Essays on Financial Sector, Inflation and Exchange Rates

by

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Abstract

Chapter 2. This chapter studies the effect of high inflation on the financial system. The chapter develops a model, which shows that employment in the banking sector, as well as the number of banks and their branches increases with inflation. Using National Accounts data, the chapter shows that the share of the financial sector in GDP is higher in high-inflation countries. This evidence confirms the hypothesis that the number of financial institutions and employment in financial sector increases substantially in times of high inflation.

Chapter 3. Using the example of the UK and Spain, this chapter shows that devaluation of a fixed exchange rate is associated with a significant positive change in the stock prices of the exporting firms versus the stock market prices of the importing and non-tradable firms. This result sheds more light on the problem of the exchange rate exposure. It is particularly interesting, since the previous literature on the subject found no exchange rate exposure of the exporting firms in the floating exchange rate regime.

Chapter 4. The chapter provides empirical evidence of a significant price decline of the firms with the substantial debt burden in Mexico and Thailand after devaluations in 1994 and 1997, respectively. In the case of Mexico, where the relevant data are available, it is shown that the decline was particularly prominent for the firms with large foreign debts.

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To my mother

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Chapter 1

Introduction

Chapter 2 of this thesis studies the interactions between inflation and financial sector. It has been known for a long time that the structure of the banking sector during the periods of high inflation is different from the low inflation periods. The number of branches of banks and other financial institutions, as well as the number of employees and ATMs utilized by the financial sector is substantially higher in the hyperinflationary countries. The expansion of the financial sector was first observed by Keynes for the case of Austria, and later documented by Bresciani-Turroni for the case of Germany. Recently, the same pattern has been observed in Israel and hyper-inflationary countries of Latin America.

The logic behind this development is the following. On the one hand, high inflation induces people to look for financial instruments that would allow them to keep the value of their monetary holdings unaffected by inflation or at least to or at least partly protected from inflationary erosion. On the other hand, most of the transactions are still done in the simple money form. Hence, the number of transactions, which banks and other financial institutions have to make, increases with inflation. At the same time, the profit of these financial institutions increases as well. If financial sector is competitive, there will be new entries in the industry to take advantage of this cumulative profit increase.

Despite general consensus on this phenomena, an adequate empirical investigation of the problem has been lacking. Chapter 2 tries to fill this gap in the literature. Using the panel data on the share of financial sector in GDP, we construct an empirical test of the hypothesis that the share of the financial sector is higher in the high inflationary countries than in the other

countries. We find that this statement is true, and that the difference between the shares of the financial sector in GDP in countries with inflation above 100 percent per year and in the other countries is positive and equal on average to about 3-4 percentage points. We also find that this difference is particularly large for the countries with high and persistent inflation. On the other hand, in the countries with medium inflation, the share of the financial sector in GDP is smaller than average. This finding can be justified by the fact that the financial repression measures, which are often used to stabilize inflation, have a significant negative impact on the financial sector when the inflation rate is moderate. However, they are largely ineffective when inflation increases towards a hyperinflationary range.

Chapters 3 and 4 investigate the links between the stock market and the exchange rate. Globalization of the stock markets across countries has opened a question of the interrelationships between the stock market and the exchange rate regimes. The questions of how firms valuation changes in response to the changes in the exchange rate, or of the connection between the currency crises and the stock market are still to be answered by economic research.

In chapter 3 we make an attempt to contribute to the understanding of the exchange rate exposure of firms. Theoretically, firms in the exporting sector should be positively affected by a devaluation of the exchange rate and negatively affected by an appreciation. However, most empirical studies undertaken to date have failed to confirm this theoretical hypothesis. We argue, that the reason for this finding is not that there is no exchange rate exposure, but rather that the changes in the exchange rates during the episodes studied in the literature were not large enough to produce significant estimates of the exchange rate exposure. Using the data on the stock market returns of English and Spanish firms, we show that the relative valuation of firms with larger export share improved as a result of the currency devaluation during the European Monetary System crisis in 1992-1993. Therefore, we find significant evidence of the exchange rate exposure of firms in these two countries.

Chapter 4 addresses the question of whether the firms debts, and in particular foreign debts, have affected the stock market performance of the firms during the currency crises in Mexico in 1994 and in East Asia in 1997. There is an opinion among some economists that the companies' debts, especially foreign, have served as one of the major reasons for the output collapse in Mexico and East Asia after the currency crises in these countries. Devaluation automatically

increases the foreign debt burden of the companies, which makes them technically insolvent, even if they are economically solvent The resulting credit crunch does not allow exporting firms to increase their production as they would have done otherwise. Hence, the total output declines.

To test this hypothesis we used the balance sheets data of Mexican and Thai companies listed on the stock exchanges of the corresponding countries. For both countries, we had information on the total amount of debts and on the amount of the short-term debts. Unfortunately, we were only able to collect the data on the foreign debts for Mexican firms. Using this information, we find that the stock market returns during a devaluation depend negatively on the size of total debts, and on the share of foreign debt in the total debts. Since we expect the changes in the stock market prices during a devaluation to reflect investors' expectations regarding the post devaluation performance of the firms, our finding suggests that investors expected that the companies with large foreign debt would under-perform compared to the other companies after a devaluation.

Chapter 2

Financial Sector and Inflation

Most economists agree that high inflation imparts a significant impact on the 'physical' size of the banking industry. In particular, it is widely accepted that the number of banks, branches, and employees increases substantially with the increase in inflation. In addition, most economists would agree that banks upgrade their technology much faster during periods of high inflation relative to low inflation periods.

To illustrate the validity of these statements, one can refer to several historical episodes. For instance, in Germany in 1923[1], the year when inflation reached its peak, the number of employees in the 'D' banks was more than four times bigger than in 1914. Moreover, in 1924, the number of employees in these banks decreased almost by half. Furthermore, the number of current accounts in the three biggest 'D' banks was 4.5 times larger in 1923 than in 1914, and this number decreased by the factor of 4 in 1924. Sixty years later, in 1983 in Israel, we can see a similar picture. The share of employment in the banking sector more than doubled from the end of the 1960s to 1983-84. After the stabilization of inflation, employment in the banking sector was permanently decreasing, and in 1995 the share of employment in the banking sector was 40 percent smaller than in 1983. Different observers noticed the same pattern of the banking sector development in the Latin American countries in the 1980s. For example, the number of financial institutions in Argentina skyrocketed when chronic hyperinflation started in mid-1970. While in 1976 there were only 3171 financial institutions in Argentina, in 1979 there

[1] Bresciani-Turroni (1937), pp. 215-216

were already 4106 of them, i.e. about one third more. Even economies in transition, which seem to be substantially different from most other economies in other respects, did not escape this pattern. In Russia, the number of registered credit institutions proliferated in the early 1990s. By the end of 1992, there were already 1713 of such institutions, and this number increased to almost 2600 by mid-1995. When inflation started to decline, the number of operating financial institutions and the number of branches decreased.

This chapter provides a systematic study of the 'overbanking' phenomena. Using the evidence from a panel data study, the chapter shows that there is a correspondence between the increase in the share of the financial sector in GDP and the increase in the level of inflation. On average, the share of the financial sector in GDP is 3-5 percents larger in countries where inflation is above 100 percent per year. The regression analysis shows that the share of the financial sector in GDP is the highest in the countries with high and persistent inflation. This finding is interpreted as confirming the hypothesis that inflation causes an increase in the 'physical size' of the banking sector. The chapter develops a theoretical model which gives the rationale for the empirical results. It is shown, that, under the assumption that individuals have Baumol-Tobin type demands for money, and that the banking industry is competitive, the number of banking institutions tends to increase with inflation.

The empirical part of this chapter is related to the empirical analysis undertaken by English (1996). While English (1996) paper is based on the cross-section analysis of data for one year only (1986) and for 73 countries, the present chapter uses panel data for the maximum period of 1949-1996, and for the maximum sample of 169 countries. To motivate the empirical section, this chapter studies the correlations between the share of the financial sector in GDP and other possible measures of the size of the financial sector, which is not done by English (1996)[2].

The classical reference on the relationship between inflation and the size of the banking sector is a footnote in the Keynes's Monetary Reform[3] (1923). Ephrame Kleiman (1989) demonstrates the presents of 'overbanking' in Israel, and makes an attempt to estimate the costs of inflation originating from overemployment in the banking sector. He estimates the banking product originated due to the inflation-caused growth of employment in the sector since 1978 at 1-1.3

[2] For the details, see the discussion of the data in Section 2.

[3] Keynes (1923), p.51

percent of 1982 NDP, and the total costs of inflation in Israel at about 3-4 percent of 1982 NDP[4]. Arie Marom, makes similar calculations on the impact of inflation above 10 percent per annum on Israelian GDP[5]. His estimate of the cumulative impact since 1955 is equal to nearly one eighth of the 1982 GDP.

Recently, the interest in this topic has received a new impetus, due to the banking problems, appearing all over the world. For example, in their study of the determinants of the banking crisis, A. Demirguc-Kunt and E. Detragiache (1997) found that the countries with high inflation have a higher probability of experiencing systematic problems with their banking systems.

The chapter proceeds as follows: Section 2.1 provides the theoretical benchmark for the empirical study of the effect of inflation on the financial sector. Section 2.2 reviews the dataset, and Section 2.3 discusses the empirical results of the panel data study. Section 2.4 concludes.

2.1 Theory

This section formalizes the idea, which goes back to at least Bresciani-Turroni (1937), that the 'overbanking' phenomena is the result of the optimal response of the banking system to the decrease in the demand for money caused by inflation[6]. We construct a model, which shows that the equilibrium number of banks increases with inflation, under the assumptions of a Baumol-Tobin type demand for money and perfect competition in the banking industry. Although an equilibrium phenomenon, 'overbanking' is caused purely by inflation, and thus can be completely attributed as a cost of inflation. The assumption of perfect competition is essential for our results: we show that the main conclusion does not hold if the banking industry is monopolistic.

2.1.1 Model

We assume that banks are private, profit maximizing institutions. Bank profit originates from the differential between credit and deposit interest rates. The demand for credit is infinitely

[4] Kleiman (1989), pp.13-15

[5] Kleiman (1989), p.20

[6] The model presented in this section is a partial equilibrium model. Ireland (1994) and English (1996) develop general equilibrium models that give similar predictions.

elastic at some constant real interest rate r. Hence, the supply of credit is completely determined by the availability of funds, i.e. by the demand for deposits by the bank customers. There are no reserve requirements, and banks lend out all the funds they get from the deposits[7]. Banks' customers are located around a unit density circle. At every moment in time, there is a certain number of banks located around this circle. A customer goes to the bank, which gives her the highest profit, taking distance from the bank into consideration. Hence, the profit function of a bank can be written in the following form:

$$P = 2m \int_0^{\overline{\tau}} B(\tau, m, \pi) d\tau - F, \tag{2.1}$$

where m is the interest rate differential between deposit and credit interest rates, B stands for the demand for deposits, τ is the distance between locations of the customer and the bank, $\overline{\tau}$ is the distance between the bank and the location of the customer, living the furthest away from the bank, but using its services, F incorporates the operation costs of the bank, π is the sum of the inflation rate and the real rate of interest that is charged by all the banks for the credit issued. The interest rate that each bank pays on the deposit accounts is $r = \pi - m$.

The bank customers' demand for money takes a classical Baumol-Tobin form, where the transaction costs of going to the bank are equal to the distance between the location of the customer and the location of the bank. Thus, the period average demand for deposits by each customer of the bank is given by

$$B = \frac{1}{2}(1 - \frac{1}{n})Y,$$

where Y is the income of the consumer earned at the beginning of the period, n is the number of times, the consumer goes to the bank during the period. The solution to the individual problem takes the usual form, $n = \sqrt{\frac{Yr}{2\tau}}$. For the rest of the exposition, the integer constraint will not be taken into account. After substituting the solution of the customers' problem into equation (2.1), the bank's profit function takes the form:

[7]This assumption is easy to relax in this model. Since reserve requirements reduce the supply of credit given deposits, one can think of reserve requirements as a tax on the credit interest rate.

$$P = mY\overline{\tau}(1 - \frac{2}{3}\frac{1}{\overline{n}}) - F,$$

where $\overline{n}$ is the number of visits to the bank by the marginal consumer.

Banks are assumed to be located equidistant at any point in time. After an entry of a new bank, all banks immediately reallocate to keep the distance between each pair of the two neighbor banks equal. This is a standard simplification assumption that allows us not to consider the reallocation of banks after an entry. This assumption simplifies the exposition substantially, without changing the main results.

Competition

Consider the case of a competitive banking industry where a zero profit condition (2.2) below holds in equilibrium, ignoring the integer constraint:

$$mY\overline{\tau}(1 - \frac{2}{3}\frac{1}{\overline{n}}) - F = 0 \tag{2.2}$$

Equation (2.3) defines the location $\overline{\tau}$ of the marginal consumer who is indifferent between going to this bank and the bank on the other side of the circle. An asterisk denotes corresponding variables for the bank on the other side of the circle.

$$\frac{1}{2}Y(1 - \frac{1}{\overline{n}})r - \overline{n\tau} = \frac{1}{2}Y(1 - \frac{1}{\overline{n^*}})r^* - \overline{n}^*\overline{\tau}, \tag{2.3}$$

Each bank chooses the profit maximizing value of the interest rate margin, m, taking the policy of other banks as given, and taking the respective changes in the location of the marginal customer into consideration.

Proposition 1 *In a symmetric equilibrium, when all banks pay the same deposit interest rate and choose the same interest rate differential, the equilibrium number of banks increases with inflation.*

Proof. See Appendix A.

The intuition for this result is as follows. As inflation increases, all individuals increase their supply of deposits. Therefore, the profit of each bank goes up. Hence, the zero profit condition is violated, unless there is an entry of a new bank. This situation can not be an equilibrium. To put it differently, with the increase of inflation, the share of seigniorage which accrues to the banking industry increases. Thus, if the industry is competitive, its size goes up too. Notice, that reintroduction of the integer constraint will make the relationship between the number of banks and inflation resemble a step function. In addition, if we drop the assumption of equidistant reallocation, the dynamics of entry will depend on the dynamic of reallocation. Nonetheless, there still will be a threshold rate of increase in inflation, such that if inflation reaches this level, new entry is unavoidable. Notice also, in this model it does not matter if new entry is the entry of a new bank or a new branch of an existent bank. What is important is that the total number of branches[8] increases with inflation.

Monopoly

For comparison, consider the case when all branches are controlled by the same headquarter. Thus, there is a monopolistic bank, which makes the decision about location of offices along the circle. Outside entry is not possible by assumption. The total profit of the monopoly is:

$$P = 2Nm \int_0^{\bar{\tau}} B(\tau, m, \pi) d\tau - FN,$$

Under the assumptions that branches are located equidistant from one another, and that the supply of deposits has the same form as before, the total profit of the bank has the following form:

$$P = \frac{1}{2} mY(1 - \frac{2}{3}\frac{1}{n}) - NF = \frac{1}{2} mY(1 - \frac{2}{3}\frac{1}{\sqrt{YrN}}) - NF. \tag{2.4}$$

Proposition 2 *If the initial level of inflation is high enough, the bank will be willing to decrease the number of branches when inflation increases.*

Proof. See Appendix A.

[8] One can also interpret this result as an increase in the number of employees.

When the banking industry consists of a one big monopolistic bank, if inflation goes up, the profit increase due to the increase in the supply of deposits after opening a new branch is smaller than the decrease in operating costs due to closing of an old branch. Thus, the monopoly decreases the number of branches when inflation rises. This is an optimal strategy for monopoly: since the supply of deposits is high, a decrease in profit due to destruction of one of the branches is smaller than the reduction in operation costs, which such a closure prompts.

In reality, it is difficult to imagine that the banking sector can stay monopolistic in times of high inflation. Even if legislation of the country makes the entry of new banks very difficult, non-banking institutions will appear that would provide essentially the same services. In a more realistic competitive case, the testable implication of the model is that 'physical' size of the banking sector will increase with an increase in inflation.

2.2 Data

The main challenge for the empirical part of the chapter has been gathering a workable dataset. The direct measures of the 'physical' size of the banking and financial industry, such as the number of banks, financial institutions, branches, ATM machines, etc., are difficult to find for most countries in the world including the hyperinflationary ones, of which only Israel and Argentina publish such information[9]. Data on employment in the financial sector, published by the International Labor Organization, exists for a bigger panel, but coverage of the high inflationary countries is poor, and the quality of the data is questionable[10].

Therefore, in this chapter the United Nations data on the GDP produced in the Financial Sector, Insurance, Real Estate and Business Services, published in the 'System of National Accounts: Main Aggregates and Detailed Tables' is used. The main advantage of this dataset is coverage: at the maximum the data exists for 169 countries for the period 1949-1994. In principle, the UN publishes the information on the GDP produced in the financial sector only, and on the employee's compensation in the financial sector. However, none of these datasets

[9] For Argentina, the information on the number of financial institutions exists only for 1976-1983.

[10] For example, the data for Argentina exists only for 1982-1984, and for Bolivia only for 1989-1992. Brazil is better covered, the time series covers 1976-1990, but the data look very suspicious: the share of the employed in the financial sector in the total employment more than doubles during the period from 1982 to 1983.

include hyperinflationary countries.

Since the data used in the empirical study include information on sectors other than financial, the empirical results can suffer from the missing variable bias. Appendix A.2 provides a discussion of the size of the possible measurement error. It turns out that the share of the sectors other than financial in the measure of the GDP produced in the Financial sector, insurance, real estate and business services is the largest for the developed countries like Canada and Sweden. Since these countries never had inflation above 20 percent per annum, the empirical results presented in this chapter probably underestimate the effect of inflation on the banking sector[11].

As a measure of the size of the financial sector, the share of the financial sector, insurance, real estate and business services in GDP is used[12]. To the extent that the value added calculations include operating profit in addition to employee compensation, this measurement overstate the 'physical' size of the financial sector. Moreover, there is a theoretical possibility, that changes in seigniorage dominate the dynamics of changes in this measure during high inflation times. To assess the importance of this issue for the validity of empirical results presented in this chapter, correlations between the share of the financial employee compensation in the total employee compensation and the share of the financial sector, insurance, real estate and business services in GDP are calculated[13] for those country/years for which the data is available. The results of these calculations demonstrate a sufficiently high correlation between the two measures: in 17 out of 34 countries in the sample the correlation is above 60 percent. As a further test, all regressions are repeated for the share of the financial employee compensation in the total employee compensation. As it is discussed in the Appendix A.3, using this measure of the size of the financial sector does not change the pattern of the results.

All countries in the sample use 1968 System of National Accounts methodology, but im-

[11] Another related question is how insurance, real estate and business services are affected by inflation. Real estate provides an inflationary safe asset, so its dynamics should be similar to the dynamics of the financial sector. The effect of inflation on insurance and business services is less clear. Since price volatility increases with inflation, the number of insurance contracts might go up in high inflationary times. There seems to be no plausible conjecture about the relationships between inflation and business servicess. However, for many countries, business services, if they exist at all, comprise only a tiny part of GDP in comparison to the financial sector.

[12] The data in current prices is used when available. Otherewise, the numbers in constant prices are used.

[13] See Appendix A.2 for the details.

plementation is different both across countries and across years. Hence, some changes in the share of the financial sector, insurance, real estate and business services in GDP are purely the results of changes in the methodology of data collection. Due to the multiplicity of the number of such changes, they are not controlled for in calculations. However, some countries in which the methodology is substantially different from the others[14] are excluded from the sample.

Inflation series are taken from the International Financial Statistics, defined as the change in the CPI variable. For the purposes of this chapter, it is not important what measure of inflation is used. Hence, we use the change in CPI as the most easily available variable. For the real GDP series, variable RGDPCH, real GDP per capita in constant dollars (Chain index, expressed in international prices, base 1985) from PWT5.6 is used. In several cases PWT5.6 data is not available, the World Bank 95 data on the real GDP is used. Other variables, such as political instability, and black market premium are taken from the Barro-Lee data set.

2.3 Evidence

As suggested by a visual inspection of the graphs of the time series of the shares of financial sector, insurance, real estate, and business services in the GDP (hereafter the shares of the financial sector) in countries, which have recently experienced high inflation, there is a correspondence between an increase in these shares and an increase in inflation. As one can see from Figure 2-1, in many Latin American countries, the share of the financial sector started to rise in the mid-70, when inflation jumped to the level above 100 percent in these countries. However, the relationship between inflation and the financial sector seems to be very weak, and country dependent. For example, in Brazil and Chile,[15] the share of the financial sector was rising during the period of inflation, and declined afterwards.[16] In Argentina and Bolivia, the share of the financial sector increased in the late 1970s, and then stayed relatively constant.

