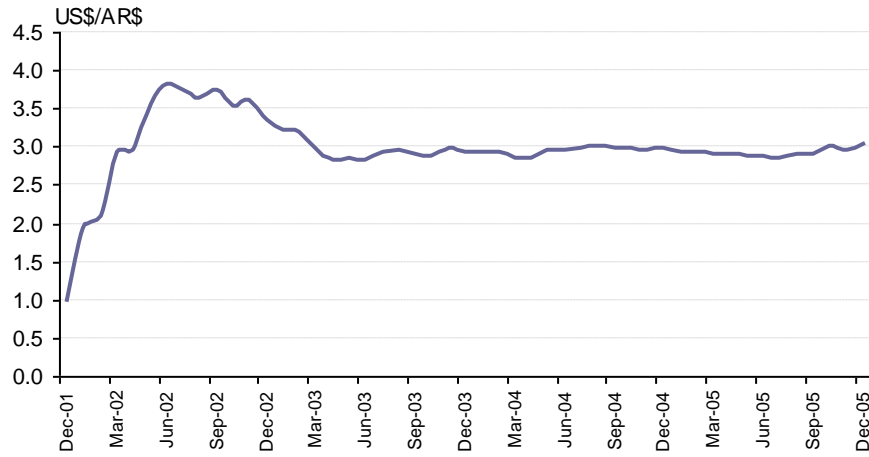
Source: Bloomberg.

Figure 2. GDP Performance
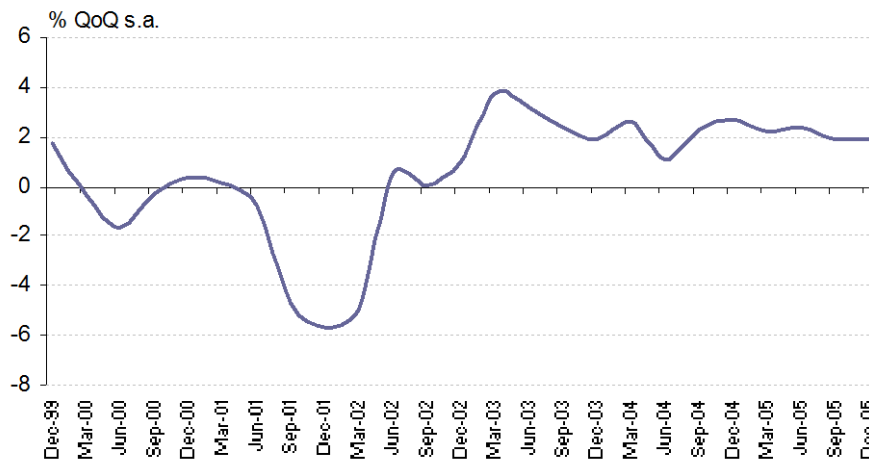
Source: Bloomberg.

Figure 3. Inflation Rate

Source: Bloomberg.

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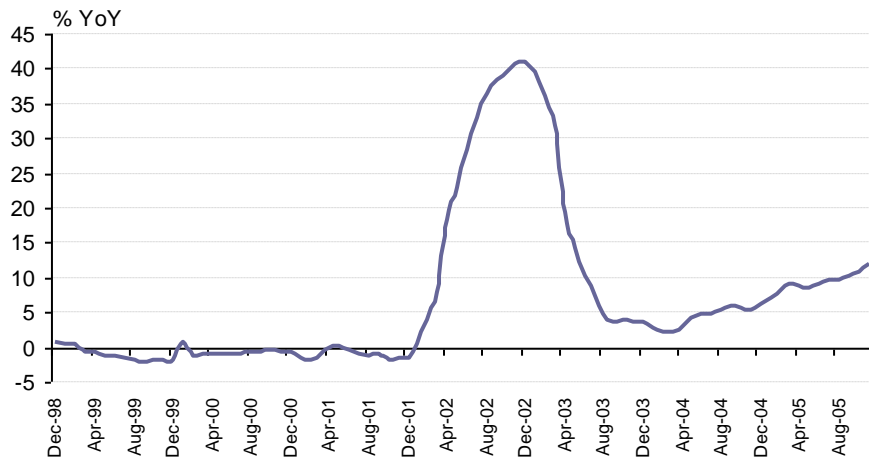
Table 1. Variable definitions and sources

Variable name	Type	Definition	Source
year	4-digit year	Year	
quarter	1-digit quarter	Quarter	
industry	Continuous	Industry or economic sector	
Default	Dichotomy	=1 if the firm defaulted during the period of study; =0 otherwise	
Debtrest	Dichotomy	=1 if the firm started a formal restructuring process (debt exchange); =0 otherwise	
Size	Continuous	Log of assets	BCBA
Liquidity	Continuous	Cash-in-hand over total debt	BCBA
Leverage	Continuous	Debt over assets	BCBA
Equity	Continuous	Total assets over total liabilities	BCBA
ROA	Continuous	Return over assets (computed as trailing)	BCBA
Sales	Continuous	Ratio of sales over assets	BCBA
ER_chng	Continuous	Variation of the exchange rate	CEI
Ln_Yield	Continuous	Log of YPF 9 1/8% 2009 Bond	Bloomberg
GDP_chng	Continuous	Change in the GDP (quarterly, seasonally adjusted)	Bloomberg

Table 2. Correlations among financial and economic variables

	Liquidity	Equity	Leverage	ROA	Sales	ER_Chng	Ln_Yield	GDP_chng
Liquidity	1.000							
Equity	0.462	1.000						
Leverage	-0.078	-0.236	1.000					
ROA	-0.124	-0.117	-0.204	1.000				
Sales	-0.114	-0.002	-0.348	0.673	1.000			
ER_Chng	0.010	-0.016	0.191	-0.057	-0.001	1.000		
Ln_Yield	0.029	0.027	0.246	-0.116	-0.022	0.593	1.000	
GDP_chng	0.095	-0.018	-0.091	0.031	-0.033	-0.435	-0.546	1.000

Table 3. Corporate distress statistics

Summary of default and restructuring terms for 56 firms and 14 industries during the 2001-2005 period. *Total* is the total number of firms in the sample. As in Gilson et al. (1990) a technical default is defined as the default on a covenant of the firm's debt contract, while a payment default is a default on an interest or principal payment. Finally, debt exchanges refer to formal debt exchanges.

	Total	Number of defaulted firms		Technical default		Payment default		Filled Chapter 11		Number of firms that have started restructuring processes (both formal and informally)		Debt exchanges	
		N	% o/Total	N	% o/TD	N	% o/TD	N	% o/Total	N	% o/Total	N	% o/Rest.
Total firms	**56**	**38**	**67.9**	**7**	**18.4**	**32**	84.2	**3**	7.9	**42**	75.0	**19**	45.2
Agricultural	3	2	66.7	1	50.0	1	50.0	0	0.0	2	66.7	1	50.0
Food & beverages	6	4	66.7	1	25.0	4	100.0	0	0.0	3	50.0	1	33.3
TV & broadcasting	3	3	100.0	0	0.0	3	100.0	0	0.0	4	133.3	3	75.0
Construction	6	5	83.3	3	60.0	2	40.0	0	0.0	4	66.7	1	25.0
Electricity	7	6	85.7	0	0.0	6	100.0	1	16.7	6	85.7	3	50.0
Gas	5	4	80.0	0	0.0	4	100.0	0	0.0	4	80.0	2	50.0
Printing and publishing	2	1	50.0	0	0.0	1	100.0	1	100.0	1	50.0	1	100.0
Holdings	5	3	60.0	0	0.0	3	100.0	1	33.3	2	40.0	2	100.0
Iron and steel	4	2	50.0	0	0.0	2	100.0	0	0.0	3	75.0	1	33.3
Petroleum	4	0	0.0	0	0.0	0	0.0	0	0.0	2	50.0	1	50.0
Misc. petroleum	3	2	66.7	1	50.0	2	100.0	0	0.0	2	66.7	0	0.0
Services	3	3	100.0	0	0.0	3	100.0	0	0.0	3	100.0	1	33.3
Telecommunications	4	2	50.0	0	0.0	2	100.0	0	0.0	5	125.0	2	40.0
Textiles	1	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

*TD: Total firms that defaulted / Rest: Total firms that restructured their debts.