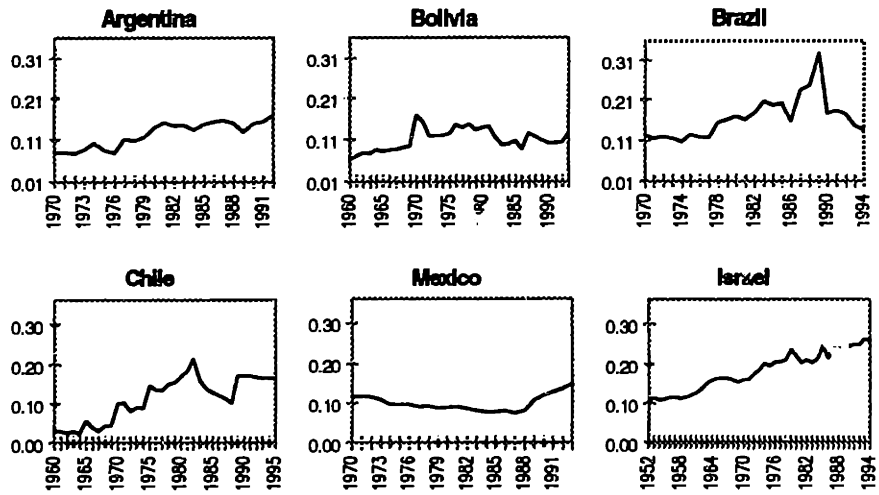
There are many factors, such as banking regulations or levels of dollarization, that at least theoretically may be responsible for these inter-country differences. Nonetheless, the shares of

[14] Paraguay, and several transition economies.

[15] The jump in the share of financial sector in Chile in 1988 represents a structural break due to changes in the methodology.

[16] The same is true for Israel. However, after a short while, the share of the financial sector started to increase again in this country.

Figure 2-1: Share of Financial Sector in High Inflation Countries in 1970-1990



the financial sector in GDP in the high inflationary countries should be higher on average than the correspondent shares in the low inflationary countries.

2.3.1 Comparison of means

If there is a systematic difference between the size of the share of the financial sector in high inflationary countries and in the low inflationary countries, it should be reflected in the means of the shares. Table 2.1 contains the mean shares of the financial sector for all countries, as well as in the breakdown for different inflation levels. The table confirms the hypothesis that the share of the financial sector increases with GDP. Not surprisingly, the relationships look non-linear: in the countries where inflation is below 100 percent per annum, the average share of the financial sector in GDP is approximately 10 percent. In countries with inflation above 100 percent, the share of the financial sector in GDP is about 12-13 percent.

Although transition economies comprise a small part of the overall sample, their share among high inflationary countries is high. Since the financial sector was highly repressed in these countries during communist times, inclusion of these countries in the sample leads to an underestimation of the mean share of the financial sector in GDP in the high-inflation countries. To correct for this underestimation, Table 2.2 presents the shares of the financial GDP in all

Table 2.1: All countries

Inflation	All	<10%	>10% and < 30%	>30% and <100%	>100%	>200%	>500%	>1000%
Mean share	0.1044	0.1093	0.0986	0.1027	0.1276	0.1349	0.1265	0.1241
st. dev.	0.055	0.053	0.043	0.050	0.066	0.066	0.071	0.079
# of observ.	3741	1629	913	190	83	41	22	15

Table 2.2: Excluding economies in transition

Inflation	All	<10%	>10% and < 30%	>30% and <100%	>100%	>200%	>500%	>1000%
Mean share	0.1057	0.1097	0.0986	0.1025	0.1338	0.1489	0.1460	0.1455
st. dev.	0.054	0.053	0.043	0.050	0.066	0.064	0.065	0.07
# of observ.	3657	1619	912	188	73	33	17	12

countries except transition economies.

As expected, the exclusion of transition economies, increases the share of the financial sector in high inflation countries. The share of the financial sector in GDP in the countries where inflation is now above 100 percent per year is on average 3-5 percent higher than in countries with low inflation.

It may take some time for the financial system to adjust to inflation. In addition, the financial system may only adjust to relatively permanent changes in inflation. Hence, it is expected that the share of the financial system in countries, where inflation is not only high, but also persistent would be higher than in other countries.

Table 2.3 presents the summary of the measures of the shares of the financial sector for the country/years, when inflation was above 100 percent for at least 2 years in a row. The share of the financial sector in these countries is approximately 5 percent higher than in low-inflation countries.

Table 2.3: Inflation in the previous year > 100

All Countries						
Inflation	>100	>200	>300	>500	>1000	>2000
Mean share	0.1369	0.1444	0.1434	0.1357	0.1350	0.1254
st. dev.	0.067	0.068	0.070	0.073	0.077	0.047
# of observations	56	34	29	18	13	9
Excluding Economies in Transition						
Inflation	>100	>200	>300	>500	>1000	>2000
Mean share	0.1422	0.1517	0.1519	0.1476	0.1455	0.1400
st. dev.	0.067	0.065	0.066	0.067	0.070	0.020
# of observations	51	31	26	16	12	8

2.3.2 Panel regressions

Calculation of means suggests that there is a difference in the size of the financial sector between the countries that have high and low inflation. However, the differences in means of the shares are not significant. One of the reasons for this insignificance may be an omitted variables bias. There are many factors other than inflation which affect the size of the financial sector, and the simple calculation of means does not allow to control for these factors.

Unfortunately, most of the factors that affect the size of the financial sector cannot be measured directly. Among such factors are differences in regulation. While it is obvious that legislation can set obstacles to the developments in the financial sector, and the size of the financial sector differs across countries with the same level of inflation, compiling a dataset which compares legislation in all countries in the world is almost impossible. Hence, the panel data technique was chosen to provide further evidence of the relationships between inflation and the financial sector.

Both theoretical and empirical studies suggest that there is a relationship between the size of the financial sector and growth, and between the financial sector and wealth[17]. Therefore, the level of real GDP per capita is included in the regressions. Among other factors, unstable political situation may exert a negative influence on the financial sector. Also a black market premium may serve as a measure of financial repression. However, using the Barro-Lee measure

[17] King, Levin (1993)

of political instability in our regressions to control for political environment, does not produce significant results. The black market premium also does not turn out to be significant.[18]

The empirical model used to estimate the effect of inflation on the financial sector in this chapter is as follows:

$log(1+\text{share of the financial sector in GDP})_t = \alpha + \beta_1 log(\text{real GDP per capita})_t + \beta_2 inflation + \varepsilon_t$

Measuring inflation

Theory predicts that the relationship between inflation and the size of the banking sector is non-linear. Therefore, we expect that the coefficient on the inflation level, if it is used to measure inflation, to be small and not significant. Hence, in addition to the specification that uses the inflation level, we estimate several other specifications that use the following dummy variables to allow for non-linearity:[19]

1. The dummy takes the value of 1 if inflation is higher than 100 in this year, and in the year before.

2. The dummy takes the value of 1 five years after inflation was higher than 100 per cent for at least two years in a row.

3. The dummy takes the value of 1 eight years after inflation was 100 percent for at least 2 years in a row.

4. The dummy takes the value of 1 if within the previous 10 years inflation was above 100 percent for at least any 2 years.

The choice of dummy variables is dictated by the conjecture that the adjustments of the financial sector size are asymmetric: for two countries with the same current level of inflation,

[18] Regressions that include these variables are not reported in the paper, but are available upon request.

[19] We assume, following the results of the calculation of means, that major changes in the share of the financial sector happen only after inflation increases above the 100 percent per year threshold. This threshold is standard in the literature as a threshold for high inflation. For example, Dornbusch and Fischer (1993) define "moderate inflation" as inflation in between 30 and 100 percent per year. Hence, inflation above 100 percent per year would qualify as a high inflation. Afterwards, we will test the assumption that 100 percent per year was a good threshold level.

Table 2.4: Regression results

	CPI	dummy1	dummy2	dummy3	dummy4
inflation	2.21E-06	0.0177	0.0217	0.0258	0.0263
	(1.411)	(4.341)	(6.419)	(8.066)	(8.354)
log real GDP per capita	0.0289	0.0252	0.0252	0.025	0.0251
	(17.737)	(17.845)	(17.866)	(17.846)	(17.86)

t-statistics in parentheses

Table 2.5: Test for 100 percent threshold

	10<infl<30	30<infl<100	infl>30	infl>50	infl>70
inflation	-0.0045	-5.40E-03	-0.0007	0.0038	0.0086
	(-4.147)	(-2.484)	(-0.350)	(1.42)	(2.737)
log real GDP per capita	0.0259	0.0253	0.0252	0.0251	0.0252
	(18.147)	(17.82)	(17.735)	(17.722)	(17.768)

t-statistics in parentheses

the one that had higher inflation in the recent past will have a significantly larger size of the financial sector.

The results of random effect estimation are presented in Table 2.4 (t-statistics are in parentheses; the column names correspond to the measure of inflation used in the estimation). Measuring inflation by the current CPI gives a small and insignificant inflation coefficient. On the other hand, the inflation coefficient is positive, significant, and quite robust, when dummy variables 1-4 are used to measure inflation.

To test if the 100 percent per year inflation is a good threshold level of inflation, the same equation specification is estimated with inflation dummies, which correspond to different levels of inflation (see Table 2.5). The effect of moderate inflation on the financial sector is negative according to this estimation. The effect of inflation increases and becomes positive with increase in inflation.

Table 2.6: Inflation expectations

	f1	f2
future inflation	-0.0096	-0.0034
	(-2.221)	(-1.028)
log real GDP per capita	0.0252	0.0252
	(17.78)	(17.781)

t-statistics in parentheses

Inflation Expectations and Future Inflation

Theoretical model developed in this chapter is a static model, which does not explore the issue of inflation expectations. However, this issue should be addressed in the empirical investigation. Since this chapter uses annual data, using indicators of the current inflation partially takes care of the inflation expectations within the year. Nonetheless, we can use some other indicators of the future in regressions to control for expectations. In particular, it is of interest to test if there are any changes in the financial system, which take place due to anticipation of the future high inflation, while inflation is still low or moderate. The results of the attempt to estimate this specification are presented in the Table 2.6. The dummy variable f1 takes the value of 1 when inflation in the next year is above 100 percent, while this year's and the last year's inflation is below 100 percent. The variable f2 takes the value of 1 when inflation is above 100 percent in the next 2 years, while this year and last year inflation is below 100 percent.

Both f1 and f2 coefficients are negative, and the one for the f1 is significant. We interpret this finding to suggest that inflation expectations are formed for the period of less than one year.

Since stationarity might be an issue in estimation, all the regressions are reestimated for the first-differenced data. The estimation results are similar to the results for regressions in levels; they are presented in the Appendix A.3. This appendix also contains all of the regressions, that use the share of employee compensation paid in the financial sector in the total employees' compensation as a dependent variable. These results confirm the conclusion that the share of the financial sector is significantly higher in the high inflationary countries.

Persistence of inflation

Theoretically, persistent inflation should have stronger effect on the financial sector than temporary inflation. Since there are costs of entry, more banks will be willing to enter if high profits are expected to last longer. To test this hypothesis, we need to classify the countries according to the persistence of inflation. We do it using the results of an Augmented Dickey-Fuller test.[20] The estimation assumption is that inflation follows an autoregressive process of the form:

$$(1 - \phi_{i1}L - \phi_{i2}L^2 - ... - \phi_{ip}L^p)\pi_{it} = \varepsilon_{it},$$

where L is the lag operator and π_{it} is the inflation in country i at time t . This model can be rewritten in the form of an ADF test:

$$\pi_{it} = \rho_i\pi_{it-1} + \alpha_{i1}\Delta\pi_{it-1} + \alpha_{i2}\Delta\pi_{it-2} + ... + \alpha_{ip-1}\Delta\pi_{it-p+1} + \varepsilon_{it}, \qquad (2.5)$$

where $\rho_i \equiv \phi_{i1} + \phi_{i2} + ... + \phi_{ip}$, $\alpha_{ij} = -\sum_{k=j+1}^{p}\phi_{ik}$, $1 \leq j \leq p-1$. To distinguish countries according to inflation persistence, ρ_i is used as a measure of persistence for country i.

The equation (2.5) is estimated using the 4 lags without trend specification. Four lags are usually enough for the estimated residuals ε_{it} to be white noise for most of the countries. The results of the estimation are reported in Table A.7 in the Appendix A.4. In addition to the 4 lags without trend specification, the specification with 5 lags and trend is estimated. Some of the results of this additional test were significantly different, and, therefore, affected the classification of a corresponding country. The results of this test for such countries are reported in Table A.8.

The results of the test are not always conclusive due to a short length of the sample. Hence, the point estimates of these tests are used to form a basic country classification. This method of selecting countries may be a source of a potential sample selection problem in the regression results below. However, since we do not see an appropriate way of identifying this problem, we

[20] All the results in this section were obtained for the smaller set of 59 countries for which at least 23 years of data on the share of the financial sector, inflation and real GDP exist. The typical country has entries for 1970-1992. For some countries the data for early 70s or early 90s is unavailable. In such cases, the years for which the complete 23 year sample is available are included in the sample. Estimations of inflation persistence were done using the whole sample of inflation data available for each country.

do not address this issue in this chapter.

Using the results of the ADF tests, all countries in the sample were classified as follows:

1. High and persistent inflation(HP).Countries in this group have average inflation above 30 percent, and maximum inflation above 100 percent. Persistence is above 0.7 for both the ADF test which does not include time trend, and the ADF test which includes the time trend. This group consists of Brazil, Israel, and Chile.

2. High and average persistent inflation (HA). Inflation is in the same range as for the HP group, but persistence is between 0.1-0.7. Countries that belong to this group are: Argentina, Mexico, Peru, Uruguay, and Turkey. Inflation in these countries fluctuates a lot, so that on average inflation is high but not persistent.

3. High and non-persistent inflation (HM). The only country in this group is Bolivia, which had hyperinflation for a short period of time.

4. Moderate and persistent inflation (AP). Mean inflation is more than 10 percent and maximum inflation is above 30 percent. Moderate inflation seems to be more persistent on average, so the countries are classified to have persistent inflation if persistence is above 0.8 for ADF tests which both include and do not include the time trend. Countries in this group are: Dominican republic, El Salvador, Iceland, Jamaica, Nigeria, and Venezuela.

5. Moderate and average persistent inflation (AA). All other moderate inflation countries, i.e. Bangladesh, Columbia, Costa Rica, Gambia, Mauritius, Philippines, Syria, and Guyana are in this group.

6. OECD countries, excluding Mexico and Turkey, are classified into a special group. As was already mentioned, the average of the dependent variable in these countries is large due to the factors other than inflation.

7. Others. All other countries.

Table 2.7 summarizes the average shares of the financial sector in the breakdown by country groups. As expected, the countries from the HP group have the largest size of the financial

Table 2.7: Mean shares of the financial sector in GDP by country groups.

	hp	ha	hm	ap	aa	oecd	others
mean	0.170	0.115	0.101	0.097	0.096	0.140	0.103
st. deviation	0.05	0.05	0.015	0.04	0.03	0.03	0.05

sector. Surprisingly, the size of the financial sector in the average inflation countries is smaller than in the other countries.

Joint estimation of the country group effects confirms this result. According to regression (1) in Table 2.8, the size of the financial sector is the largest in the countries from the high and persistent inflation group. For other country groups, the country group coefficient is positive and insignificant, and for the countries with average and persistent inflation, the effect is negative, although insignificant.

It turned out, that not only the size of the financial sector differs across the country groups, but also the dynamics of the financial sector development is different across the groups. Table 2.8 regression (2) reports the result of joint estimation of the effect of the CPI changes on the logarithms of the shares of the financial sector by country-groups. The largest effect is again within the HP group. For the HA group the effect is positive and significant, although smaller than for the HP group. In all other country groups the effect is negative, but insignificant. This result can be a consequence of an endogeneity problem, from which this regression suffers. The problem is that the financial repression policies[21], which negatively affect the banking system, are endogenous to inflation. Hence, the share of the financial sector in GDP may look as if it were decreasing with inflation in some countries, while the true source of this effect is not inflation itself, but inflation stabilization policies. However, due to the lack of data, we will be unable to further investigate this issue.

Dollarization

The share of the financial sector in GDP is increasing with inflation only if the banking sector of the country has an opportunity to provide customers with inflationary safe assets. If such

[21] Such as increase in the reserve requirements.

Table 2.8: OLS with robust standard errors

	(1)	(2)	(3)
lrgdp	0.02177	0.02327	0.02140
	(2.803)	(3.627)	(2.755)
cpi	4.65E-06		
	(1.546)		
hp	0.04874		0.03981
	(3.144)		(2.223)
ha	0.00397		-0.00347
	(0.331)		(-0.247)
hm	0.00787		0.00386
	(1.112)		(0.408)
ap	-0.00580		-0.01337
	(-0.367)		(-0.806)
aa	0.00174		-0.00327
	(0.168)		(-0.270)
oecd	0.00478		0.00710
	(0.305)		(0.371)
hp*cpi		0.00005	0.00002
		(5.53)	(2.896)
ha*cpi		7.98E-06	9.71E-06
		(3.140)	(2.794)
hm*cpi		6.98E-07	4.15E-07
		(1.303)	(22.215)
ap*cpi		-0.00041	0.00007
		(-0.898)	(0.369)
aa*cpi		-0.00028	-0.00010
		(-0.760)	(-0.434)
oecd*cpi		-0.00094	-0.00124
		(-0.755)	(-1.428)
others*cpi		-0.00082	-0.00068
		(-1.743)	(-1.209)
Rsq	0.29	0.26	0.30
# obs.	1357	1357	1357

t-statistics in parentheses

an opportunity does not exist, because of banking system regulations, for instance, the effect of inflation on the financial system will be small.

Usually countries which have problems with their banking system due to regulations or distrust, start suffering from dollarization or currency substitution when inflation starts to increase. Therefore, while measuring the effect of inflation on the financial sector, one would like to control for dollarization. Unfortunately, we do not have the relevant information for the countries in our sample. Nonetheless, it is still possible to make some qualitative statements about empirical significance of this conjecture. For example, it is well known that in Brazil, in contrast with the other high inflationary countries of Latin America, there was almost no flight from the national currency. It was possible because of a sophisticated indexation system, which was established in this country in pre-inflationary times. On the other hand, the share of the financial sector in GDP in Brazil is the largest among the countries in our sample. At the same time, Argentina, which had similar inflation pattern, but also suffered from dollarization, has the financial sector which is on average 3 percent smaller than the one in Brazil. The same is true of Bolivia, another Latin American country which experienced dollarization. Therefore, our data seems to suggest that dollarization has a negative effect on the size of the banking sector.[22] However, no final conclusions on this point can be made without further research.

2.4 Conclusion

The chapter provides the empirical evidence which supports the theoretical conjecture that the physical size of the banking sector is higher than normal in the high- and hyper-inflationary countries. By looking at the panel data of the shares of the financial sector in GDP, the chapter shows, that these shares are significantly larger in the countries with chronic high inflation than in other countries. The chapter also finds that in the countries where inflation is within a moderate range, the size of the financial sector is smaller than average, and tends to decline with inflation. This latter finding is, probably, caused by the endogeneity problems the financial repression measures commonly used to stabilize inflation. Inflation stabilization measures, such as an increase in the reserve requirements or in the interest rates, are damaging for the financial

[22] At least as far as the legal banking sector is concerned.

system. Therefore, ideally we would like to control for such policy changes in our regressions, but we do not do so because of unavailability of data. This problem will be addressed in detail in the future research. The absence of data also prevented us from studying the effect of dollarization on the banking sector. Although, it is possible to make a qualitative conclusion that the countries which suffered from dollarization have, other factors equal, a smaller share of the financial sector. The quantitative analysis of this phenomenon is left for future research.

Chapter 3

ERM Crisis and Exchange Rate Exposure: Example of the UK and Spain

In this chapter we study the effect of depreciation on the stock market valuation of firms. While theory predicts that the price of exporting firms shall rise as a result of a currency devaluation, the empirical results are ambiguous. Empirical studies, such as Maurice Levi (1994), Yakov Amihud (1994), Eli Bartov and Gordon Bodnar (1994), Gordon Bodnar and William Gentry (1993), etc., find insignificant, and sometimes even the opposite sign on the coefficient of exchange rate exposure of exporting firms. Usually this disappointing empirical finding is explained by the hedging practices of the firms, which decrease exchange rate exposure. Another explanation circulating in the literature is that investors do not know how to price the exchange rate movements correctly. Hence, the effect of exchange rate changes on firms' valuations is revealed only after earnings announcements. Since most empirical studies were done using data from the US, and Canada, where exchange rate fluctuations are relatively small and exchange rate regimes are flexible, this hedging or "investors cannot make up their mind" explanation appear to be valid justification for the small estimates of exchange rate exposure.

To minimize the effect of hedging, this chapter studies the stock market reaction to large one time devaluations during the Exchange Rate Mechanism (ERM) of the European Monetary

System (EMS) crises in 1992-1993 in the UK and Spain. One caveat to this approach is that these devaluations were accompanied by other reforms, which are also expected to have a significant impact on firms' valuation. To eliminate this effect, the chapter only studies the cross-sectional differences in changes in the valuation of firms having different shares of export of final product and shares of imported intermediate input. We assume that macroeconomic policies affect all firms in the same way, and, therefore, do not affect cross-sectional variation in firms' valuation.

We find strong evidence of changes in relative firms' valuation in the theoretically predicted way in the UK on September 16, the day when the UK announced that it would cancel its membership in the ERM, and in Spain on September 17, when the peseta was devalued for the first time, and on May 11, the day of the last successful speculative attack. These results are robust for different estimation techniques, and different time-spans of normal return estimations. We also find that in the UK there were almost no effect of higher interest rates on the relative valuations, while in Spain, the relative value of firms dependent on bank loans decreased throughout the crisis. We also find evidence that the change in firm valuation on the devaluation days is correlated with the post-devaluation performance. For example, firms, whose share of foreign sales increased between 1991 and 1994, experienced a relative increase in their values.[1]

The chapter is organized as follows. The next section (section 3.1) reviews the theoretical predictions of the relationship between firm valuation and the exchange rate, and addresses the relevant methodological issues for the chapter. Section 3.2 studies the stock market reaction on the UK suspension of the membership in the ERM on September 17, 1992. Section 3.3 repeats the study for Spanish devaluations in September 1992-May 1993. Section 3.4 concludes. All data relevant description can be found in the Appendixes B.1 and B.2 which follows.

[1]The share of foreign sales may have decreased for two reasons: because of an increase in export volume, or because of an increase in export revenue due to a change in the relative prices after devaluation. We calculate the correlation between the percentage change in the share and the stock returns. In this case, unless the change in relative prices was not uniform accross the firms, the positive correlation coefficient means that firms which increase export volume experienced higher price increases than other firms.

3.1 Motivation and Methodology

Economic theory predicts that exchange rate devaluations shall boost country's exports and, therefore, have a positive effect on the market price of exporting firms. The appendix to this chapter presents a simple model which demonstrates this effect. However, while there is an overall consensus on the theoretical prediction of the effect of exchange rate changes on firm valuation, the empirical evidence on this matter has had only limited success so far. Maurice Levi (1994) studies the exchange rate exposure in the Canadian paper and forest industry, which exports about 70-80 percent of its final product. He finds that exposure is significant and has the correct sign only with respect to Japanese yen, while it is insignificant and even wrongly signed with respect to the American dollar or English pound. Yakov Amihud (1994) does not find any significant reaction to exchange rate changes among the 32 largest exporting companies in the US. However, he finds that the largest (and the most significant) effect of changes in the dollar on firms valuation comes with a lag of about 2 quarters. This finding is confirmed by the work of Eli Bartov and Gordon Bodnar (1994). They also find significant abnormal returns which follow earnings announcements in the quarter following significant changes in the exchange rate. This suggests, that significant amount of information that investors have on the effect of exchange rate fluctuations on firms' performance comes from the earnings announcements. Gordon Bodnar and William Gentry (1993) study exchange rate exposure among different industries in Canada, Japan, and the US. They find significant exposure for 11 out of 39 US industries, 4 out of 19 Canadian industries, and 7 out of 20 Japanese industries. Their results show that exporting industries in Japan and Canada benefit from exchange rate devaluations, while there is no significant effect of exchange rate changes on firms in the US.

Per Frennberg (1994) studies the response of the Swedish stock market to exchange rate devaluation in Sweden in 1977, 1981, 1982, and 1992. He argues that Sweden provides a good example of a country to study exchange rate exposure, since it has a fixed exchange rate, which was substantially devalued several times. He finds large exchange rate exposure for Swedish firms. About 3 percent of cross-sectional differences in exposure can be attributed to differences in the level of net foreign income.

In this chapter, we follow the strategy similar to the one in the Per Frennberg (1994) paper. We study the effect of big devaluations of fixed exchange rates on stock market prices.

Specifically, we study the effect of exchange rate devaluations in the UK and Spain during the ERM crisis of 1992-1993. Since the exchange rates are fixed, firms are expected to be less involved in hedging activities. In addition, changes in the exchange rates are big enough to make perfect hedging very complicated and costly. Events similar to the ERM crisis are usually widely discussed in the press, so the possibility that investors would neglect them in calculating the firms' values, or would not know how to price them are small. There is a caveat to using this strategy, though. Such changes in the exchange rates are usually accompanied by other reforms. In fact, several reforms accompanied the cases studied in this chapter. Therefore, it is important to separate the effect of other policies from the effect of devaluation. We find a way around this problem by concentrating on the relative price changes of firms with different shares of export of the final product. As the general equilibrium model, presented in the appendix of this chapter, shows, big devaluations, such as the ones that we deal with in the chapter, have a positive effect on the prices of both tradable and non-tradable firms measured in local currency. However, the effect on the prices of exporting firms is expected to be substantially larger.

We are using the event study methodology in this chapter. We estimate the abnormal returns for each firm, and then regress them on firm characteristics, such as the share of domestic sales and the share of foreign labor, to find out how abnormal returns differ depending on firm characteristics. There is one problem with this methodology. Since exchange rate changes happen simultaneously for all firms, abnormal returns, estimated by OLS, are correlated across firms. Therefore, our results can be biased. To overcome this problem, we use the estimator of the type developed by Shipper and Thompson (1983a, 1983b). The estimation procedure consists of estimating the equation of the type shown below in (3.1), using an estimation technique which allows us to address heteroskedasticity and contemporaneous correlation among disturbances. The typical regression, named in the tables of results as jointly estimated regressions, has the following form:

$$\begin{bmatrix} rstock_1 \\ ... \\ rstock_N \end{bmatrix} = \begin{bmatrix} \alpha_1 & 0 & 0 \\ 0 & ... & 0 \\ 0 & 0 & \alpha_N \end{bmatrix} + \begin{bmatrix} \beta_1 * rindex & 0 & 0 \\ 0 & ... & 0 \\ 0 & 0 & \beta_N * rindex \end{bmatrix} \tag{3.1}$$

$$+\begin{bmatrix} \sum \gamma_i * charact_{1i} \\ \dots \\ \sum \gamma_i * charact_{Ni} \end{bmatrix} + \begin{bmatrix} e_1 \\ \dots \\ e_N \end{bmatrix}$$

where $rstock_j$ is the vector of time series returns to stock j, $rindex$ is the vector of returns of the stock market index, and $charact_{ji}$ is the vector of a firm characteristics i times the dummy variable, which takes the value of 1 during the event window, and is equal to zero on all other dates. The returns are calculated in the usual way as a log difference between the stock price on the date t and $t-1$. Firm characteristics differ from one regression to another, and will be explained subsequently.

3.2 England

3.2.1 Event description and preliminary evidence

According to the IMF, the ERM crisis started in early summer 1992, when the Danish referendum rejected the Maastricht Treaty. The crisis reached its peak in September. At first, Finland floated the makka on September 8, and then the United Kingdom and Italy suspended their membership in the ERM, and Spain devalued on September 17.[2] The initial nominal devaluation of the pound was as big as 10-15 percent. However, the resulting real devaluation of the pound was not that big, since some other countries devalued at the same time. Devaluation allowed England to switch to a less strict monetary policy: the Bank of England started to decrease their lending rates as early as on October 16, while some of the other countries had to keep their interest rates high until the end of the crisis in the summer of 1993.

The overall stock market reaction to the devaluation was positive. The FTSE index, which was declining over the last few months, started to increase with the expectations of the forthcoming devaluation (see figure 3-1).

Figure 3-2 illustrates the relationships between the returns on different stocks and the shares of domestic sales of corresponding companies in the days around the devaluation.[3] We use the

[2]The UK announced that it would suspened its membership in the ERM on September 16.

[3]The graph is drawn for all companies in our sample for which we have the information on the share of domestic sales. For more details about the dataset see Appendix B.2.

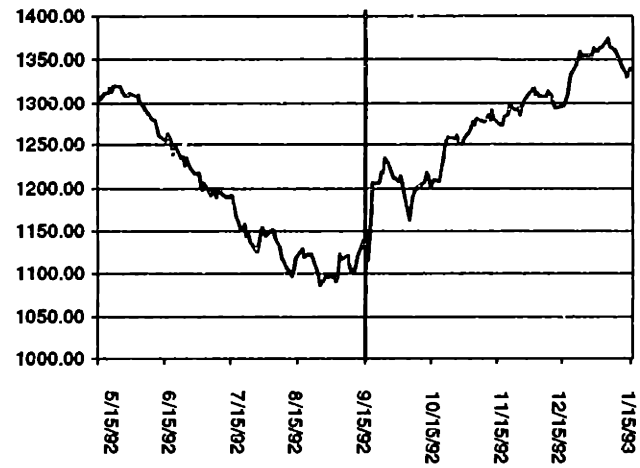


Figure 3-1: FTSE all share index, May 1992-January 1993

share of domestic sales in 1991 as a measure of export orientation of the companies. The straight line represents the fitted values of the regression of the stock returns and domestic sales, showing the direction of the relationship between the two variables. The graphs clearly show, that there were no clear relationships between the stock returns and export orientation in any day around the devaluation, except for the day before the devaluation, i.e. September 16 (time==0), when the UK announced that it would suspend its membership in the ERM.

Unfortunately, the second prediction of the theory, i.e. that the companies with smaller share of foreign inputs benefit from devaluation, does not hold, at least unconditionally. Figure 3-3 shows the relationship between the stock returns, and the shares of domestic labor. The relationship between the two is always negative, except for September 18, the day after the devaluation, when it is slightly positive. However, in our sample, the correlation between the share of domestic sales and the share of domestic labor is 0.84. Therefore, the share of foreign labor is just another proxy for companies with big operations abroad, and the negative relationship between the share of domestic labor and the stock returns just reinforces the conclusion that import oriented companies benefited from the devaluation.

Following Per Frennberg (1994) we divide all the firms in our sample into 4 groups, according to the size of the stock return on September 16, 1992. Then we calculate the average shares of domestic sales, and domestic labor for each group. In the group with the lowest stock returns,

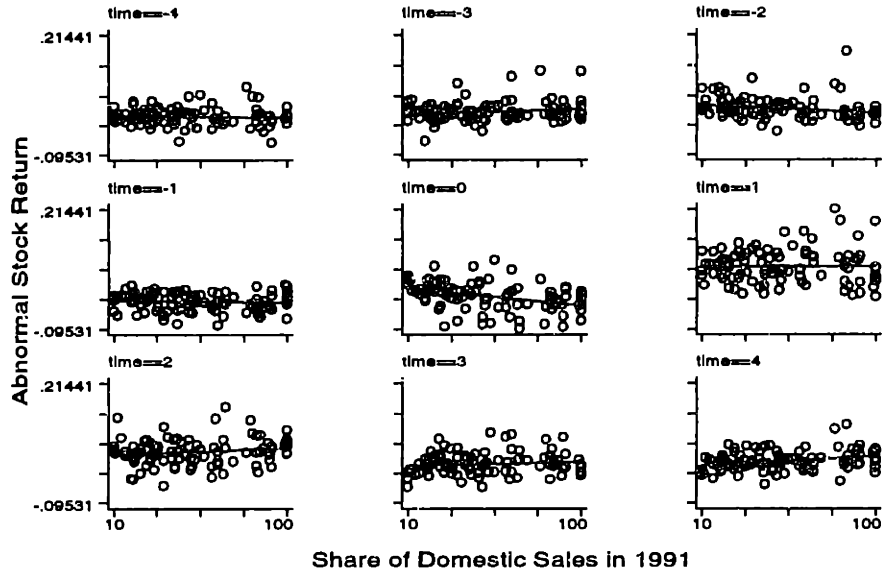


Figure 3-2: Stock Market Returns on September 10-September 22, 1992 (time==0 corresponds to September 16, 1992, the day when the UK announced that it will suspend it's membership in the ERM)

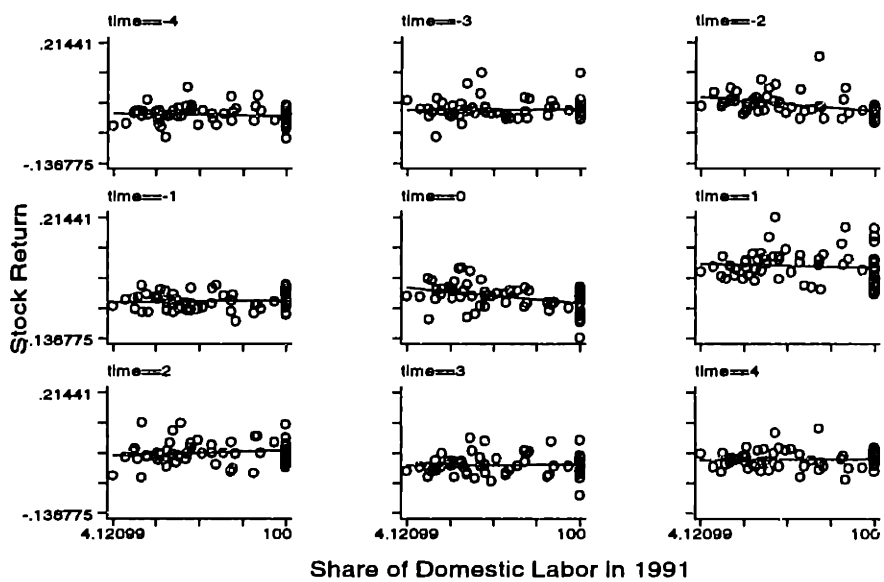


Figure 3-3: Stock Returns vs Share of Domestic Labor on September 10-September 22, 1992.

the average share of domestic sales is 66 percent, and the share of domestic labor is 76 percent.[4] In the group with the highest stock return, the average share of domestic sales is much lower, only 36 percent, and the average share of domestic labor is 41 percent.[5] Therefore, these calculations support the idea, that the change in the stock market valuations of British firms on September 16 was in the direction predicted by the theory.[6]

To conclude, the preliminary evidence suggests, that on September 16, the day before the suspension of membership in the ERM, the British stock market revalued firms, taking into account the positive effect of devaluation on exporting firms.

3.2.2 Evidence

In this subsection we study the robustness and significance of preliminary results presented in the beginning of this section. Figure 3-4 and 3-5 are the same as figure 3-2 and 3-3 with the exception that we use abnormal returns over the model: $stock\ return = \alpha + \beta * return\ to\ stock\ market\ index$ as the y-axis variable. We estimated three versions of the model: 1. for the period starting from the earliest point in our data until the week before the devaluation, 2. starting from the earliest point in our data until four months before the devaluation (approximately right before the beginning the ERM crisis), 3. for the period between these two dates. For the purpose of drawing these graphs, the models were estimated by OLS.[7] The abnormal returns calculated using all three models are very similar, the correlation coefficient between the first two abnormal returns is 0.99, and between the first two and the third is 0.95 and 0.96, respectively. Calculation of abnormal returns in this way is a traditional way of studying problems similar to ours in the event study literature. Therefore, we would like to know if using this methodology changes our results. To this end, we used model estimated for the longest period to draw the graphs, but we performed the rest of the calculations for all models. It is easier to see, that the graphs for abnormal returns look almost identical to the figures 3-2 and 3-3. Once again, September 16 looks like the special day, when firms were revalued according to the export shares of their sales.

[4] The average stock return in this group was -0.06.
[5] The stock return in the group is positive, and equal to 0.03 on average.
[6] More detailed report of these calculations can be found in Table 3.1 .
[7] OLS is identical to SUR in this case, because all models are the same.

Table 3.1: UK. Summary.

Classification Variable:

Stock Return						Abnormal Stock Return					
		Q1	Q2	Q3	Q4			Q1	Q2	Q3	Q4
24-Jun-92						24-Jun-92					
	uksale	50.5	52.5	46.4	56.9		uksale	47.6	58.0	42.9	57.9
	uklabor	67.8	54.2	58.6	70.9		uklabor	64.1	59.3	55.9	73.4
	cratio	0.38	0.61	0.27	0.39		cratio	0.37	0.62	0.26	0.39
5-Aug-92						5-Aug-92					
	uksale	46.5	52.4	54.1	52.5		uksale	47.6	50.5	55.4	52.6
	uklabor	52.5	68.8	63.1	70.7		uklabor	58.2	65.1	67.1	61.8
	cratio	0.71	0.28	0.34	0.33		cratio	0.72	0.29	0.34	0.34
19-Aug-92						19-Aug-92					
	uksale	55.3	51.9	51.2	48.0		uksale	56.5	48.7	50.7	50.5
	uklabor	61.0	57.2	81.5	51.9		uklabor	64.0	54.7	78.5	55.4
	cratio	0.57	0.38	0.30	0.42		cratio	0.57	0.40	0.29	0.41
2-Sep-92						2-Sep-92					
	uksale	61.1	52.1	46.4	46.1		uksale	60.0	56.0	44.0	46.1
	uklabor	62.0	69.9	58.5	62.1		uklabor	62.8	72.7	53.3	62.1
	cratio	0.64	0.40	0.27	0.34		cratio	0.64	0.31	0.33	0.34
4-Sep-92						4-Sep-92					
	uksale	52.0	55.0	41.9	57.5		uksale	52.0	51.5	51.0	52.0
	uklabor	63.7	66.0	54.7	66.9		uklabor	63.7	63.9	63.6	59.5
	cratio	0.59	0.32	0.39	0.36		cratio	0.59	0.32	0.41	0.36
8-Sep-92						8-Sep-92					
	uksale	41.6	45.9	54.4	69.8		uksale	42.4	42.0	54.2	70.6
	uklabor	50.5	48.0	72.8	78.4		uklabor	47.8	49.0	69.2	79.5
	cratio	0.59	0.35	0.36	0.30		cratio	0.62	0.31	0.36	0.35
10-Sep-92						10-Sep-92					
	uksale	57.5	46.9	52.4	49.7		uksale	54.3	55.6	47.6	48.7
	uklabor	68.6	61.1	60.7	60.5		uklabor	66.7	72.3	54.3	58.5
	cratio	0.35	0.37	0.29	0.69		cratio	0.34	0.38	0.28	0.69
11-Sep-92						11-Sep-92					
	uksale	48.5	58.2	47.5	52.5		uksale	47.8	59.7	40.9	56.9
	uklabor	62.4	68.4	60.4	59.6		uklabor	65.1	63.8	59.7	62.3
	cratio	0.39	0.32	0.28	0.65		cratio	0.36	0.35	0.37	0.67
14-Sep-92						14-Sep-92					
	uksale	67.3	57.7	58.5	41.2		uksale	68.5	53.9	44.3	39.5
	uklabor	88.4	73.0	51.6	40.2		uklabor	86.9	73.6	51.5	41.5
	cratio	0.40	0.32	0.29	0.68		cratio	0.39	0.34	0.27	0.67
15-Sep-92						15-Sep-92					
	uksale	54.9	58.9	41.2	52.2		uksale	54.8	61.7	39.6	51.5
	uklabor	56.3	70.8	56.4	71.0		uklabor	55.5	72.7	56.7	65.5
	cratio	0.67	0.41	0.26	0.37		cratio	0.68	0.35	0.31	0.33

Table 3.1: continued

16-Sep-92						16-Sep-92				
	uksale	63.8	61.0	47.2	34.8		uksale	63.3	61.5	47.2	34.8
	uklabor	75.8	65.2	60.4	41.0		uklabor	74.9	65.9	60.3	41.0
	cratio	0.48	0.37	0.27	0.54		cratio	0.48	0.38	0.28	0.54
17-Sep-92						17-Sep-92				
D	uksale	59.1	48.9	48.1	50.4	D	uksale	54.7	56.0	47.1	48.1
	uklabor	78.3	54.6	59.7	61.2		uklabor	72.8	61.7	55.5	63.7
	cratio	0.30	0.32	0.34	0.70		cratio	0.32	0.35	0.33	0.67
18-Sep-92						18-Sep-92				
	uksale	49.7	46.8	54.2	56.6		uksale	48.5	46.2	54.5	57.8
	uklabor	65.1	49.7	69.7	70.9		uklabor	53.7	58.2	73.5	63.7
	cratio	0.42	0.50	0.34	0.39		cratio	0.44	0.50	0.36	0.36
21-Sep-92						21-Sep-92				
	uksale	48.8	52.8	53.0	51.5		uksale	44.5	56.5	53.0	51.5
	uklabor	62.5	56.9	64.2	67.5		uklabor	60.2	59.8	64.2	67.5
	cratio	0.41	0.53	0.30	0.43		cratio	0.40	0.54	0.31	0.43
22-Sep-92						22-Sep-92				
	uksale	44.5	48.9	49.3	65.0		uksale	45.0	45.8	53.5	63.1
	uklabor	57.2	65.2	61.4	65.6		uklabor	60.5	55.9	70.4	63.0
	cratio	0.35	0.32	0.32	0.68		cratio	0.36	0.35	0.29	0.66
24-Sep-92						24-Sep-92				
	uksale	49.2	50.8	54.0	52.7		uksale	49.9	51.3	55.0	50.3
	uklabor	61.3	65.1	60.9	60.9		uklabor	61.7	63.1	66.7	60.8
	cratio	0.51	0.43	0.32	0.40		cratio	0.52	0.36	0.38	0.39
28-Sep-92						28-Sep-92				
	uksale	52.5	50.5	54.9	48.5		uksale	54.8	49.0	51.8	50.7
	uklabor	59.6	66.5	59.6	67.4		uklabor	61.7	65.7	57.5	68.9
	cratio	0.57	0.45	0.31	0.30		cratio	0.58	0.41	0.39	0.26
30-Sep-92						30-Sep-92				
	uksale	48.5	46.8	57.3	54.8		uksale	47.7	48.7	58.1	54.1
	uklabor	59.0	59.0	65.3	71.3		uklabor	58.3	59.8	63.8	74.5
	cratio	0.31	0.35	0.61	0.42		cratio	0.31	0.35	0.67	0.38
14-Oct-92						14-Oct-92				
	uksale	57.7	50.4	48.2	50.0		uksale	57.3	48.3	50.4	50.2
	uklabor	68.1	55.5	66.7	60.5		uklabor	68.1	54.6	68.7	59.1
	cratio	0.36	0.43	0.52	0.34		cratio	0.36	0.42	0.50	0.36
28-Oct-92						28-Oct-92				
	uksale	46.9	53.2	49.3	58.8		uksale	46.5	53.4	51.3	55.9
	uklabor	60.9	64.7	58.0	67.3		uklabor	57.2	73.2	57.5	64.4
	cratio	0.40	0.29	0.39	0.59		cratio	0.41	0.27	0.37	0.62
9-Dec-92						9-Dec-92				
	uksale	61.8	57.8	44.3	42.1		uksale	63.3	56.6	43.6	42.6
	uklabor	80.3	64.2	61.2	45.2		uklabor	81.5	62.0	62.9	56.3
	cratio	0.64	0.34	0.31	0.39		cratio	0.64	0.34	0.31	0.40