Table 4. Industry performance

Summary of industry performance separating the 2001-2005 period into three sub-periods. *Liquidity* denotes cash-in-hand over total debt, *Leverage* stands for debts over assets, and *Equity*, total assets over total liabilities. *ROA* represents return over assets *and Sales* denotes net sales over total assets.

	Liquidity			Equity			Leverage			Earnings			Sales		
	2001	2002	2003-2005	2001	2002	2003-2005	2001	2002	2003-2005	2001	2002	2003-2005	2001	2002	2003-2005
Agricultural	5.1	41.6	28.1	215.8	184.7	214.6	125.3	223.0	194.6	0.3	0.8	0.8	15.4	12.3	7.3
Food & beverages	4.4	4.9	13.3	100.0	59.6	86.5	256.0	627.5	184.4	6.3	5.0	6.7	68.3	71.0	82.8
TV & broadcasting	2.4	3.8	6.6	32.4	7.9	13.3	786.0	1277.2	776.8	4.0	3.0	3.0	19.9	16.5	14.3
Construction	1.5	10.8	44.5	50.3	230.1	184.5	321.6	866.1	533.6	0.6	0.4	0.7	12.9	7.5	13.4
Electricity	0.9	1.6	1.5	48.7	20.5	28.5	480.0	894.7	501.7	4.4	2.7	2.0	23.6	14.6	15.4
Gas	2.7	8.7	11.6	52.9	25.0	48.2	603.6	764.3	383.6	3.5	1.7	1.9	26.4	15.7	15.8
Printing and pub.	16.8	14.9	15.1	557.2	422.0	218.3	200.0	407.5	224.7	3.4	1.6	5.1	42.4	25.4	38.3
Holdings	13.7	157.2	31.8	189.5	396.7	112.7	727.4	405.4	582.0	1.4	1.6	2.2	21.2	15.1	22.9
Iron and steel	4.0	3.8	12.2	132.6	131.2	213.6	148.4	204.5	111.9	1.1	5.3	6.8	31.3	38.4	41.9
Petroleum	2.1	2.4	9.9	49.3	58.4	75.3	784.5	1140.7	608.8	1.7	2.9	3.9	22.7	26.3	32.6
Misc. petroleum	1.9	4.5	4.3	47.9	89.5	116.7	340.3	365.3	227.5	3.8	5.8	6.4	32.1	28.5	30.8
Services	11.2	10.1	10.9	60.9	39.3	42.9	190.0	470.0	392.1	2.4	0.9	2.4	28.2	21.6	27.9
Financial services	2.0	1.3	0.7	73.1	26.7	43.0	348.8	552.1	336.3	5.8	2.2	3.5	28.5	18.4	25.6
Telecommunications	0.8	17.9	32.2	55.8	178.4	220.6	402.1	918.3	647.3	0.4	0.5	2.8	5.5	8.1	28.0
Textiles	4.9	18.3	14.8	119.8	119.7	113.1	394.8	607.0	352.7	3.0	2.7	3.5	30.9	26.5	30.4