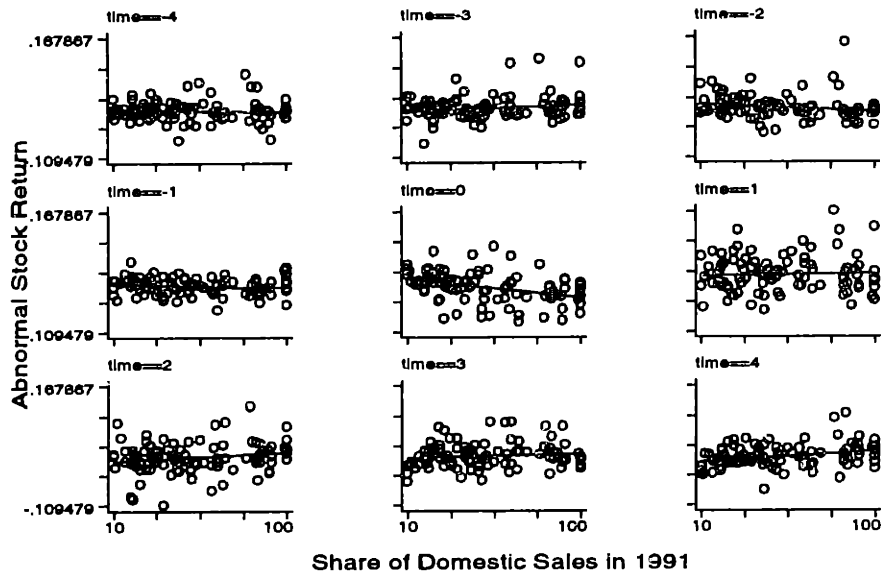


Figure 3-4: Normal Returns Model: $rstock = \alpha + \beta rindex$, estimated for the period untill September 9, 1992

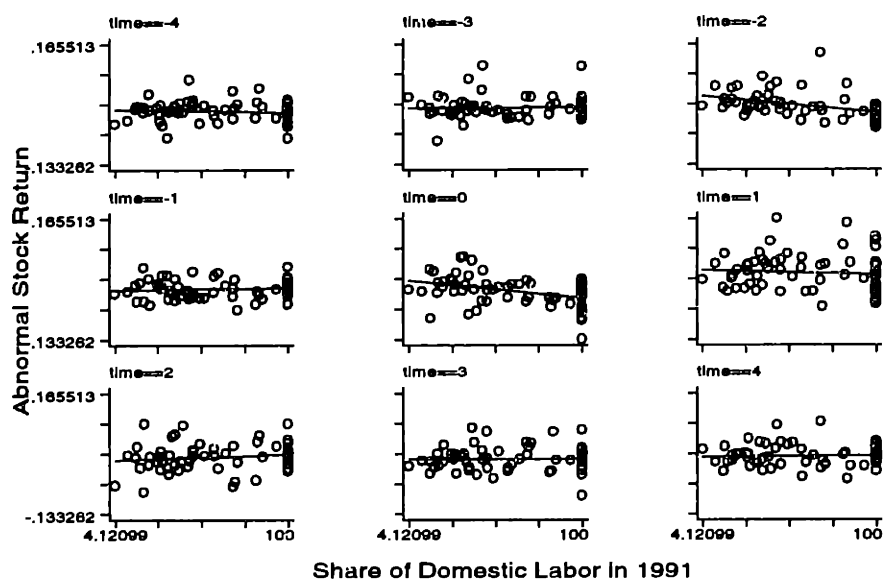


Figure 3-5: Normal Returns Model: $rstock = \alpha + \beta * rindex$ for the period untill September 9, 1992.

Table 3.1 reports the average share of domestic sales, domestic labor, and the average cover ratio for different quartiles of the stock returns on different dates around the UK suspension of membership in the ERM. The cover ratio is the ratio of the interest payments in 1991 over the sum of profit and the interest payments in 1991. We would like to control for the cover ratio in our calculations, to see if the interest rate increase, which accompanied the balance of payment crisis, affected firms dependent on bank lending. Table 3.1 was constructed in the following way. For each date, firms were classified into 4 groups according to the size of their stock returns (or abnormal stock returns, calculated using the model, estimated for the period ending 90 days before the devaluation). Then, for each group, the mean shares of domestic sales and domestic labor, and the mean cover ratios were calculated. The results show, that there were clear differences, in descending order, in shares of domestic sales among the groups on September 2 (11 working days before the devaluation), September 14 (3 working days before the devaluation), September 16 (the day before the devaluation), and December 9 (60 working days after the devaluation). The shares of domestic sales increases among the groups on September 8 (7 days before the devaluation). This confirms that around the time of the devaluation, firms were revalued in a way beneficial for firms with large foreign sales. Notice, that the pattern of changes in the shares of domestic labor across the groups almost mimics the pattern of changes in the shares of domestic sales. This is not surprising since, as we mentioned before, the two shares are highly correlated. Finally, there seems to be no specific pattern across the groups' differences in the cover ratios.

Table B.1-B.2[8] reports the results of regressing the stock returns and the abnormal stock returns on different variables in question.[9] The results, reported in Table B.1, confirm the pattern found in Table 3.1. There was a strong negative and significant correlation between the stock returns, and the shares of domestic sales on September 2, 14, 16, and December 9. Moreover, the reaction on September 16 was the strongest and the most significant among the reactions on all other dates. Table B.2 reports the results of the regression of the stock returns on both the share of domestic sales and the cover ratio. The results for the share of domestic sales are in line with the previous results. Moreover, the reaction on September 16

[8]See Appendix B.3 for tables of regression results.

[9]Notice, that all the coefficients were multiplied by 100000 for presentation purposes.

looks even stronger than before. There does not seem to be a clear pattern of dependence of firm valuation on the cover ratio. The overall effect during the period appears to be positive. This finding contradicts the theoretical prediction that firms with higher dependence on bank financing should be negatively affected by devaluation due to an increase in the interest rates, which accompany speculative attacks. We do not have a clear explanation for this finding. Probably, firms with large cover ratios were also the firms with larger recent investments, and they were expected to benefit from the devaluation even further. In addition, these could have been the firms with larger debt-equity ratios. Since interest payments were supposed to be stable in such firms, the increase in profits after the devaluation will be in one way or another distributed between the shareholders. Therefore, shareholders in firms with a larger share of debt would receive larger return per share. Hence, the price of shares of such firms will rise. On the other hand, the UK was one of the countries which did not fight the speculative attack for long, and quickly allowed the currency to float. Therefore, the high interest rates did not last long enough to have a deep effect on the economy. In contrast, countries which preferred to fight the speculative attacks longer, as we will see in the case of Spain, may have experienced a larger negative effect of the interest rate on valuation.[10]

The last column of table B.1 and the last part of the table B.2 present the results of the joint estimation of the regressions across all firms, which takes care of the contemporaneous correlations. We estimate this regression using a different time span to estimate the normal returns. We use the data on the stock market returns for the period of 120 working days before and after September 16 to estimate the model of normal stock returns. Therefore, the normal returns estimated in this way contain the information on the post-devaluation stock market behavior. Hence, we expect the results of these estimates to be different from the previous results. The numbers indeed differ in magnitude, but not in their predictive substance. September 16 still appears as the date when the firms were revalued in a way which takes consequences of the devaluation into account. However, these changes were partially undone during the next few days. Interestingly, controlling for the cover ratio changes this result: September 16 now looks like the day of the biggest change in the relative valuation of

[10] Companies, which had negative cover ratio because of big losses were excluded from the sample. This error in measurement problem may have affected some of our findings.

firms. Part of this change seems to have been undone on some other days, though. However, the results regarding the days other than September 16 seem to be more seriously affected by the changes of estimation techniques, or the time periods of estimation of the model of normal returns, or equation specification. Therefore, we conclude, that in the case of the UK, firms were revalued on the day of the speculative attack and of the announcement of the UK cancelling its membership in the ERM, in the way predicted by theory.

In Tables B.3-B.5 we report the results of our attempts to use the data on the shares of domestic labor in the regressions. Theoretically, we would expect that this variable will measure the share of imported inputs, and therefore, the coefficients of this variable should be opposite to the share of domestic sales coefficients. However, as we mentioned before, the two measures turned out to be highly correlated in our sample. Therefore, the regression results may suffer from multicollinearity, which unfortunately turns out to be the case. Table B.3 reports the results of regressing stock returns on the share of domestic labor. This table looks very similar to Table B.1. In Table B.4 we use both the share of domestic sales and the share of domestic labor in the regression. The results for the share of domestic sales look much worse than previously, but the results for the share of domestic labor do not look convincing either. In most cases, the signs of the coefficients are opposite of the theoretically predicted ones. In Table B.5 we use all three variables in the same regression. The coefficients for the cover ratio are similar to the ones reported in Table B.2. The coefficients for the other two variables are similar to the ones in Table B.4, but insignificant. Therefore we conclude, that our variable, the share of domestic labor in 1996, does not measure the amount of foreign inputs, but rather serves as an indicator of firms that have large international operations. Therefore, the regressions in which both the share of domestic sales and the share of domestic labor are used suffer from multicollinearity, and their results should not be taken into account.

3.2.3 Post-devaluation performance

For some of the firms we were able to get data on profits in 1991 and 1994, sales in 1991 and 1994, employment costs in 1991 and 1994, and the share of domestic sales in 1991 and 1994. With this data we are able to compare the stock market reaction on the devaluation date with the post-devaluation performance. We constructed three measures of the post-devaluation

Table 3.2: UK. Correlations between stock returns and changes in after-devaluation performance measures

	stock return	abnormal stock return
change in profit	-0.1978	-0.1997
change in sales/wages	0.2078	0.2082
change is ukshare	-0.0743	-0.0769

performance: 1. the ratio of profits in 1994 to 1991, 2. the change in the ratio of sales to employment costs in 1994 versus 1991, 3. the percentage change in the share of domestic sales between these two years. We expect the first two variables to measure the profitability of firms, and therefore, to be positively correlated with the stock market returns on the devaluation day. The third variable measures the change in the share of domestic sales. We expect that the firms, whose share of domestic sales increased after the devaluation are not exporting firms. Therefore, we expect to observe the negative correlation between this variable and the stock market returns on the devaluation date. The correlations between these three measures and the stock returns are summarized in Table 3.2. The only variable which has the wrong sign for the correlation coefficient with the stock returns is the change in profit. However, since we use an accounting profit in calculating this variable, using two point values of this variable to judge the post-devaluation performance may be inappropriate. The correlations for the change in the share of domestic sales is negative, as expected. Therefore, the relative value of the firms that increased their share of domestic sales after the devaluation decreased on the devaluation day. The correlation between the change in the ratio of sales to employment costs with the stock returns is positive. Thus, the relative value of the firms whose after devaluation sale prices went up in comparison to their after devaluation employment costs increased on the day of devaluation. We conclude from these calculations, that in the case of the UK, investors correctly priced the firms in response to the devaluation.

3.3 Spain

3.3.1 Event description and preliminary evidence

In contrast to the UK, Spain did not suspend membership at the early stage of the crisis, but devalued three times during the crisis. As a result, the Spanish peseta was often under pressure during the crisis, and Spain had to introduce some capital control measures during some periods of the crisis. Spain devalued three times during the crisis: on September 17 by 5 percent, on November 22 by 6 percent, and on May 13 by 8 percent. In between the devaluations, Spain had to fight the speculative pressure by introducing capital control, increasing interest rates, and using multiple interventions.

While the nominal devaluation throughout the crisis looks substantial, the real devaluation was much smaller, because of devaluations in other countries. Figure 3-6 demonstrates the behavior of the Madrid Stock Exchange index on three devaluation dates: September 17, 1992, November 22, 1992, and May 13, 1993. The first devaluation of September 17 took place at the beginning of the crisis. This initial devaluation was not large enough to prevent expectations of future devaluations. The pressure on the currency continued after this devaluation, and the stock market reacted negatively to it. The stock market continued to be low until the second devaluation in November. The reaction of the stock market to the second devaluation in November and to the third devaluation in May 1993 was positive. However, the stock market was bolstered only after the end of the ERM crisis in the summer of 1993.

Figures 3-7 through 3-10 illustrate the relationship between the stock market returns and the share of domestic sales on the day of devaluation. Figure 3-7 is the average of all devaluations, and Figures 3-8,3-9, and 3-10 are drawn separately for each devaluation. As we can see, on average, the stock market prices of firms with a low share of domestic sales increased in comparison to firms with a higher share on the day of devaluation. The effect is particularly pronounced during the first devaluation, September 17, 1992. The second devaluation, which happened in the middle of the crisis, had almost no effect on the comparative change in firm valuation. During the third devaluation, there was a substantial change in the relative firm values on the day of devaluation, May 13, and on May 11, the day when the speculative attack started.

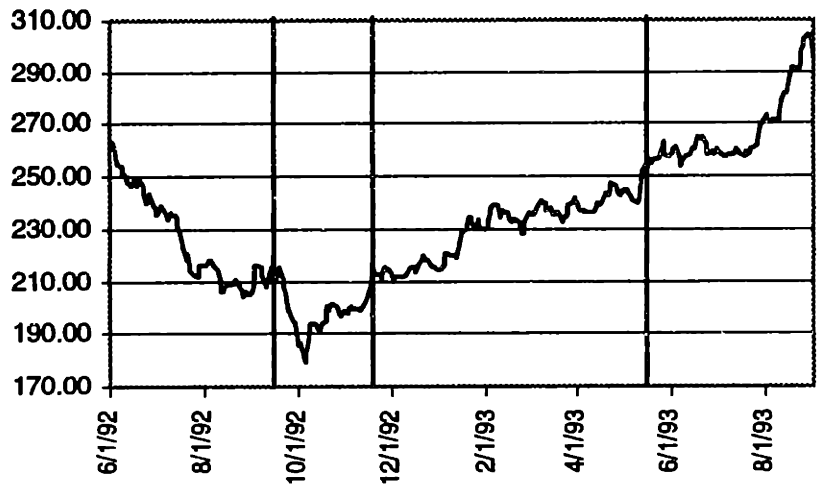


Figure 3-6: Madrid Stock Exchange Index: June 1992-Augast 1993

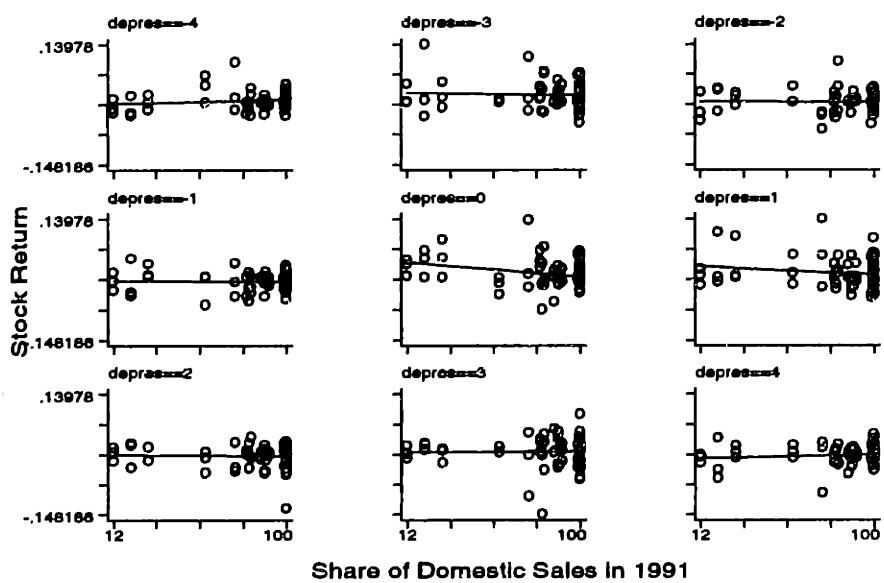


Figure 3-7: Spain: all devaluations

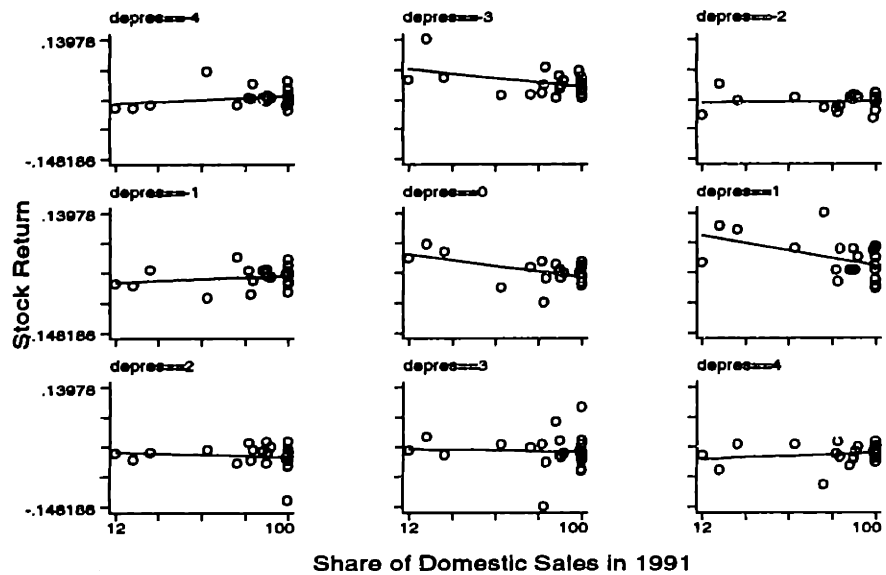


Figure 3-8: Spain: September 17, 1992 devaluation

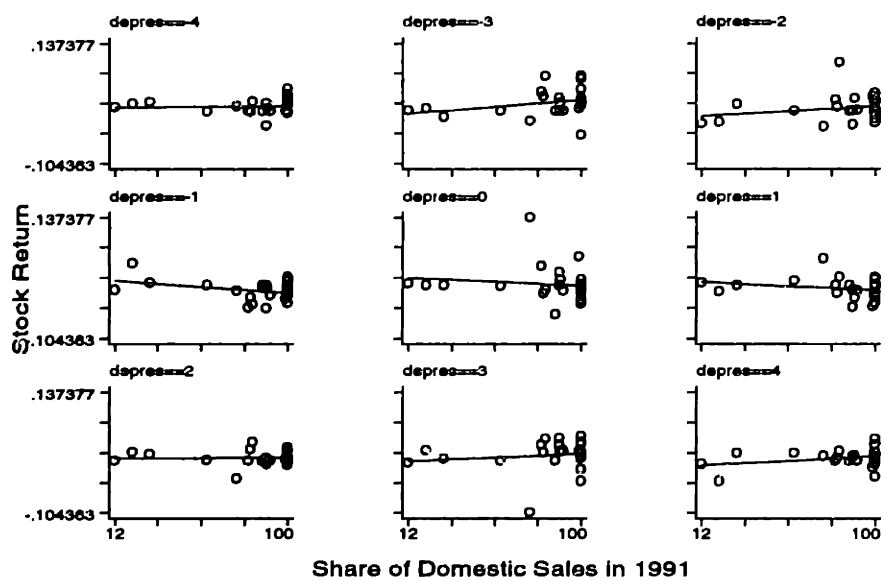


Figure 3-9: Spain: November 22 devaluation (November 22 is time==0 point)

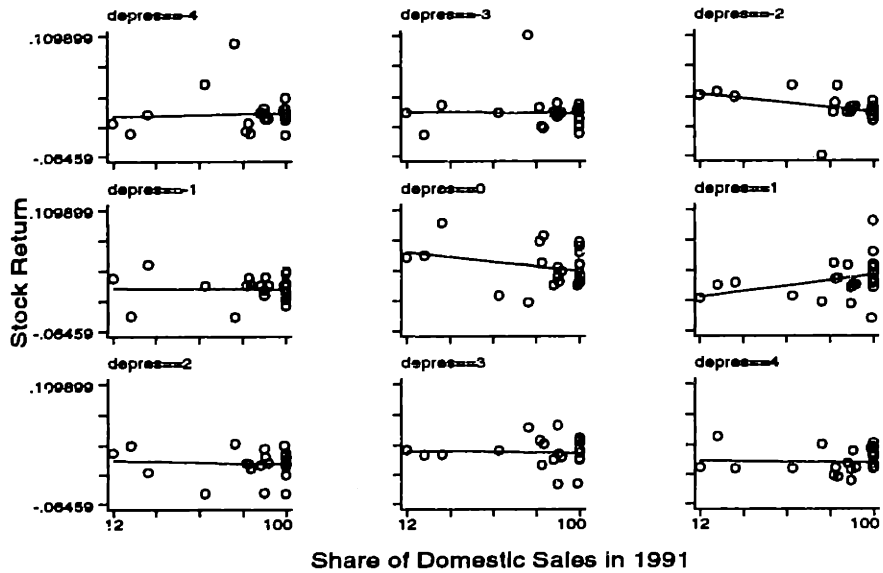


Figure 3-10: Spain: May13, 1993, devaluation

The Spanish sample is very small, consisting of only 25 firms, most of which have very high share of domestic sales: 11 firms have the share of domestic sales equal to 100 percent, and only 3 firms have the share of domestic sales below 50 percent. Therefore, the calculations of mean shares across the quartiles on the devaluation days do not look as clear as the ones for the UK. On September 17, the average share of domestic sales for the firms from the quartile of the firms with the lowest stock returns is 88.9 percent. For the other 3 quartiles, we can see a clear declining pattern of means of the shares of domestic sales: 96.8, 91.8, and 55.0 percent, respectively. On November 23,[11] the average shares of domestic sales across the quartiles looks the following: 94.1, 90.2, 58.7, and 87.9. Therefore, with the exception of the last quartile, there is a tendency of the shares of domestic sales to decline across the quartile. On May 13, there is a clear trend in the average shares of domestic sales across the quartiles. However, on May 11, the day when the speculative attack started, the average shares are 93.2, 100.0, 91.8, and 50.7. Therefore, for each devaluation, we have some evidence of a decline in the average shares of domestic sales across the quartiles of the stock market returns.