Figure 4. Industry dynamics: selected ratios (2001-2005)
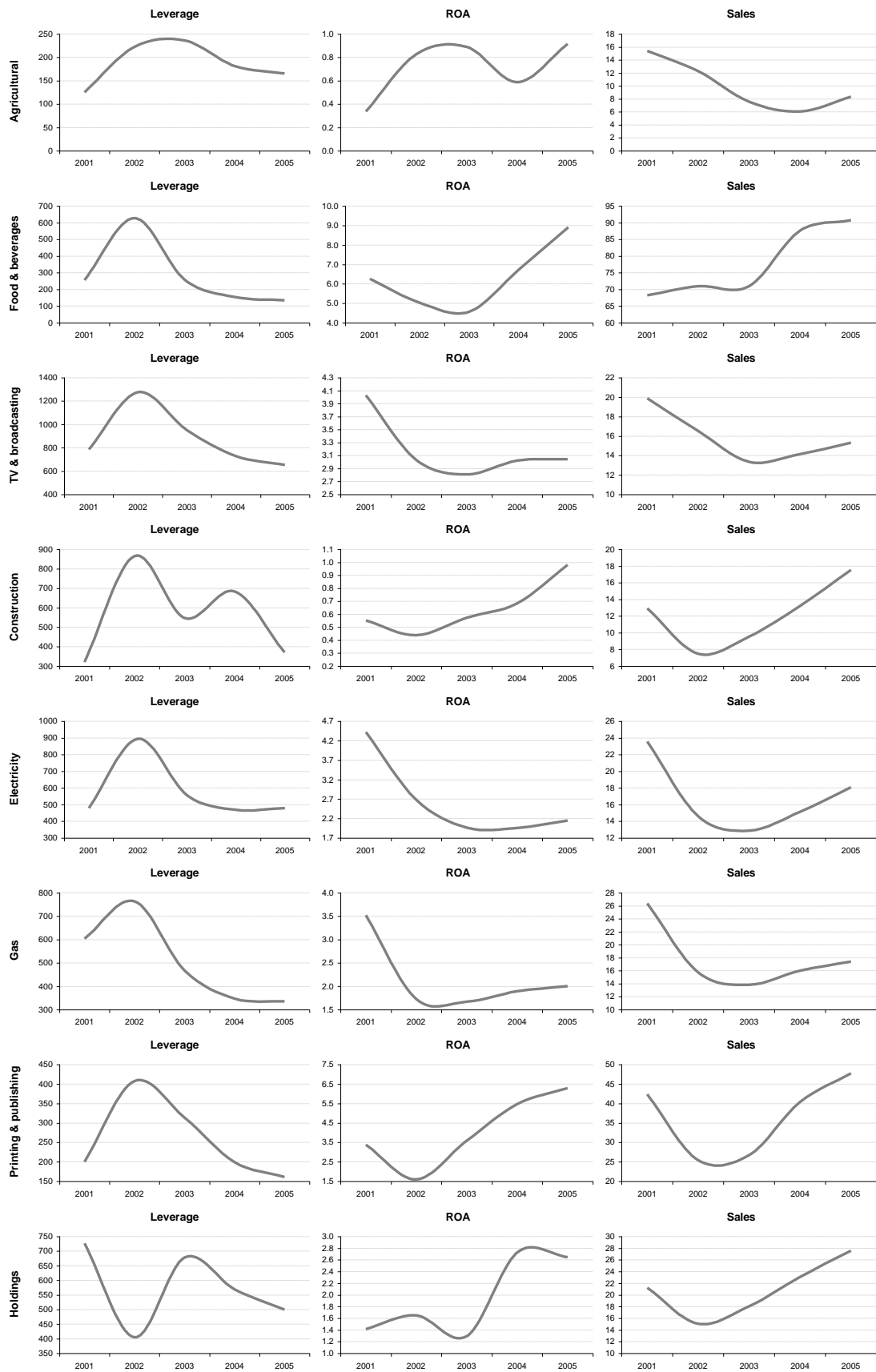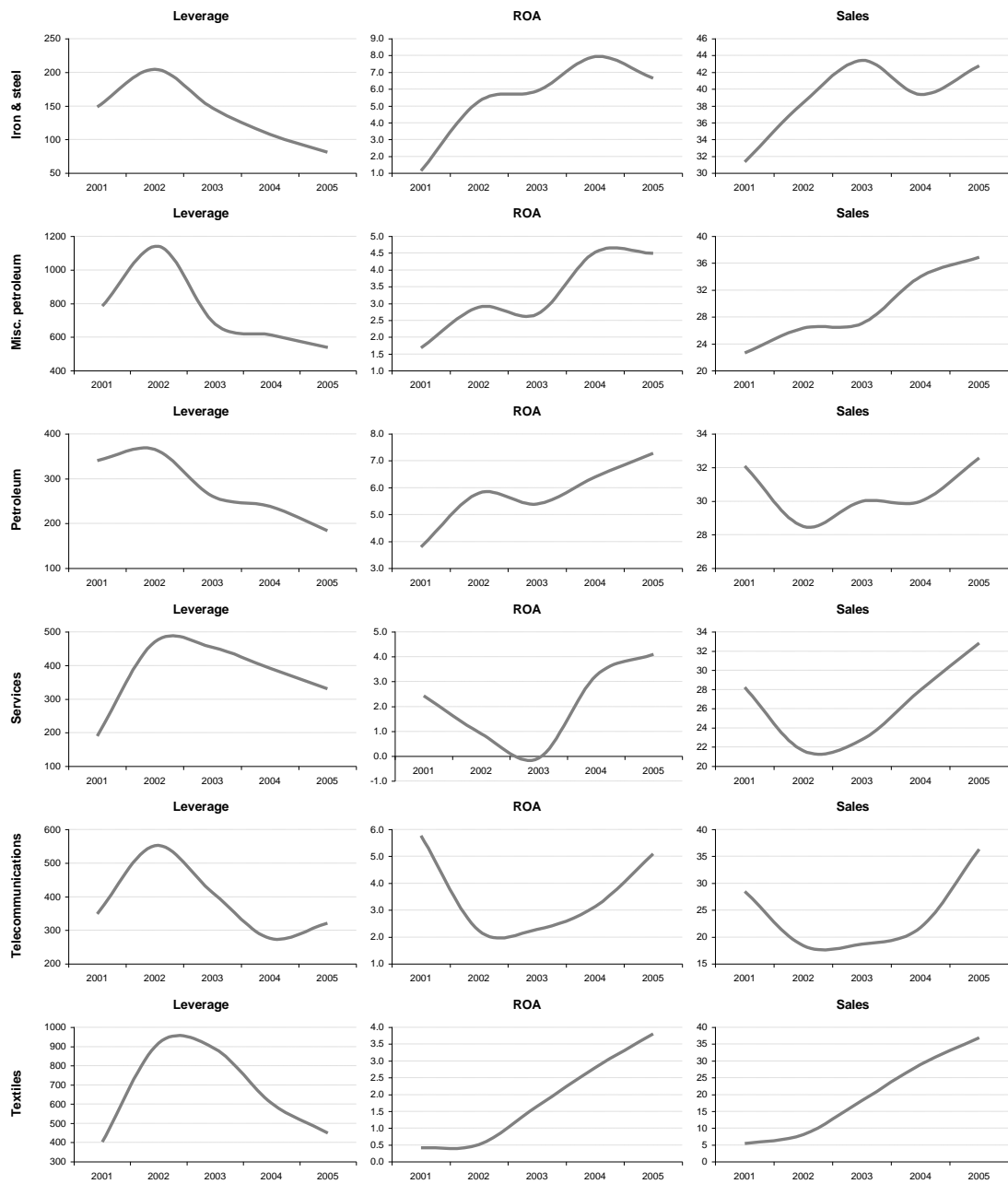
Figure 1. Industry dynamics (continued)