[11] November 22 is Sunday.

Table 3.3: Spain. Summary.

Classification Variable:

Stock Return						Abnormal Stock Return					
		Q1	Q2	Q3	Q4			Q1	Q2	Q3	Q4
25-Jun-92						25-Jun-92					
	spsale	76.9	91.3	82.0	83.5		spsale	75.7	89.4	85.3	83.5
	cratio	0.33	0.40	0.26	0.20		cratio	0.48	0.29	0.24	0.20
06-Aug-92						06-Aug-92					
	spsale	88.3	79.5	100.0	81.1		spsale	88.3	96.5	66.0	81.1
	cratio	0.34	0.24	0.11	0.40		cratio	0.35	0.23	0.22	0.40
20-Aug-92						20-Aug-92					
	spsale	69.7	94.0	94.2	77.2		spsale	69.7	95.2	93.0	77.2
	cratio	0.32	0.22	0.33	0.34		cratio	0.32	0.18	0.35	0.34
03-Sep-92						03-Sep-92					
	spsale	78.6	96.7	90.3	68.0		spsale	78.5	96.7	90.8	68.1
	cratio	0.28	0.24	0.36	0.30		cratio	0.28	0.24	0.38	0.28
07-Sep-92						07-Sep-92					
	spsale	73.3	96.4	96.3	68.3		spsale	74.9	96.4	94.5	68.0
	cratio	0.37	0.33	0.28	0.14		cratio	0.35	0.30	0.33	0.14
09-Sep-92						09-Sep-92					
	spsale	70.4	81.5	94.4	87.8		spsale	70.1	93.2	85.1	86.5
	cratio	0.32	0.19	0.18	0.53		cratio	0.26	0.30	0.14	0.48
11-Sep-92						11-Sep-92					
	spsale	61.7	90.8	96.5	90.2		spsale	61.7	93.2	93.0	88.4
	cratio	0.33	0.25	0.26	0.37		cratio	0.33	0.24	0.33	0.28
14-Sep-92						14-Sep-92					
	spsale	85.1	96.4	80.7	70.2		spsale	82.4	96.3	70.4	83.7
	cratio	0.36	0.34	0.20	0.28		cratio	0.40	0.33	0.18	0.26
15-Sep-92						15-Sep-92					
	spsale	74.9	86.5	91.0	79.9		spsale	74.9	88.3	89.8	81.1
	cratio	0.37	0.31	0.25	0.23		cratio	0.37	0.22	0.31	0.27
16-Sep-92						16-Sep-92					
	spsale	67.6	93.8	93.6	77.8		spsale	67.6	93.8	95.8	78.8
	cratio	0.24	0.21	0.32	0.43		cratio	0.24	0.21	0.34	0.39
17-Sep-92						17-Sep-92					
D	spsale	88.9	96.8	91.8	55.0	D	spsale	88.9	96.8	91.2	55.0
	cratio	0.29	0.27	0.37	0.25		cratio	0.29	0.27	0.37	0.25
18-Sep-92						18-Sep-92					
	spsale	92.7	100.0	78.8	63.3		spsale	92.9	81.4	93.5	63.3
	cratio	0.34	0.13	0.28	0.32		cratio	0.38	0.22	0.25	0.33
21-Sep-92						21-Sep-92					
	spsale	91.4	72.0	81.4	86.5		spsale	87.1	93.8	68.3	83.5
	cratio	0.47	0.30	0.24	0.12		cratio	0.37	0.33	0.28	0.18

Table 3.3: continued

22-Sep-92						22-Sep-92				
	spsale	93.2	85.0	74.2	79.4		spsale	93.2	85.0	78.3	74.5
	cratio	0.30	0.19	0.35	0.35		cratio	0.30	0.19	0.22	0.49
23-Sep-92						23-Sep-92				
	spsale	79.4	78.8	96.8	78.3		spsale	81.0	78.8	96.5	76.8
	cratio	0.44	0.32	0.20	0.20		cratio	0.42	0.29	0.25	0.21
25-Sep-92						25-Sep-92				
	spsale	67.1	96.0	83.2	89.0		spsale	67.2	96.1	83.2	89.0
	cratio	0.26	0.24	0.38	0.30		cratio	0.26	0.24	0.38	0.30
29-Sep-92						29-Sep-92				
	spsale	79.0	87.9	80.3	85.0		spsale	79.0	94.2	75.3	85.0
	cratio	0.27	0.42	0.27	0.20		cratio	0.27	0.36	0.36	0.20
01-Oct-92						01-Oct-92				
	spsale	70.6	87.8	81.4	95.0		spsale	80.6	86.2	88.3	78.2
	cratio	0.36	0.34	0.30	0.18		cratio	0.37	0.33	0.16	0.29
09-Nov-92						09-Nov-92				
	spsale	81.4		95.5	79.3		spsale	76.0	88.1	90.5	79.8
	cratio	0.19		0.38	0.47		cratio	0.20	0.16	0.34	0.47
11-Nov-92						11-Nov-92				
	spsale	70.6	84.7		94.9		spsale	70.6	98.0	71.3	94.9
	cratio	0.30	0.36		0.18		cratio	0.30	0.42	0.28	0.18
13-Nov-92						13-Nov-92				
	spsale	80.5	100.0	83.5	85.3		spsale	78.8	84.0	85.3	85.3
	cratio	0.35	0.47	0.21	0.23		cratio	0.34	0.33	0.28	0.23
17-Nov-92						17-Nov-92				
	spsale	87.3	67.8	85.0	85.3		spsale	86.9	61.8	83.5	100.0
	cratio	0.28	0.38	0.36	0.21		cratio	0.28	0.37	0.35	0.19
18-Nov-92						18-Nov-92				
	spsale	75.1	70.3	98.2	90.5		spsale	65.6	80.0	96.4	93.7
	cratio	0.34	0.22	0.31	0.30		cratio	0.34	0.38	0.22	0.26
19-Nov-92						19-Nov-92				
	spsale	70.3	87.7	85.2	91.8		spsale	68.7	87.8	86.8	91.8
	cratio	0.41	0.30	0.25	0.23		cratio	0.40	0.34	0.22	0.23
20-Nov-92						20-Nov-92				
	spsale	90.1	78.8	94.3	68.3		spsale	92.9	93.6	71.3	73.3
	cratio	0.24	0.39	0.36	0.17		cratio	0.24	0.22	0.51	0.26
23-Nov-92						23-Nov-92				
D	spsale	94.1	90.2	58.7	87.9	D	spsale	95.4	95.5	51.8	87.9
	cratio	0.27	0.30	0.19	0.41		cratio	0.31	0.25	0.19	0.41
24-Nov-92						24-Nov-92				
	spsale	94.1	83.5	82.8	70.5		spsale	96.8	82.2	81.0	70.5
	cratio	0.30	0.26	0.28	0.35		cratio	0.31	0.32	0.22	0.35

Table 3.3: continued

25-Nov-92						25-Nov-92				
	spsale	81.9	86.0	73.3	93.8		spsale	89.7	74.8	73.3	93.8
	cratio	0.28	0.33	0.39	0.23		cratio	0.31	0.26	0.39	0.23
26-Nov-92						26-Nov-92				
	spsale	65.4	96.8	80.1	93.3		spsale	65.4	96.6	80.3	93.3
	cratio	0.35	0.26	0.24	0.32		cratio	0.35	0.26	0.25	0.32
27-Nov-92						27-Nov-92				
	spsale	76.7	92.5	79.7	90.2		spsale	73.1	91.3	79.8	90.2
	cratio	0.22	0.40	0.30	0.32		cratio	0.20	0.37	0.30	0.32
01-Dec-92						01-Dec-92				
	spsale	85.6	77.3	88.4	77.3		spsale	85.5	77.3	91.4	78.0
	cratio	0.34	0.34	0.29	0.18		cratio	0.34	0.34	0.20	0.29
03-Dec-92						03-Dec-92				
	spsale	7.7	95.7	77.3	97.0		spsale	71.2	85.8	80.7	97.0
	cratio	0.32	0.36	0.24	0.29		cratio	0.28	0.38	0.25	0.29
07-Dec-92						07-Dec-92				
	spsale	93.9	83.1		64.9		spsale	93.9	97.0	80.1	60.0
	cratio	0.40	0.26		0.21		cratio	40.00	0.26	0.17	0.35
29-Apr-93						29-Apr-93				
	spsale	70.0	75.5	94.1	95.6		spsale	70.0	80.6	93.2	91.2
	cratio	0.21	0.33	0.32	0.31		cratio	0.22	0.24	0.32	0.38
03-May-93						03-May-93				
	spsale	94.0	76.7	93.7	70.1		spsale	94.0	73.7	88.2	75.1
	cratio	0.23	0.35	0.40	0.20		cratio	0.24	0.27	0.46	0.20
05-May-93						05-May-93				
	spsale	75.7	93.8	94.3	70.1		spsale	75.7	93.8	95.8	68.6
	cratio	0.44	0.33	0.29	0.08		cratio	0.44	0.33	0.28	0.09
07-May-93						07-May-93				
	spsale	68.0	96.8	84.2	86.3		spsale	69.2	95.3	84.3	86.2
	cratio	0.24	0.16	0.35	0.47		cratio	0.19	0.21	0.38	0.43
10-May-93						10-May-93				
	spsale	83.4	78.4	99.8	78.2		spsale	83.4	80.3	90.8	78.2
	cratio	0.26	0.10	0.33	0.45		cratio	0.27	0.13	0.35	0.44
11-May-93						11-May-93				
	spsale	93.2	100.0	91.8	50.7		spsale	92.7	94.2	93.6	50.7
	cratio	0.42	0.27	0.16	0.18		cratio	0.43	0.32	0.19	0.18
12-May-93						12-May-93				
	spsale	82.9	90.5	91.0	68.8		spsale	82.9	98.0	83.2	68.8
	cratio	0.41	0.28	0.39	0.18		cratio	0.41	0.29	0.31	0.18
13-May-93						13-May-93				
D	spsale	86.4	96.7	67.2	82.0	D	spsale	84.7	95.1	70.7	82.0
	cratio	0.37	0.37	0.20	0.22		cratio	0.46	0.31	0.18	0.22

Table 3.3: continued

14-May-93					14-May-93				
	spsale	74.0	71.9	93.8	94.5	spsale	74.0	68.8	97.0	94.5
	cratio	0.45	0.16	0.37	0.28	cratio	0.45	0.18	0.26	0.28
17-May-93					17-May-93				
	spsale	80.0	89.8	98.3	65.2	spsale	80.0	93.2	94.9	65.2
	cratio	0.31	0.28	0.20	0.41	cratio	0.31	0.25	0.23	0.41
18-May-93					18-May-93				
	spsale	93.7	71.9	75.5	89.8	spsale	72.4	77.0	91.9	93.2
	cratio	0.32	0.16	0.23	0.43	cratio	0.34	0.16	0.24	0.42
19-May-93					19-May-93				
	spsale	81.4	73.8	97.8	79.9	spsale	85.9	71.8	94.7	79.9
	cratio	0.32	0.24	0.30	0.31	cratio	0.28	0.31	0.28	0.31
21-May-93					21-May-93				
	spsale	88.3	86.0	76.4	79.6	spsale	88.3	83.7	80.3	79.6
	cratio	0.45	0.26	0.23	0.23	cratio	0.45	0.29	0.21	0.23
25-May-93					25-May-93				
	spsale	89.1	73.6	82.1	86.8	spsale	89.1	73.7	78.8	90.1
	cratio	0.34	0.25	0.17	0.41	cratio	0.34	0.25	0.35	0.26
27-May-93					27-May-93				
	spsale	82.1	81.2	91.3	78.3	spsale	69.1	96.2	88.1	81.7
	cratio	0.27	0.38	0.26	0.26	cratio	0.40	0.31	18.32	0.28
10-Jun-93					10-Jun-93				
	spsale	81.3	96.4	77.0	78.3	spsale	92.9	82.9	77.0	78.3
	cratio	0.26	0.26	0.22	0.43	cratio	0.21	0.33	0.22	0.43
24-Jun-93					24-Jun-93				
	spsale	81.8	86.8	60.5	86.3	spsale	81.8	98.2	79.8	73.2
	cratio	0.32	0.25	0.21	0.34	cratio	0.32	0.29	0.15	0.41
05-Aug-93					05-Aug-93				
	spsale	75.6	80.1	98.1	88.8	spsale	75.6	79.1	89.2	88.9
	cratio	0.36	0.27	0.21	0.32	cratio	0.36	0.20	0.30	0.32

For Spain, we do not have the data on the share of domestic labor, so we can not make any conclusions on how it affected firm valuation during the devaluation episodes.

To check if it was the case that the same firms experienced a relative increase in their value during each of the three devaluations, we calculated the correlations between the returns on different days. Stock market returns were relatively highly correlated for the first and the third devaluation; the correlation is 40 percent (only 35 percent for companies with the share of domestic sales below 100 percent, but 70 percent for companies with the share of domestic sales below 80 percent). Correlation between the stock market returns on September 17 and November 22 is very small, only 8 percent; and the correlation between returns on November 22 and May 13, 1993 is negative, -3 percent.

3.3.2 Evidence

Graphs 3-11 through 3-14 show the relationships between the share of domestic sales and abnormal returns, calculated using the time series until 90 working days before the first devaluation. As in the case of simple stock market returns, there is a negative relationship on average across all three devaluations. The relationship is particularly strong on the day of the first devaluation, September 17, 1992, and it is much smaller on the day of the second and third devaluations. We may interpret this finding in the following way: since further devaluations were considered unavoidable after the first devaluation, most of the changes in relative firm valuations happened after the first devaluation.

Table 3.3 summarizes the average share of domestic sales and the average cover ratio for Spanish firms on the following days: 60, 30, and 20 days before the first devaluation, and after the last devaluation, 10, 8, 6 days and all days within the 4 days around each devaluation. The means are calculated for each quartile of the stock returns on each day. In contrast to the UK, there seems to be no clear trend of the mean shares on any date. However, it may just be a consequence of the fact that the Spanish sample is very small: only 25 companies for which the shares of domestic sales were available, and 23 companies for which the cover ratios were calculated. In addition, the share of firms with the share of domestic sales of 100 percent is particularly big in the sample. Taking this into consideration, there seems to be a negative relationship between the share of domestic sales and stock returns on the day of the first

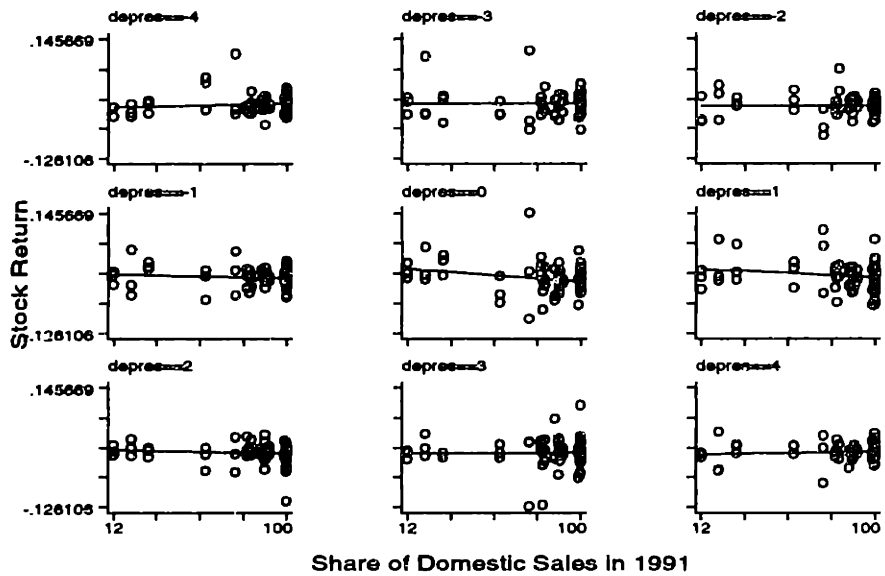


Figure 3-11: Spain: all devaluations

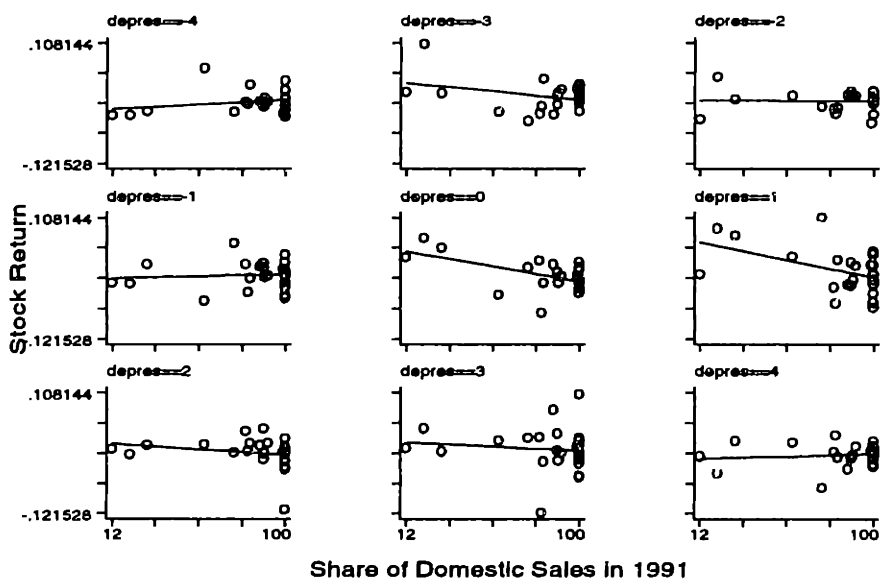


Figure 3-12: Spain: September 17 devaluation

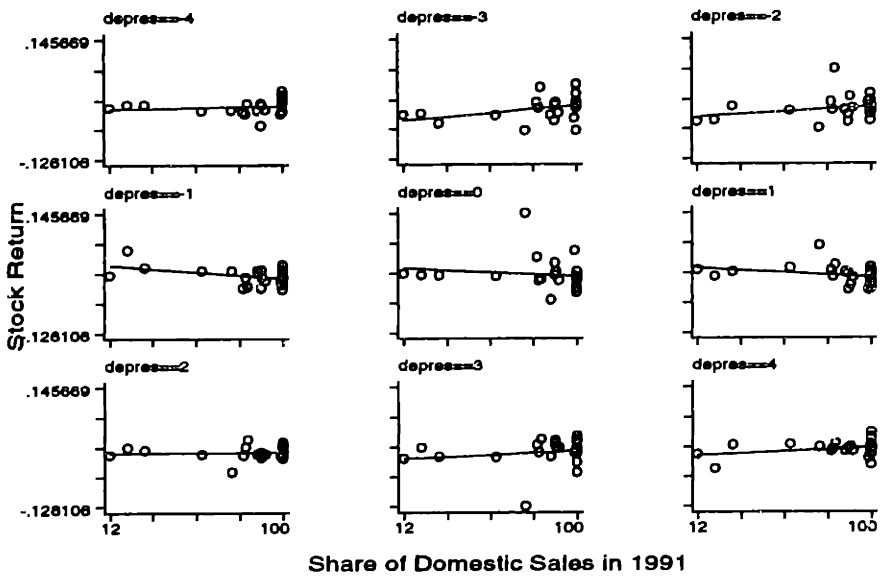


Figure 3-13: Spain: November 22 devaluation (November 23 is time==0 point)

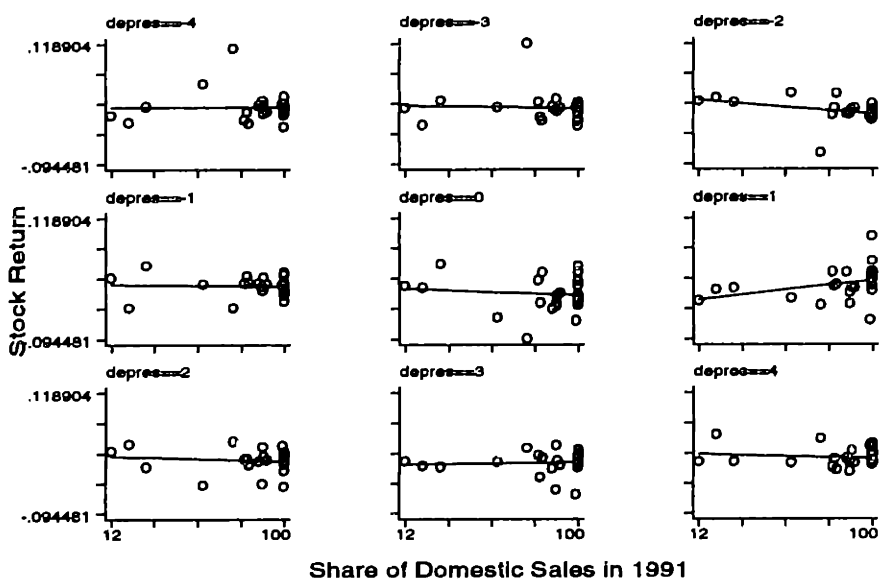


Figure 3-14: Spain: May13, 1993, devaluation

devaluation and the day after that, i.e. on September 17-18, 1992.[12] The relationship appears strongly negative on the day of the second devaluation, November 23, with the exception of the last quartile. On November 24, the day after the second devaluation, the relationship between the share of domestic sales and the stock return looks even stronger. There is no strong pattern during the period around the day of the third devaluation, May 13, 1993. The only exception is May 11, when, excluding the first quartile, there seems to be a negative association between the share of domestic sales and the stock returns. Since May 11 is the day when the speculative attack on peseta started, it is conceivable, from the point of view of the theory, for the major changes in the relative valuations of firms to have happened on this date.

As in the case of the UK, the relationship between the cover ratio and the stock return is not clear. There seems to be a slight tendency of a bigger cover ratio in the first and second quartiles on the one hand and the third and forth quartiles, on the other hand. This tendency is particularly strong on the dates between the first and the second devaluations.

Table B.6 contains the results of regressions of the stock returns (simple and abnormal) on the share of domestic sales. This table confirms the conjecture that there was a strong association between the stock returns, and the share of domestic sales on September 17-18, and on May 11. The change in the relative valuations of firms on the day of the second and third devaluation was much smaller. Notice, that the results for the simple stock market returns, and for the abnormal returns differ substantially in this case. The difference increases with time, while the time lag from the period during which the normal returns were estimated increases. The last two columns of the tables report the results of the joint estimation of the abnormal returns, using the whole time-series available as a normal return model. The difference between these abnormal return and the ones in the columns 3-4 is that they, in addition to taking the cross-correlations into account, put much more weight on the dates after the crisis. The estimates from the last two columns go in line with the previous results, although they are somewhat different. According to these results, in addition to the devaluation dates, there were some big changes in the relative valuation of firms, beneficial for the exporting firms, on September 21-23, the days after the first devaluation, on November 18, one of the days preceding the second devaluation, and on May 5, 21 and 27. There were some backward changes of the

[12] With the exception of the first quartile.

relative valuations on some other dates, however. Nonetheless, the overall tendency of changes in the firms' valuations through out the crisis looks beneficial for the exporting firms.

Table B.7 contains the results of the regression of the stock returns on the share of domestic sales and the cover ratio. The results for the shares of domestic sales are similar to the ones from Table 3.3. The coefficients appear to be more significant than the ones from Table B.6 in the case of the second and the third devaluations. It is interesting to notice that, in contrast to the UK, the estimates for the cover ratio are often negative and very significant. Since Spain, in contrast to the UK, did not cancel its membership in the ERM right after the first speculative attack, the period of high interest rates lasted longer in this country, and could have hurt firms dependent on bank loans. This conjecture is supported by the fact that some of the large and significant regression coefficients correspond to the dates when Spain introduced some strict measures to support the exchange rate. The example is September 23, 1992, when Spain introduced foreign exchange control. The cover ratio coefficient for this date is negative, among the largest in the absolute level for the period in question, and significant at the 1 percent level in all types of estimations.

3.3.3 Post-devaluation performance

We calculated the correlations between the stock returns and the changes in profit, changes in the ratio of sales to the employment costs, and the changes in the share of domestic sales between 1991 and 1994 for Spain as we did for the UK. These correlations, separate for each devaluation, and average among all three devaluations, are reported in Table 3.4. The average correlations among all the devaluations, and correlations at the time of the first devaluation are of the wrong sign, unfortunately. The changes in the ratio of sales to the employment costs is positively correlated with the stock returns on November 23, the date of the second devaluation. The strongest correlations between the after-devaluation performance measures and the stock returns for the third devaluation are observed on May 11, the day when the speculative attack started. The correlations of changes in profit and the stock returns are positive, while the correlations between the changes in the share of domestic sales are negative in this case, as expected. Moreover, the correlations between the changes in the share of domestic sales and the stock returns are very large in this case, around 75-79 percent. Since in this sample, a

Table 3.4: Spain. Correlations between stock returns and changes in after-devaluation performance measures

		stock return	abnormal stock return
17-Sep-92			
	change in profit	-0.6139	-0.5941
	change in sales/wages	-0.1179	-0.1271
	change is ukshare	0.1301	0.1589
23-Nov-92			
	change in profit	-0.0964	-0.0741
	change in sales/wages	0.0474	0.0388
	change is ukshare	0.7404	0.7301
13-May-93			
	change in profit	0.0534	-0.1241
	change in sales/wages	-0.1570	-0.1393
	change is ukshare	-0.6209	-0.5045
11-May-93			
	change in profit	0.1307	0.0902
	change in sales/wages	-0.0338	-0.0437
	change is ukshare	-0.7901	-0.7519
Average			
	change in profit	-0.1821	-0.0229
	change in sales/wages	-0.0556	-0.0627
	change is ukshare	0.2427	0.2073

large proportion of companies had 100 domestic sales share, we interpret this finding as if the possibility to increase exports was valued by the market at the end of the crisis. Unfortunately, the correlation between the changes in the ratio of sales to the employment costs is negative, although small.

3.4 Conclusion

This chapter provides a comparative study of the stock market reaction to the devaluations in the UK and Spain during the ERM crisis of 1992-1993. We show that in both countries there was a substantial change in the relative firm valuations on the day of the devaluation or on the day of the speculative attack, which was expected to be successful. On the devaluation days, the value of exporting firms in these countries increased in comparison to the value of non-tradable and importing firms. Thus, this chapter provides clear evidence that in the case of fixed exchange rates, investors correctly changed firms' valuation after devaluations. The chapter shows also that British firms were not significantly affected by the high interest rates, which the UK had to set to fight the speculative attack. On the other hand, there seems to be a trend of declining relative valuation of Spanish firms dependent on bank lending. Since the UK cancelled its membership in the ERM in the early stage of the crisis, and Spain was confronted with substantial speculative pressure during the crisis, this finding provides conclusive evidence that long fighting can be damaging for economy. The chapter also studies the post-devaluation performance of firms and compares it with the changes in the relative valuation on the day of devaluation. We find, that firms which substantially increased their share of foreign sales after the devaluation, had larger price increases on the devaluation day. Also, firms that experienced higher increases in profit, or a decrease in the labor costs in comparison to sales, had higher increases in their value on the devaluation day. This finding is valid for both countries. Thus, the results of this chapter support the idea that investors correctly change their relative valuations of firms in the case of large devaluations of fixed exchange rates.

Chapter 4

The Stock Market Reaction to Devaluation and Companies' Debts: the Case of Mexico and Thailand

The recent currency crises have inspired extensive research aimed toward constructing theory and finding empirical evidence of the causes and indicators of such crises. Theoretical models, such as Krugman (1979, 1998a and 1998b), Obstfeld (1984), Dornbusch (1987), and many others answer such questions as why crises happen, why they take this or that form, and how to prevent crises. Empirical studies, such as Eichengreen, Rose and Wyplosz (1996) or Kaminsky (1997) investigate the problem of finding good indicators of currency crises, or of classification of crises according to one or another theoretical model, or of demonstrating the contagion character of the crises. At the same time, surprisingly little work has been done to explain the after-crisis performance of different countries. This is even more surprising as such performance differs substantially for different groups of countries. For example, European countries received a boost in their growth after the European Monetary System crisis of 1992. England, which went through several years of stagnation before the crisis, reached a record growth rate of more than 4 percent per year in 1994. On the other hand, Mexico, which was doing relatively well before the crisis, had an output decline of more than 6 percent in the devaluation year. Asian countries seem to be following the Mexican example. These countries are experiencing a dramatic decline

in their growth rates as a result of the crisis.

Calvo (1996) proposed that the output decline in Mexico can be explained by the collapse of domestic and foreign credit. Depreciation implies changes in the relative prices, and therefore, negatively affects the solvency on some companies, particularly in the non-tradable goods sector. If companies are linked to each other, this negative effect of solvency can be spread even to firms that were positively affected by the price changes. Thus, devaluation may lead to a substantial increase in the number of bankruptcies. Credit squeezes happen because of the deterioration of the balance sheets of most companies, and because of the adverse selection problem of discerning good and bad firms. This problem is particularly prominent in the case of companies having their debts denominated in foreign currency. The size of such debts explode automatically with devaluation, and thus worsens the balance sheet. This effect can be especially strong in countries which have a weak banking system. Accumulation of bad loans by the banks leads to the collapse of the banking system in general, and then gets spread over to the otherwise healthy firms. Countries which have recently liberalized their financial systems are sensitive to problems in the banking sector as they usually lack financial regulation and, as a result, are endowed with risky and inexperienced financial institutions. A collapse of foreign credit may also be enhanced by the inability of the public sector to service its debt. As Sachs, Tornell, and Velasco (1995) pointed it out: "There is a fact often overlooked in economic analysis: if the government succumbs to a creditor panic, the private sector is generally cut off from the international capital market as well, even if the country as a whole is solvent".

In this chapter we try to find evidence of the credit crunch effect on the post devaluation performance of firms. We use balance sheet data of Mexican and Thai non-financial firms to investigate how the expectations of the future firm performance, reflected in the stock market returns, depend on the size and on the structure of debts of these companies. Both countries provide a good case studies for two reasons. First, before the currency crises, both countries had badly regulated financial systems. In both countries, the financial system was liberalized just a few years before the crisis. Liberalization led to creation of multiple new financial companies, which invested their funds into risky projects. As a result, the financial system in both countries maintained a big share of bad loans even in the pre-devaluation period. Second, the governments of both countries were reluctant to raise the interest rates to fight the speculative attacks. High

interest rates would have immediately provoked a financial crisis (or worsened it, as in the case of Thailand) because of the shaky state of the banking system. In addition, in both countries, firms held a substantial share of foreign or foreign currency denominated debts. In Thailand, foreign borrowing was popular because there were strong tax incentives for offshore borrowing by banks and other financial intermediaries. In Mexico, foreign borrowing became popular after financial liberalization and the introduction of NAFTA. According to Conesa-Labastida (1997), Mexican firms substantially increased the share of foreign currency denominated debts during the last few years before the devaluation. While in 1987, the median exporting Mexican firm had only 3 percent of its debt denominated in foreign currency, this share increased to 72 percent in 1994. In non-exporting firms the increase was smaller, but also substantial: from almost zero in 1887 to 32 percent in 1994.

In this chapter, we study how the size and the structure of debts affect the stock market returns at the time of devaluation. We maintain the hypothesis that stock prices reflect expectations of the future firm performance. Therefore, we can use stock returns as indicators of the expected post-devaluation profits. We are interested in getting an insight into how the firms' stock market returns during the periods of devaluation depend on the size of their total debt, and on the size of such parts of debts as foreign, short-term, and short-term foreign debts. In the case of Mexico, we find strong evidence that the stock market returns depend negatively and significantly on the size of the firm's short run debt related payments, measured as the ratio of the sum of interest payments and short term debts.[1] We also find a negative relationship between the stock market returns and the share of foreign short term debt in the total short term debt. As it is well known, rolling over of the foreign short term debt was almost impossible in the post-devaluation Mexico. Our findings suggest that this situation had a detrimental effect on the post-devaluation performance of Mexican firms, which was reflected in the fall of the stock market prices. We also find that firms with larger export share experienced smaller price declines than other firms. This finding supports the theoretical conjecture that, other things equal, exporting firms benefit from the devaluation.

Unfortunately, Thai dataset which we use does not contain information on the foreign debt

[1] Since rolling over of the short term debt is impossible during financial crises, we include the total amount of such debt into our measure of the short-term debt related payments.

or foreign sales. Nonetheless, our main finding, i.e. that firms with higher debt were negatively affected by the devaluation, holds true in the case of Thailand.

The chapter is organized as follows. Section 4.1 contains a simple model in the spirit of Myers (1977), which shows how the presence of the foreign currency denominated debts can deteriorate firms' performance after devaluation. Section 4.2 provides empirical results for the sample of Mexican firms. Section 4.3 summarizes the results of the empirical tests for Thailand. Section 4.4 concludes. The Data appendix, which follows, comments on the sources of data used in the chapter.

4.1 Model

Some of the empirical tests undertaken in this chapter are based on the conjecture that firms with a substantial amount of foreign currency denominated debt should be negatively affected by devaluation. This section presents some theoretical arguments why massive private foreign denominated debt can induce a substantial decline of output after devaluation. The model is based on the debt overhang argument, first introduced by Myers (1977).

Suppose that there are 2 kinds of firms in the economy: bad firms and good firms. The proportion of good firms is equal to p. Good firms can produce both tradable and non-tradable goods, so their sales are indexed to the exchange rate and are equal to eR, where e is the nominal exchange rate. Bad firms can only produce non-tradable goods, and their sales are equal to R. In each period, both good and bad firms need a cash amount eI to pay for their working capital.[2] Firms do not have their own funds to pay for working capital, so they must borrow it from foreign investors. *Ex ante* investors cannot distinguish good firms from the bad ones. This is possible if, for example, all firms are united into big conglomerates, and all borrowing usually is done on the behalf of a conglomerate, or because the current exchange rate is overvalued, and both types of firms produce non-tradable goods. Assume that current exchange rate is equal to 1. Therefore, both types of firms look completely identical, and, if there is no expectation of a devaluation, investors have no incentives to try to discriminate against the two types of

[2]The model can be reformulated in such a way that only good firms need credit equal to eI and bad firms only need I. However, due to investors' inability to distinguish firm type, bad firms want to mimic good firms, and ask for the same credit.

firms. Assume, that under the current exchange rate, it is profitable for foreign investors to lend to all firms: $R - D - I > 0$, where D is the amount of the previously accumulated debt, senior to the debt for working capital, I. We assume that managers of the good firms require, at the minimum, zero compensation for their work. In this case, all firms will receive credit for their working capital. Under the assumption of perfect competition among foreign investors, the interest rate required on all loans, is 0.

Now, suppose that the country unexpectedly devalues. Since in the pre-devaluation times investors were not able to discriminate between the two types of firms, bad firms would try to mimic the good ones. In this case it is possible that, if the devaluation is substantial enough, the expected profit from lending to every firm which used to receive credits for its working capital before the devaluation becomes $(peR - (1-p)R) - eD - eI < 0$. Therefore, unless investors could distinguish good firms from the bad ones, all firms will be unable to receive credit. Hence, all firms will not be able to produce, and output will fall. The solution to this problem is either to find the mechanism, which would allow good firms to signal their type, or to renegotiate all debts. It is conceivable, that the signaling mechanism for the good firms is unattainable in such a situation. On the other hand, debt renegotiation will help if it is possible to decrease the total amount of outstanding debts to the point when firms can borrow again. Notice that as soon as all firms would be able to borrow and to start production, it becomes easier than before the devaluation to develop the mechanism which allows investors to observe the firm type: a truthful accounting system can serve as such a mechanism. Notice also that debt renegotiation usually takes a lot of time, during which firms are unable to borrow. Hence, even if eventually firms will get credit, initial output decline can be substantial. On the other hand, if all the debts were originally denominated in the local currency, they would have depreciated together with the currency, and the problem of a liquidity crisis would not have occurred.

4.2 Mexico

Already in 1993, some observers, for example Dornbusch (1993), pointed out that the current account deficit of 7-8 percent of GDP in Mexico was unsustainable. However, this country did not experience any pressure on its currency prior to the spring of 1994. Moreover, it

was political, not economic problems which pounded the catalyst for the crisis of 1994: Mexico suffered from peasant rebellions in Chiapas, and the assassination of the ruling party's President candidate. Nonetheless, some authors, including Sachs, Tornell, and Velasco (1995), claim that the crisis, in the form it eventually took, was not inescapable, and was by and large provoked by the government and the Mexican Central Bank. The idea is that in response to the first signals of the run on the currency, the Mexican Central Bank launched domestic credit expansion, instead of devaluing the currency, or increasing the interest rates. This credit expansion eventually lead to the loss of reserves by the Central Bank, and to the panic among the foreign creditors. In December 1994, the Mexican government found itself unable to roll over its short term foreign denominated debts, and had to, at first, devalue, and then float the currency. After being allowed to float, the Mexican peso was declining in value for the next 3-4 months. The resulting devaluation, was much larger than the predicted 20 percent. The creditors' panic caused substantial increase in interest rates. As a result, many banks became illiquid or insolvent. Many manufacturing firms were unable to get credit to continue production, and the resulting output decline was equal to about 6 percent.

The stock market reaction to the devaluation was extremely negative. Was this reaction purely a result of the investors' panic, or did it reflect the expectations of a future output collapse? We believe that investors correctly anticipated the output collapse, and that this was reflected in the cross-sectional differences among the stock prices of firms. Interestingly, the Mexican stock market price index in dollars did not recover to its pre-devaluation level to date (see Figure 4-1).

In the rest of the section we summarize accounting measures of indebtness of Mexican firms, and test if these measures are correlated with the relative decline of the firms' stock market prices during the devaluation period.

Table 4.1 contains a summary of debt related measures for all firms in our dataset across different years and across different groups of companies.[3] Variables are summarized for all companies for which relevant information is available. We consider debt to sales and debt to asset ratios as our a measure of the relative debt size. The borrowing ratio, i.e. the ratio of debt to the net worth, is a measure of solvency of a company. The table also summarizes the

[3]For the description of the dataset, see Appendix C.1.

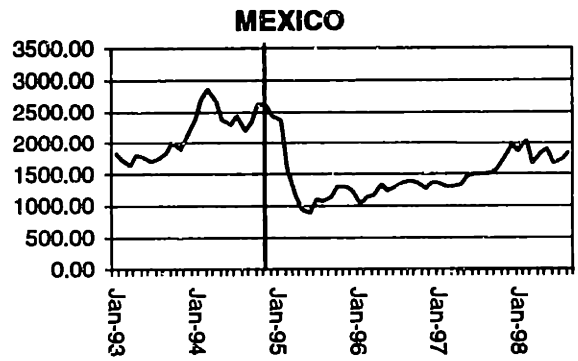


Figure 4-1: IFC Emerging Markets Global Stock Price Index (dollars): Mexico

following variables: the share of short-term debt and the share of foreign debt in total debt, the share of foreign short term debt in total short term debt, the share of foreign sales in total sales, and the ratio of interest payments to sales and to the total assets. The last two ratios measure the relative size of debt service payments a company has to make during the year. However, if a company cannot roll over its short term debt, its outflow of debt related payments increases by the amount of the short-term debt. Notice that, since all the variables in the dataset are net values, the ratios of, for example, foreign debt to the total debt would not necessarily be less than 1.