Table 5. Selected firm characteristics

This table contrasts selected characteristics by whether or not they are survivors or defaulters and whether or not they have restructured their debt using the Wilcoxon rank sum test. Also known as the Mann-Whitney test, the Wilcoxon rank sum test, is a non-parametric test used to test the median difference in paired data. All statistical tests are two-sided. A p-value of < 0.1 is considered statistically significant.

		Survivors	Defaulters	p-value of Wilcoxon rank sum test	Restruct.	Not Restruct.	p-value of Wilcoxon rank sum test
Liquidity	Median	0.036	0.040	0.4781	0.050	0.033	0.002***
	Min.	0.001	0.001		0.001	0.001	
	Max	2.038	4.426		0.560	4.426	
Leverage	Median	1.712	3.647	0.000***	2.974	3.023	0.091*
	Min.	0.078	0.386		0.541	0.078	
	Max	10.218	24.354		18.478	24.354	
Equity	Median	1.188	0.571	0.000***	0.679	0.735	0.1461
	Min.	0.098	0.041		0.076	0.041	
	Max	17.531	38.372		4.226	38.372	
Sales	Median	0.354	0.200	0.001***	0.244	0.204	0.5369
	Min.	0.008	0.023		0.066	0.008	
	Max	0.714	1.454		0.604	1.454	
ROA	Median	0.036	0.023	0.001***	0.025	0.024	0.2829
	Min.	-0.018	-0.047		-0.008	-0.047	
	Max	0.132	0.158		0.111	0.158	

* statistical different at the 10%; ** statistical different at the 5%; *** statistical different at the 1%.

Table 6. Determinants of default: economic factors

Estimates of the probability of default due to economic factors. The dependent variable is a dummy variable that takes the value of one if the firm defaulted during the period of study and zero otherwise. The independent variables are economic factors (exogenous to the firm): *ER_chng* denotes the variation of the exchange rate. *Ln_Yield* is the log of the YPF 9 1/8% 2009 Bond yield, *GDP_chng* is the change in the GDP.

Panel A: Logit Estimation	Probit (1)	Probit (2)	Probit (3)	Probit (4)
ER_chng	3.289***			1.563***
	[0.455]			[0.598]
Ln_Yield		4.885***		3.599***
		[0.924]		[0.695]
GDP_chng			-0.224*	0.067
			[0.133]	[0.089]
Constant	-3.950***	-14.792***	-3.367***	-12.014***
	[0.363]	[2.294]	[0.376]	[1.690]
Observations	1357	1416	1416	1357
Pseudo R-squared	0.18	0.24	0.05	0.25

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Panel B: Fixed Effects Logit	FE Probit (5)	FE Probit (6)	FE Probit (7)	FE Probit (8)
ER_chng	3.288***			1.569***
	[0.358]			[0.599]
Ln_Yield		4.895***		3.622***
		[0.604]		[0.705]
GDP_chng			-0.223***	0.067
			[0.047]	[0.074]
Observations	828	864	864	828
Number of companyindex	36	36	36	36

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7. Determinants of default: financial factors

Estimates of the probability of default due to financial factors. The dependent variable is a dummy variable that takes the value of one if the firm defaulted during the period in consideration and zero otherwise. The independent variables are internal or firm-specific factors of default. For the financial category, in terms of firm characteristics, *Size* represents the size of the firm (log of assets). In terms of balance sheet data, *Liquidity* denotes cash-in-hand over total debt, *Leverage* stands for debts over assets, and *Equity*, total assets over total liabilities. *Sales* denotes net sales over total assets (computed as trailing) and *ROA* represents return over assets (computed as trailing).

Panel A: Logit Estimation

	Logit (1)	Logit (2)	Logit (3)	Logit (4)	Logit (6)	Logit (5)	Logit (7)
Size	0.18						0.16
	[0.157]						[0.300]
Liquidity		-3.670**					-1.63
		[1.558]					[2.485]
Leverage			0.142***				0.102**
			[0.044]				[0.049]
Equity				-1.586**			-0.89
				[0.754]			[0.594]
Sales					-0.32		1.52
					[0.907]		[1.271]
ROA						-3.46	-7.58
						[6.567]	[9.328]
Constant	-6.982**	-2.941***	-3.938***	-2.166***	-2.901***	-2.886***	-6.39
	[3.375]	[0.351]	[0.397]	[0.535]	[0.430]	[0.328]	[6.438]
Observations	856	872	858	864	711	711	677
Pseudo R-squared	0.01	0.02	0.06	0.08	0	0	0.1

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Panel B: Fixed Effects Logit

	FE Logit (8)	FE Logit (9)	FE Logit (10)	FE Logit (11)	FE Logit (12)	FE Logit (13)	FE Logit (14)
Size	1.715**						1.00
	[0.687]						[0.847]
Liquidity		-3.21					-0.43
		[2.850]					[3.661]
Leverage			0.405***				0.333***
			[0.095]				[0.096]
Equity				-2.94***			-1.26
				[1.004]			[0.944]
Sales					-2.77		3.41
					[2.668]		[4.279]
ROA						-12.46	-6.64
						[11.260]	[16.371]
Observations	548	534	534	534	459	453	453
Number of companyindex	24	23	23	23	23	23	23