According to calculations presented in Table 4.1, debts of Mexican companies comprised 35 percent of their assets, and 78 percent of their net worth in 1993. The share of the short-term debt in 1993 was 58 percent, 62 percent of which was denominated in foreign currency. Fifty six percent of all debt was denominated in foreign currency, while export sales comprised only 17 percent of total sales. The devaluation substantially increased the debt burden by increasing the amount of foreign debt. In 1995, Mexican companies' foreign debt increased to 88 percent of all debts. Since foreign investors were reluctant to lend to Mexican companies in 1995, the bulk of this increase comprised the increase in the peso value of the same dollar amount. The other potential source of an increase in the share of net foreign debt in the net total debt is a decrease in the value of loans that companies extended to other companies. This happens because of bankruptcy and default of the later. The share of foreign sales increased, but not

Table 4.1: Mexico. Summary

	All companies			Regression sample**		
%	1993	1994	1995	1993	1994	1995
debt/sales	241.24	334.35	443.79	(203.41)	(392.18)	(361.12)
debt/assets	34.57	38.60	40.55	(31.09)	(39.05)	(39.49)
borrowing ratio	78.32	121.65*	110.47*	(59.49)	(94.66)	(101.18)*
s-t. debt/total debt	57.87	58.48	58.93	(49.99)	(51.41)	(49.66)
f. debt/total debt	56.13	74.28	87.84	(68.59)	(87.16)	(87.50)
f.s-t debt/s-t debt	61.61	78.53	107.01	(68.27)	(96.49)	(93.49)
f.sales/total sales	16.73	21.43	31.32	(18.12)	(27.56)	(37.29)
f.debt/f.sal. (times)	3,009.71	166.16	47.66	(58.35)	(160.46)	(92.87)
interest/sales	8.36	10.71	14.54	(4.59)	(9.71)	(17.36)
interest/asset	1.17	1.26	2.24	(0.70)	(0.93)	(1.86)
	Holdings			Members of Conglomerates		
%	1993	1994	1995	1993	1994	1995
debt/sales	257.54	687.58	542.68	229.18	313.53	283.55
debt/assets	40.67	48.49	47.84	35.80	40.01	42.64
borrowing ratio	113.06	351.76	168.92	85.95	89.96*	95.98*
s-t. debt/total debt	47.00	52.81	51.08	44.34	53.61	53.60
f. debt/total debt	77.06	82.51	92.41	69.60	83.13	139.22
f.s-t debt/s-t debt	72.30	78.64	94.71	72.89	86.10	147.29
f.sales/total sales	28.38	34.60	46.04	17.29	22.76	26.66
f.debt/f.sal. (times)	33.64	606.50	17.41	7002.14	68.32	66.76
interest/sales	5.39	25.41	27.08	8.02	7.90	15.73
interest/asset	0.54	1.55	1.86	1.44	1.04	2.18

* Companies with negative borrowing ratio are excluded

** Smaller sample used in regressions

Table 4.1: continued

	Other companies		
%	1993	1994	1995
debt/sales	243.93	293.12	504.03
debt/assets	33.41	36.43	38.71
borrowing ratio	71.44	102.36	109.38*
s-t. debt/total debt	64.24	61.83	62.31
f. debt/total debt	48.62	68.51	64.05
f.s-t debt/s-t debt	56.10	74.61	90.32
f.sales/total sales	15.18	18.81	31.61
f.debt/f.sa. (times)	1837.41	151.76	42.76
interest/sales	8.82	9.99	12.46
interest/asset	1.14	1.33	2.32

* Companies with negative borrowing ratio are excluded

as much as the share of foreign debt. This may happen because of difficulties in increasing or keeping the same share of foreign sales in the situation when there are credit market problems. These two observations are valid for the whole dataset, and for the small dataset used in the regressions. Holding companies on average are more indebted than other companies. Their borrowing ratio, and ratios of debt to sales and debt to assets are higher. Holdings also have a higher share of foreign debt, presumably because they have better access to credit markets and, in particular, to the international credit market. However, holding companies also have a substantially higher share of foreign sales. Companies, members of conglomerates, while being less export oriented than holdings, have higher than average proportion of foreign debt. As members of conglomerates, they may have had better access to the credit market than companies not affiliated with the conglomerates. Notice, also, that holdings and members of conglomerates have a lower share of the short-term debt. Independent companies have a higher share of the short-term debt and lower share of the foreign debt. Therefore, their access to the credit market before the devaluation was limited in comparison to other companies. Their share of foreign sales is also the smallest in the sample. This affected the stock market performance during the devaluation. We calculated the cumulative percentage price change in the stock market prices for the period from December 1994 to March 1995 for each company. The average price decrease is the largest, 43 percent,[4] for the companies, members of conglomerates. These companies, while not being export-oriented, having export share of 17 percent in 1993, were highly indebted, particularly, in foreign debts: the borrowing ratio in 1993 is 86 percent, and the foreign debt share of total debt is 70 percent. Companies not affiliated with any conglomerate on average experienced price decreases almost as high as the price decrease of companies, members of conglomerates: 40 percent. Since these companies had limited access to the foreign credit market their position after the devaluation was seriously affected by the domestic bank crisis. At the same time, holdings, as companies with the largest share of foreign sales, and the best pre-devaluation access to foreign credit markets, experienced the smallest, although also substantial, stock price decline of 29 percent.

Table 4.2 summarizes accounting characteristics for private and public companies in 1993.

[4]This is measured in current pesos, not corrected for inflation. The decline in the dollar prices was even larger.

Table 4.2: Mexico. Private vs Public

%	private	public
debt/sales	291.36	210.92
debt/assets	41.67	30.28
borrowing ratio	95.74	67.78
s-t. debt/total debt	56.62	58.62
f. debt/total debt	46.10	62.20
f.s-t debt/s-t debt	60.44	62.32
f.sales/total sales	15.99	17.18
f.debt/f.sa. (times)	7849.24	82.09
interest/sales	11.91	6.20
interest/asset	1.88	0.74

Private companies are on average more indebted than public companies, with the exception of foreign debt. However, we suspect that this result may be partially caused by the fact that our debt measures are net debt. To the extent that public companies tend to lend to their subsidiaries, their net debt can be lower, even if their gross debt is higher.

Tables 4.3 summarizes different debt measures for companies, depending on their size. Companies of different size turned out to be almost equally indebted with the exception of the foreign debt. Notice that, for the biggest companies from the group for which we have stock market prices, foreign debt is substantially larger than foreign sales. The stock price decline in this group was substantially larger than in the smallest firms group: 49 versus 23 percent, when the breakdown into size groups is based on sales, and 42 versus 20 percent when the breakdown is based on assets.

Finally, Table 4.4 summarizes the same variables for those firms for which we have stock market data, broken down according to the stock market performance during the devaluation, from December 1994 to March 1995. The table summarizes 1993 values of the variables. There are two interesting facts which become apparent after examining the table. First, and the most important finding is that firms from the group with the smallest price decline (group 3) have the smallest ratio of foreign debt to foreign sales. In addition, this ratio is monotonically decreasing from the first group to the third one. Hence, only firms whose foreign debts were very small in comparison to their foreign sales were expected to perform well after the devaluation. Notice,

Table 4.3: Mexico. Size breakdown

	According to assets			According to sales		
	A1	A2	A3	S1	S2	S3
debt/sales	213.24	293.05	222.90	282.73	243.87	181.90
	(92.59)	(234.16)	(232.17)	(96.42)	(282.82)	(192.68)
debt/assets	36.21	33.78	33.22	35.85	34.03	33.61
	(19.56)	(34.26)	(34.12)	(20.025)	(33.21)	(33.85)
borrowing ratio	81.33	75.84	76.97	80.46	76.10	78.50
	(33.10)	(65.61)	(67.15)	(34.95)	(63.09)	(66.27)
s-t. debt/total debt	66.70	61.65	41.93	62.80	65.46	40.83
	(80.76)	(53.44)	(34.02)	(78.01)	(60.39)	(33.11)
f. debt/total debt	38.10	58.19	78.11	40.97	56.04	76.62
	(44.62)	(64.38)	(82.06)	(48.84)	(68.28)	(76.07)
f.s-t debt/s-t debt	44.76	66.61	78.83	54.25	59.84	73.92
	(50.57)	(60.46)	(81.36)	(55.65)	(67.85)	(73.20)
f.sales/total sales	14.25	18.11	18.57	17.05	15.82	17.55
	(11.63)	(22.01)	(18.41)	(11.81)	(28.30)	(14.01)
f.debt/f.sal. (times)	3025.35	5713.14	71.87	3286.61	4879.55	73.52
	(8.10)	(19.97)	(106.28)	(9.12)	(13.18)	(105.02)
interest/sales	8.75	9.63	6.46	13.47	5.38	5.57
	(4.19)	(3.09)	(5.78)	(4.74)	(3.97)	(4.94)
interest/asset	1.54	0.72	1.16	1.69	0.65	1.17
	(0.81)	(0.50)	(0.78)	(0.92)	(0.45)	(0.77)
% of holdings	0.00	12.20	13.16	2.13	8.33	14.29
	(0)	(25)	(27.78)	0	(25)	(26.32)
% in conglom.	9.80	21.95	50.00	10.64	22.92	48.57
	(25)	(25)	(33.33)	(28.57)	(16.67)	(36.84)

Numbers in brackets are for the sample used in regressions

Table 4.4: Mexico. Stock returns breakdown

	Q1	Q2	Q3
debt/sales	258.398	143.480	208.776
debt/assets	31.957	30.824	30.468
borrowing ratio	58.714	61.787	57.865
s-t. debt/total debt	40.350	50.995	59.355
f. debt/total debt	69.266	68.405	68.073
f.s-t debt/s-t debt	63.002	74.943	66.776
f.sales/total sales	18.043	11.900	24.933
f.debt/f.sal. (times)	137.756	21.176	12.601
interest/sales	7.007	1.290	5.573
interest/asset	0.948	0.242	0.913
% of holdings	23.077	15.385	25.000
% in conglom.	30.769	30.769	25.000

however, that the ratio of foreign debt to foreign sales is very high in all groups. Even in the third group, foreign debt is almost 13 times larger than foreign sales. Hence, after devaluation, when the relative prices of non-tradable goods fall dramatically, all firms could have experienced problems rolling over their foreign debts. On the other hand, the share of the short-term debt monotonically increases across groups. We do not have a good explanation for this. We suspect that this can be explained by better access to the credit market by the firms belonging to the third group.

4.2.1 Regression Results

We collected the information on the stock prices denominated in the Mexican Pesos for 59 public companies. For these companies, we calculated the cumulative stock return during the period from December 1994 to March 1995. Most companies in our sample have significantly negative stock price returns during these months, while during previous and consequent months, stock returns were either positive, or negative, but of a much smaller magnitude. Seven companies in the sample have positive stock returns during this period, and prices of the two other companies did not change.[5]

[5] We believe, that this is just due to the fact that these companies are not traded often.

Table 4.5: Mexico. Regression results

	OLS	OLS	OLS	IV	IV	IV	IV
int.t+s-t debt/sal.	-0.033	-0.037	-0.035		-0.037	-0.042	-0.040
	(0.015)	(0.016)	(0.016)		(0.018)	(0.019)	(0.018)
for.s-t debt/s-t d.	-0.396	-0.394	-0.519	-0.354	-0.391	-0.390	-0.506
	(0.137)	(0.145)	(0.158)	(0.146)	(0.139)	(0.146)	(0.162)
for. debt/t. debt	0.558	0.577	0.703	0.493	0.578	(0.609)	0.735
	(0.279)	(0.291)	(0.298)	(0.298)	(0.286)	(0.302)	(0.307)
s-t debt/t. debt	0.651	0.640	0.390	0.585	0.685	0.682	0.461
	(0.211)	(0.216)	(0.263)	(0.233)	(0.230)	(0.235)	(0.289)
for. sales/t. sales	0.291	0.272	0.363		0.218	0.174	0.235
	(0.145)	(0.151)	(0.150)		(0.246)	(0.253)	(0.248)
borrowing ratio				-0.017	0.578	0.077	0.098
				(0.148)	(0.156)	(0.161)	(0.149)
holding		0.102				0.099	
		(0.154)				(0.156)	
comglomerate		-0.031				-0.042	
		(0.122)				(0.125)	
s2			-0.250				-0.247
			(0.198)				(0.201)
s3			-0.327				-0.306
			(0.199)				(0.205)
const.	-0.836	-0.844	-0.479	-0.839	-0.903	-0.930	-0.614
	(0.196)	(0.204)	(0.292)	(0.274)	(0.267)	(0.273)	(0.362)
adj R2	0.29	0.26	0.31				

Standard Errors in parenthesis

To extract information about expectations of the future firm performance, we regressed the stock return on the accounting ratios. This allows us to find out if expectations of the future performance were in any way affected by the structure and the size of debt. Regression results are presented in Table 4.5. Since we believe that company performance at that time should have depended on the amount of all debt related payments firms had to make in the near future, and it is likely to be the case that firms were not able to roll over their short term debt, we use the ratio of the sum of interest payments and short term debt over sales to measure these payments.[6] Other variables are the same as the ones summarized in Table 4.1. We estimated regressions which do not include borrowing ratios using simple OLS. We used the data from the last quarter of 1994, since this is the information that investors most likely used to judge future firm performance. We believe that, since devaluation happened in the middle of December, the effect of the devaluation and of the consequent stock market price change on accounting variables was negligible. The only exception is the borrowing ratio, to the extent that it depends on the stock market prices directly. Therefore, in all regressions which use the borrowing ratio, we instrumented 1993 values for 1994 ones.

There are several interesting observations we can make regarding the results of regressions. First, the ratio of the sum of interest payments and the short term debt over total sales, and the share of short-term foreign debt in the total short-term debt is negative and significant at the 5 percent level in all specifications. The share of foreign sales in total sales is always positive and usually significant. Hence, firms with higher debts and those with higher short term foreign debt experienced a significant decreases in their stock prices. This effect was much less prominent for firms with higher shares of foreign sales. Surprisingly, the share of both long- and short-term foreign debt in the total debt, and the share of short-term debt in total debt are significantly positive in all specifications. However, the size and significance of these coefficients are affected by the introduction of firm size measures in the regression. We interpret this finding in a way that firms which have a larger share of foreign and short-term debt have better access to the credit market and are expected, after controlling for other effects, to have fewer solvency related problems. The borrowing ratio is usually insignificant and often has a wrong

[6] We also tried to use the ratio of the sum of these two variables over assets, but this variable was always insignificant in the regressions.

(positive) sign.[7] This may be a result of poor quality of our instruments. It is well known, that in financial crises, solvency problems become visible only after a crisis has started, and that firms that quickly become insolvent after the start of the crisis, look perfectly solvent before the crisis. Hence, the 1993 borrowing ratio does not really capture 1995 solvency problems. In addition, we have to drop bankrupt firms from the regression, since their borrowing ratio is negative. The bias, which we create by doing this, may explain the insignificance of the variable. Dummy variables for holding companies, and for members of conglomerates are not significant. However, dummy variables for the second and third size group are negative and highly significant. Therefore, firms in these groups experienced larger price declines during devaluations. Since introduction of these dummies affects the foreign and the short-term share coefficients, we may conclude that the size dummies reflect the pre-devaluation access to the credit markets, and the overaccumulation of foreign and short term debt.

To conclude, we find evidence that stock price changes during devaluations are negatively correlated with the total debt size in general, and with the share of the short term foreign debt in particular. We interpret this finding as evidence that firms with larger debt, and particularly, with larger short-term foreign debt are expected to have substantial liquidity and solvency problems after devaluation. This negative relation is compensated for export oriented companies having larger export share of total sales.

4.3 Thailand

The Thai crisis differs from the Mexican one because it started not with political problems, but with financial ones. In the early 1990s, there was a boom in the stock and the real estate market in Thailand. A number of financial and property corporations appeared, which, while being backed by implicit or explicit government guaranties, borrowed off-shore money, and then invested them into the stock market or real estate. By 1996, some of these companies accumulated a substantial amount of non-performing debt. The overall insolvency of the financial sector became so big, that the perspective of a government bail-out has become questionable. This led to a substantial fall in the stock market prices that aggravated solvency problems even

[7] We include the borrowing ratio in the regressions, since it is typically used as a formal measure of firms solvency.

Figure 4-2: IFC Stock Market Index: Thailand

further. Hence, by 1997, Thailand was in a deep financial crisis. Increasing problems in the financial sector, accompanied by the current account deficit of 7.5 percent of GDP triggered the speculative attack on the currency. As in the case of Mexico, the Bank of Thailand was reluctant to increase the interest rates to fight the attack. In fact, the interest rates were decreased in May, and this made the speculative attack even simpler than before. Finally, the government announced a devaluation on July 2, 1997.

Table 4.6 summarizes the following accounting ratios for 230 Thai firms traded on the Thailand Stock Exchange, in breakdown by industry: the borrowing ratio, the ratio of total debt to total sales, and the share of borrowings with the maturity below 1 year of the total debt. The borrowing ratio is the ratio of the sum of all subordinated debt, total loan capital, and borrowings repayable within one year over the sum of equity and reserves minus intangibles plus deferred tax. This is a common accounting measure of firm solvency. Since we do not have the measure of interest payments, we use the ratio of total debt over sales to measure the size of debt related payments firms were expected to make relative to the size of their revenue. We use total debt, and not net debt, since we believe that during a financial crisis it is a more relevant measure of firms indebtness, since the probability that loans which the firm accepted will be repaid is substantially smaller during the crisis than in the normal times. Table 4.6 confirms the belief that Thai firms hold substantial amount of debt before devaluation. At the end of

Table 4.6: Thailand. Summary

Industry	accounting item	1993	1994	1995	1996	1997
Total	borrowing ratio (d/e)	95	302	110*	121*	479*
	total debt/sales	73	76	82	121	134
	borrowings<1/total debt	77	75	71	71	71
	st.price ch.in June97				-16	
	max/min st.price				14	
	# of firms with pos.trend				27	
	total # of firms				230	
Agribusiness	borrowing ratio (d/e)	64	82	116	132	235*
	total debt/sales	24	30	39	123	53
	borrowings<1/total debt	88	85	78	81	81
	st.price ch.in June97				-12	
	max/min st.price				6	
	# of firms with pos.trend				5	
	total # of firms				23	
Building	borrowing ratio (d/e)	135	132	133	157	2568*
	total debt/sales	108	121	113	117	151
	borrowings<1/total debt	63	59	57	62	64
	st.price ch.in June97				-24	
	max/min st.price				21	
	# of firms with pos.trend				0	
	total # of firms				28	
Chemicals	borrowing ratio (d/e)	100	137	109*	157*	209*
	total debt/sales	57	61	74	86	147
	borrowings<1/total debt	79	83	72	59	60
	st.price ch.in June97				-20	
	max/min st.price				8	
	# of firms with pos.trend				0	
	total # of firms				13	
Commerce	borrowing ratio (d/e)	122	120	140	133	589*
	total debt/sales	55	60	77	69	57
	borrowings<1/total debt	83	80	63	67	76
	st.price ch.in June97				-36	
	max/min st.price				19	
	# of firms with pos.trend				0	
	total # of firms				12	

* Companies with negative borrowing ratio are excluded

Table 4.6: continued

Industry	accounting item	1993	1994	1995	1996	1997
Communication	borrowing ratio (d/e)	63	109	106	160	847
	total debt/sales	227	422	309	563	703
	borrowings<1/total debt	57	45	32	37	46
	st.price ch.in June97				-24	
	max/min st.price				13	
	# of firms with pos.trend				0	
	total # of firms				8	
Electrical Products	borrowing ratio (d/e)	97	101	161	180	178*
	total debt/sales	48	46	61	119	95
	borrowings<1/total debt	75	83	73	81	67
	st.price ch.in June97				-11	
	max/min st.price				15	
	# of firms with pos.trend				1	
	total # of firms				11	
Electronic	borrowing ratio (d/e)	109	93	66	106	93
	total debt/sales	41	33	36	58	51
	borrowings<1/total debt	70	82	76	62	72
	st.price ch.in June97				-14	
	max/min st.price				202	
	# of firms with pos.trend				5	
	total # of firms				7	
Energy	borrowing ratio (d/e)	99	61	83	104	167
	total debt/sales	191	73	123	197	178
	borrowings<1/total debt	42	37	34	29	34
	st.price ch.in June97				-14	
	max/min st.price				4	
	# of firms with pos.trend				1	
	total # of firms				7	
Entertainment	borrowing ratio (d/e)			31	23	22
	total debt/sales			37	170	35
	borrowings<1/total debt			71	64	86
	st.price ch.in June97				-17	
	max/min st.price				24	
	# of firms with pos.trend				0	
	total # of firms				4	

* Companies with negative borrowing ratio are excluded

Table 4.6: continued

Industry	accounting item	1993	1994	1995	1996	1997
Foods	borrowing ratio (d/e)	145	1984	98*	107	180*
	total debt/sales	53	48	47	127	68
	borrowings<1/total debt	80	77	76	82	82
	st.price ch.in June97				-7	
	max/min st.price				5	
	# of firms with pos.trend				7	
	total # of firms				24	
Household	borrowing ratio (d/e)	66	85	108	121	249
	total debt/sales	61	50	55	68	92
	borrowings<1/total debt	74	80	75	69	80
	st.price ch.in June97				-15	
	max/min st.price				21	
	# of firms with pos.trend				3	
	total # of firms				8	
Jewelry	borrowing ratio (d/e)	65	124	138	141	161
	total debt/sales	58	89	101	112	66
	borrowings<1/total debt	100	92	97	98	63
	st.price ch.in June97				-21	
	max/min st.price				5	
	# of firms with pos.trend				0	
	total # of firms				3	
Machinery	borrowing ratio (d/e)	70	40	85	101	5*
	total debt/sales	41	23	58	66	117
	borrowings<1/total debt	98	82	89	72	72
	st.price ch.in June97				-9	
	max/min st.price				6	
	# of firms with pos.trend				0	
	total # of firms				6	
Packaging	borrowing ratio (d/e)	77	97	96	109	118*
	total debt/sales	75	67	69	67	86
	borrowings<1/total debt	81	81	78	77	81
	st.price ch.in June97				-9	
	max/min st.price				12	
	# of firms with pos.trend				2	
	total # of firms				16	