Robust standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8. Characteristics of restructuring firms: economic factors

Estimates of the probability of restructuring corporate debt in terms of firms' characteristics. The dependent variable is a dummy variable that takes the value of one if the firm restructured by means of an exchange offer during the period of study and zero otherwise. The independent variables are economic factors (exogenous to the firm): *ER_chng* denotes the variation of the exchange rate. *Ln_Yield* is the log of the YPF 9 1/8% 2009 Bond yield, *GDP_chng* is the change in the GDP.

Panel A: Logit Estimation

	Logit (1)	Logit (2)	Logit (3)	Logit (4)
ER_chng	-2.764			-1.354*
	[2.681]			[0.820]
Ln_Yield		-0.087		1.711***
		[0.676]		[0.439]
GDP_chng			0.464***	0.507***
			[0.177]	[0.175]
Constant	-3.655***	-3.583***	-4.423***	-7.994***
	[0.217]	[1.386]	[0.440]	[1.116]
Observations	1357	1416	1416	1357
Pseudo R-squared	0.01	0	0.06	0.07

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Panel B: Fixed Effects Logit Estimation

	FE Probit (5)	FE Probit (6)	FE Probit (7)	FE Probit (8)
ER_chng	-2.806			-1.471
	[1.979]			[1.593]
Ln_Yield		-0.089		1.821***
		[0.590]		[0.685]
GDP_chng			0.477***	0.533***
			[0.140]	[0.157]
Observations	437	456	456	437
Number of companyindex	19	19	19	19

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9. Characteristics of restructuring firms: financial factors

Estimates of the probability of restructuring corporate debt in terms of firms' characteristics. The dependent variable is a dummy variable that takes the value of one if the firm restructured by means of an exchange offer during the period of study and zero otherwise. The independent variables are internal or firm-specific factors of default. In terms of firm characteristics, *Size* represents the size of the firm in terms of its assets (log of assets). In terms of balance sheet data, *Liquidity* denotes cash-in-hand over total debt, *Leverage* stands for debts over total liabilities, and *Equity*, total assets over total liabilities. *ROA* represents return over assets (computed as trailing) and *Sales* denotes net sales over total assets (computed as trailing).

Panel A: Logit Estimation

	Probit (3)	Probit (4)	Probit (6)	Probit (5)	Probit (7)	Probit (8)	Probit (9)
Size	-0.118 [0.135]						-0.143 [0.110]
Liquidity		0.1 [0.184]					0.049 [0.256]
Leverage			-0.016 [0.040]				-0.05 [0.046]
Equity				-0.044 [0.087]			-0.09 [0.156]
Sales					-0.426 [0.524]		-2.920** [1.574]
ROA						5.61 [5.097]	20.609* [10.516]
Constant	-1.26 [2.806]	-3.715*** [0.274]	-3.621*** [0.286]	-3.645*** [0.303]	-3.373*** [0.310]	-3.684*** [0.336]	-0.096 [2.593]
Observations	856	872	858	864	711	711	677
Pseudo R-squared	0	0	0	0	0	0	0.03

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Panel B: Fixed Effects Logit

	FE Probit (10)	FE Probit (11)	FE Probit (12)	FE Probit (13)	FE Probit (14)	FE Probit (15)	FE Probit (16)
Size	2.348** [0.969]						2.176* [1.277]
Liquidity		3.629* [1.862]					1.608 [2.376]
Leverage			-0.068 [0.132]				-0.093 [0.156]
Equity				0.211 [0.371]			-0.034 [0.439]
Sales					0.753 [3.607]		-3.486 [6.954]
ROA						14.978 [14.734]	30.68 [30.515]
Observations	275	281	281	281	239	236	236
Number of companyindex	12	12	12	12	12	12	12

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

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