* Companies with negative borrowing ratio are excluded

Table 4.6: continued

Industry	accounting item	1993	1994	1995	1996	1997
Mining	borrowing ratio (d/e)	65	87	94	78	
	total debt/sales	146	178	85	111	
	borrowings<1/total debt	79	45	43	53	
	st.price ch.in June97				-5	
	max/min st.price				3	
	# of firms with pos.trend				0	
	total # of firms				1	
Pharmaceutical	borrowing ratio (d/e)	17	11	36	38	53
	total debt/sales	9	8	21	21	31
	borrowings<1/total debt	99	100	77	85	95
	st.price ch.in June97				-14	
	max/min st.price				3	
	# of firms with pos.trend				0	
	total # of firms				2	
Printing	borrowing ratio (d/e)	60	71	125	101	60
	total debt/sales	102	95	114	140	53
	borrowings<1/total debt	64	61	75	75	78
	st.price ch.in June97				-15	
	max/min st.price				22	
	# of firms with pos.trend				1	
	total # of firms				9	
Pulp,Paper	borrowing ratio (d/e)	195	178	159	182	589
	total debt/sales	307	170	355	200	308
	borrowings<1/total debt	30	40	32	46	42
	st.price ch.in June97				-4	
	max/min st.price				4	
	# of firms with pos.trend				1	
	total # of firms				5	
Textiles	borrowing ratio (d/e)	63	66	93	123	196*
	total debt/sales	45	50	64	82	135
	borrowings<1/total debt	81	84	83	79	78
	st.price ch.in June97				-12	
	max/min st.price				10	
	# of firms with pos.trend				1	
	total # of firms				23	

* Companies with negative borrowing ratio are excluded

Table 4.6: continued

Industry	accounting item	1993	1994	1995	1996	1997
Transportation	borrowing ratio (d/e)	84	73	69	118	464
	total debt/sales	43	39	57	99	131
	borrowings<1/total debt	49	35	31	41	41
	st.price ch.in June97				-19	
	max/min st.price				19	
	# of firms with pos.trend				0	
	total # of firms				4	
Vehicles	borrowing ratio (d/e)	141	132	146	115	1340*
	total debt/sales	62	55	52	36	198
	borrowings<1/total debt	81	78	86	87	93
	st.price ch.in June97				-29	
	max/min st.price				16	
	# of firms with pos.trend				0	
	total # of firms				10	
Warehouse,Silo	borrowing ratio (d/e)	48	23	36	41	10
	total debt/sales	222	103	159	225	157
	borrowings<1/total debt	100	100	68	97	100
	st.price ch.in June97				-6	
	max/min st.price				2	
	# of firms with pos.trend				0	
	total # of firms				4	
Others	borrowing ratio (d/e)	87	37	32	59	131
	total debt/sales	65	42	30	59	103
	borrowings<1/total debt	59	84	100	96	92
	st.price ch.in June97				-50	
	max/min st.price				2669	
	# of firms with pos.trend				0	
	total # of firms				2	

* Companies with negative borrowing ratio are excluded

1996, total debts held by Thai companies was equal to 121 percent of their sales.[8] Seventy one percent of this debt was short-term (repayable within 1 year). The debt is 21 percent higher than the sum of equity plus reserves (the borrowing ratio). The Table 4.6 shows that between 1993-1996, the coverage of debt by equity and reserves deteriorated. Already in 1995, there appeared some firms with negative reserves. In 1997, 19 firms had negative reserves, and 44 firms had debts which were more than three times larger than the sum of their equity and reserves. Therefore, in 1997, a large amount of firms looked technically bankrupt.

Unfortunately, the Thai dataset does not contain the data on debts denominated in foreign currency.[9] The dramatic increase in the borrowing ratio for many companies, as well as the increase in the ratio of debt to sales in 1997, in contrast to 1996, can be a consequence of the automatic multiplication of debts after the devaluation. However, financial and banking crisis may have contributed to worsening of the situation since companies' equity shrunk with the decline in the stock prices. In addition, companies most probably either held their reserves in domestic banks or invested them in the stock market. Hence, their reserves were wiped out by the stock market crash, and the massive insolvency of the banks.

In addition to accounting information, Table 4.6 provides the summary of dependent variables used in regressions, i.e. the stock return in June 1997, and the ratio of the maximum and the minimum stock prices during the period from January 1996 until March 1998, and the total number of firms in the industry. Most firms in the sample have negative trends in their stock prices during the period in consideration. However, some firms experienced substantial price increases, particularly during the second half of the sample period. For these firms, the overall price trend is positive. Table 4.6 gives the number of such firms for each industry.

Table 4.7 summarizes the same accounting ratios according to the size of the firm's sales. We divided all the firms into 4 groups according to the level of their sales in 1996. The table shows that large firms tend to have larger borrowing ratios, but smaller ratios of debt to sales. This suggests that large firms had proportionally smaller reserves, or experienced a proportionally larger decline in the value of their equity. The ratio of the maximum to the minimum price

[8] Notice, that debt ratios in Mexico and Thailand are not directly comparable, since the Thai data are gross variables, and Mexican data are net variables. Unfortunately, for Mexico gross variables were not available.

[9] We tried to estimate the ratio of the foreign debts share of the total debts over the foreign sales share of foreign sales, using the assumption that these shares are constant in real terms. However, ratios turned out to be negative, which can only be the case if our assumption of constant shares is violated.

Table 4.7: Thailand. Breakdown by sales

	S1	S2	S3	S4
borrowing ratio (d/e)	86	115*	135	150
total debt/sales	230	95	86	84
borrowings<1/total debt	75	78	72	58
st.price ch.in June97	-18	-14	-16	-24
max/min st.price	13	12	12	21

* Companies with negative borrowing ratio are excluded

Table 4.8: Thailand. Breakdown by stock return

	Q1	Q2	Q3	Q4
borrowing ratio (d/e)	152	101	122*	98
total debt/sales	230	107	83	54
borrowings<1/total debt	64	68	77	73

* Companies with negative borrowing ratio are excluded

over the sampling period in our dataset amounted to only 12-13 times for the firms in the 1-3 quartiles, while it is as large as 24 times for the firms in the fourth quartiles. The drop in prices in June 1997, the month preceding the devaluation, was also substantially bigger for the large firms. At the same time, large firms appear to have easier access to long term credit: while short-term debt comprises 75 percent of the debt of the firms in the smallest size group, this share is equal to only 58 percent in the group of the largest firms.

We divided all the firms into 4 groups according to the size of the price decline in June 1997, the month preceding the July 2 devaluation. The firms from the group with the largest price decline, have the highest borrowing ratio and the highest ratio of debt to sales.[10] Surprisingly, there is almost no difference in the shares of short-term debt in the total debt among the groups. Notice, however, that given the ratio of short term debt over total debt, firms with larger debts have larger short term debt.

Table 4.9 summarizes the same accounting measures for the firms that had a negative time

[10] See Table 4.8.

Table 4.9: Thailand. Positive vs Negative trend

	negative trend:	positive trend:
1996		
borrowing ratio (d/e)	125*	87
total debt/sales	132	43
borrowings<1/total debt	71	74
1995		
borrowing ratio (d/e)	146*	77
total debt/sales	88	35
borrowings<1/total debt	70	77

* Companies with negative borrowing ratio are excluded

trend during the sample period, and for the firms which had a positive time trend. In both 1995 and 1996, firms from the first group have substantially higher borrowing ratios and ratios of debt to sales. However, firms from the second group have slightly higher shares of short term debt in the total debt. It is possible that these firms did most of their borrowing in the last years, when only short-term debt was available. Nonetheless, the relative size of the short term borrowings, measured by the ratio of such debts over sales, is much smaller for the firms that belong to the second group . The substantial increase in the stock market price of the firms in the second group happened mostly after the devaluation. This suggests that these firms are the firms in the exporting sector. However, we suspect that the share of exporting firms is high even among the firms from the first group. This is based on the observation that manufacturing firms in Thailand are generally export oriented. If this is true, the table suggests that only firms with small debt burdens benefited from the devaluation in Thailand, regardless of the share of export sales.

4.3.1 Regression Results

To study the devaluation effect on the valuation of firms, we proceed in the following manner. We choose the month when, as we believe, the stock market behavior was most determined by the devaluation. Then we regress the stock returns in this month on the accounting ratio measuring debt size and composition, and a group of control variables. We chose June 1997 as a month when the stock market was most substantially affected by the devaluation expectations.

We have two reason for choosing this month, one statistical, and one historical. First, in June 1997, the average stock market return in our sample is the largest among surrounding months. Since the financial crisis was already going on for more than a year at that time, such a change in the stock prices can only be explained by some outstanding events. The natural candidate for such an event is the decrease in the interest rates, which The Bank of Thailand undertook in May. This decrease in the interest rates made attacking the currency easier, and also signaled the weakness of the Bank of Thailand in defending the currency. Therefore, in June the devaluation probability became a matter of days, and the stock market reacted accordingly.

Table 4.10 summarizes the results of regressing the stock market returns in June 1997 on the accounting ratios, summarized in the Table 3.1, and on the dummy variables, which correspond to the different firm groups according to the size of the firms. We used two types of regressions: one uses the ratio of total debt over sales as a measure of the relative debt size, while the other one uses the ratio of total debt over total assets for these purposes. In the first case, we divided firms into 4 size groups, according to the size of their sales, and in the second case, we divided firms into groups according to the size of their assets.

The first and the second columns of Table 4.10 report the results of the OLS regressions with standard errors corrected for heteroskedasticity among different industries. We use the end of 1996 accounting ratios in these regressions. To the extent that the stock returns in June 1997 are correlated with the previous periods stock returns, which at the same time affected firm's borrowing ratio by decreasing the size of equity, we have an endogeneity problem in this regression. Therefore, we use the borrowing ratios in 1995, the year preceding the financial crises, to instrument for the borrowing ratio in the third and the forth column of the table. The standard errors of the coefficients are corrected for heterosckedasticity across the sectors. The fifth and the sixth columns of the table use a fixed effect estimator.

We find some of the estimation results to be surprising. For example, the share of short-term debt is not significant in any of the regressions. We find that the share of short term debt does not substantially differ across different kinds of firms, and therefore, this effect is completely captured by the size of total debt. In addition, as in the case of Mexico, the borrowing ratio is

Table 4.10: Thailand. Regression results

Dependent variable: stock returns in July 1997

	OLS		IV		FE	
borrowing<1/total debt	0.014	-0.018	0.016	-0.032	-0.003	0.00003
	(0.058)	(0.056)	(0.59)	(0.061)	(0.067)	(0.070)
debt/sales	-0.0049		-0.006		-0.005	
	(0.003)		(0.004)		(0.005)	
debt/assets		0.081		-0.056		0.031
		(0.107)		(0.303)		(0.126)
bratio	-0.016	-0.022	0.003	0.01	-0.017	-0.02
	(0.012)	(0.010)	(0.29)	(0.043)	(0.017)	(0.022)
size2	0.028	0.03	0.023	0.023	0.056	0.037
	(0.054)	(0.044)	(0.055)	(0.048)	(0.049)	(0.046)
size3	0.02	0.026	0.007	0.016	0.023	0.051
	(0.044)	(0.052)	(0.48)	(0.054)	(0.050)	(0.049)
size4	-0.042	-0.113	-0.056	-0.132	-0.006	-0.075
	(0.033)	(0.041)	(0.036)	(0.047)	-0.054	(0.060)
const	-0.147	-0.143	-0.162	-0.112	0.151	-0.154
	(0.07)	(0.087)	(0.072)	(0.095)	(0.054)	(0.077)
	OLS2		IV2		FE2	
debt/sales	-0.005		-0.007		-0.0055	
	(0.002)		(0.003)		(0.006)	
debt/assets		0.058		-0.072		0.008
		(0.095)		(0.173)		(0.123)
bratio	-0.017	-0.021	0.0026	0.014	-0.018	-0.019
	(0.012)	(0.008)	(0.029)	(0.043)	(0.016)	(0.022)
size2	0.024	0.027	0.019	0.02	0.051	0.032
	(0.052)	(0.044)	(0.053)	(0.046)	(0.047)	(0.046)
size3	0.014	0.025	0.002	0.018	0.019	0.045
	(0.042)	(0.049)	(0.046)	(0.051)	(0.049)	(0.048)
size4	-0.049	-0.104	-0.064	-0.118	-0.008	-0.071
	(0.028)	(0.033)	(0.031)	(0.036)	(0.052)	(0.055)
const	-0.13	-0.146	-0.143	-0.129	-0.147	-0.143
	(0.040)	(0.054)	(0.038)	(0.055)	(0.038)	(0.045)

Standard Errors in parenthesis

insignificant.[11] The non-significance of the borrowing ratio may reflect the fact that this ratio was already incorporated in the stock price on some other day, for example on the day when firm reports were issued to the shareholders. Notice, though, that the borrowing ratio has expected (negative) sign in OLS and fixed effect estimations, and positive sign in the IV estimations. We had similar result in Mexican regressions. Thus, we have an additional confirmation of the conjecture, that borrowing ratio has very little prediction power: firms, which afterwards have become insolvent, were completely solvent according to the conventional accounting measures at the end of 1995.

In all regressions, coefficient of the debts over sales ratio is substantially more significant than the coefficient of the ratio of debt to assets. In regressions, which omit the share of the short-term debts, this coefficient is significant on at least 5 percent level, except for the fixed effect estimator. The coefficient is even more significant in regressions, which do not include the borrowing ratio.[12] Since devaluation, in addition to the direct effect on the size of the foreign debt, has an effect on sales, the ratio of debt to sales, after controlling for the size of sales, serves as a better measure of the relative size of the effect of devaluation on debt, and of the post-devaluation effect of debt on firms performance. It is interesting to notice that firms from the smallest and the largest size groups have the most negative and significant stock price declines after devaluation.[13] It is possible that this result captures the fact that large firms had easier access to foreign currency borrowing before the devaluation, and therefore, had the largest foreign debts. On the other hand, small firms have limited access to the credit market in general, and therefore, are substantially affected by any turmoil in this market.

To test the hypothesis that the stock price behavior in June 1997 was determined not by the devaluation, but by the ongoing financial crisis, we repeated our regressions using the difference between the highest and the lowest stock price over the sampling period from January 1996 to March 1998 as a dependent variable. As graph 4-2 shows, financial crisis, mitigated in the decline of the stock prices, started in Thailand in early 1996. Hence, we can attribute most

[11] For those firms, whose equity plus reserves is negative, the borrowing ratio is negative. We omitted such firms from the regressions. We are not absolutely sure about the direction of the bias which we introduced into our regressions by doing this. However, since omitting this variable from the regression does not substantially change the results for other variables, we believe that the bias is small.

[12] Not reported here.

[13] The dummy variables for groups 2 and 3 have a positive sign. Therefore, the stock return in the smallest group is smaller than in these two groups.

Table 4.11: Thailand. Regression results

Dependent variable:max/min stock price, 1/1996-4/1998

	OLS		IV		FE	
borrowing<1/total debt	5.444	15.707	3.065	42.183	5.506	13.29
	(8.258)	(13.034)	(24.707)	(127.658)	(8.274)	(8.254)
debt/sales	0.591		-0.925		1.037	
	(0.317)		(5.242)		(0.660)	
debt/assets		27.878		117.14		37.402
		(12.062)		(442.094)		(11.278)
bratio	0.001	-0.356	52.126	-53.25	0.299	-0.233
	(0.493)	(0.422)	(143.591)	(248.645)	(0.802)	(0.774)
size2	-0.453	1.808	-10.29	68.724	4.315	5.194
	(4.113)	(2.287)	(38.454)	(311.649)	(6.028)	(5.697)
size3	-0.157	4.737	1.31	33.097	6.738	4.972
	(3.291)	(3.223)	(31.830)	(123.746)	(6.071)	(5.794)
size4	9.861	16.228	-20.7	73.043	11.984	14.076)
	(10.449)	(11.200)	(95.947)	(255.354)	(11.984)	(6.702)
const	7.725	-13.625	-32.656	-53.242	3.342	-16.253
	(6.874)	(14.167)	(106.956)	(178.981)	(8.115)	(9.023)
	OLS2		IV2		FE2	
debt/sales	0.462		-1.044		0.928	
	(0.235)		(5.313)		(0.631)	
debt/assets		26.960		188.189		36.416
		(10.511)		(1168.723)		(11.064)
bratio	0.014	-0.280	51.715	-98.662	0.312	-0.125
	(0.495)	(0.408)	(138.979)	(693.346)	(0.796)	(0.769)
size2	-0.682	0.966	-10.661	122.732	3.054	4.411
	(4.078)	(2.040)	(38.983)	(853.973)	(5.830)	(5.656)
size3	-0.532	2.915	0.271	49.87	5.623	3.367
	(3.086)	(3.010)	(31.777)	(310.965)	(5.926)	(5.683)
size4	8.778	9.801	-21.885	95.732	10.408	8.891
	(9.095)	(7.086)	(95.659)	(581.240)	(6.112)	(6.100)
const	12.055	0.102	-29.011	-29.408	8.264	-4.585
	(2.787)	(3.535)	(101.451)	(193.095)	(4.451)	(5.315)

Standard Errors in parenthesis

of the stock price decline in the sample to the financial crisis. However, as we have already noted, some firms experience substantial price increases at the end of the sample period. This price increase can only be attributed to the positive effect of the devaluation on these firms. Hence, we limited ourselves only to the firms that had a negative time trend throughout the sample. We used the borrowing ratio at the end of 1995 as an independent variable. In the IV estimations, we instrumented the 1994 borrowing ratio for the 1995 one to eliminate potential endogeneity problem due to the effect of the stock price decline on the borrowing ratio. The regression results are presented in the Table 4.11. As in the case of the stock returns, coefficients of the borrowing ratio and of the share of the short-term debt are insignificant. In contrast to previous results, the coefficients on debt to asset ratio are substantially more significant in all regressions. While the debt to sales ratio is significant at the 10 and 12 percent level in the OLS and fixed effect estimations, respectively, the debt to asset ratio is significant at the 5 and 1 percent level, and the point coefficient is substantially higher. The IV estimates are insignificant. Hence, the borrowing ratio from the previous period contains little if any information about the future solvency of firms, particularly in the event of a massive financial crisis.

Since financial crises, in contrast to devaluations, have no direct effect on sales, the effect of firm indebtness on the stock market reaction to such crises should be better captured by the ratio of debt to assets than by the ratio of debt to sales. The difference between the highest and the lowest stock market price over the period of financial crisis is expected to reflect the effect of the financial crisis on the stock market better than the stock returns in the month preceding the devaluation. This should be true even if the financial crisis had a significant effect on the stock market during the devaluation month. Since, in our regressions, these two measures of the stock market changes produce different, and consistent with intuition, results regarding the reference point in calculating the relative debt burden, we conclude that the regressions presented in Table 4.10 correctly capture the effect of devaluation on the stock market.

4.4 Conclusions

This chapter provides evidence of the effect of the size and the structure of debt of Mexican and Thai companies on their stock market returns during devaluations. Using the dataset of 44 Mexican companies, we show that the stock price change during the period from December 1994 to March 1995 depends negatively on the size of companies debt, measured by the ratio of the sum of the interest payments and the short term debt over sales. Larger short term foreign debts are associated with an additional price decline. This result is confirmed for the dataset of 230 Thai firms. Debt size, measured in this case by the ratio of total debt to sales, has a substantial negative effect on the stock market returns in June 1997, the month preceding the devaluation in Thailand. The stock returns were much lower for the smallest and the largest firms in the dataset in comparison to the firms of medium size. As far as large firms are concerned, this may be a result of a substantial debt overaccumulation and loss of investor confidence. On the other hand, small firms in general have only limited access to the credit market and the availability of credit to such firms during financial crises is questionable. Hence, the stock market price change, in reaction to a devaluation, can be exceptionally negative in the case of small firms. In addition, small firms usually belong to the non-tradable goods sector. We do not have data on the share of the foreign sales for Thai firms. However, we have this data for Mexico, and the regression results for this country confirm the theoretical prediction that stock prices of exporting firms shall be positively affected by devaluation. Hence, the negative returns for the very small companies in Thailand can capture the non-tradable nature of goods or services produced by such firms.

Appendix A

Notes to Chapter 1

A.1 Solution to the model

A.1.1 Competition

Marginal customer

The location of the marginal customer is defined in equation (2.3).

From now on, bars from the notation for marginal customers will be eliminated, so that τ will be used instead of $\overline{\tau}$ and n instead of $\overline{n}$. By applying the implicit function theorem, one can calculate the following useful derivatives:

$$\frac{\partial \tau}{\partial m} = -\frac{\frac{1}{2}Y(1-\frac{1}{n})}{n+n^*} = -\frac{\frac{\tau}{r}n(n-1)}{n+n^*} < 0 \tag{A.1}$$

Thus, we expect τ to decrease with m. When n goes up, r goes down, so that the bank becomes less profitable for all its customers. Hence, the bank looses marginal customers.

$$\frac{\partial \tau}{\partial \pi} = \frac{1}{2}Y * \frac{(m-m^*)}{nn^*(n+n^*)} \tag{A.2}$$

The effect of inflation on the location of the marginal consumer depends on the relative sizes of m and m^*. If $m = m^*$, then τ does not change. When $m > m^*$, τ is smaller than $\frac{1}{2N}$. With an increase in inflation, the relative difference between r and r^* decreases, and τ goes up. The opposite is true when $m < m^*$.

$$\frac{\partial \tau}{\partial N} = -\frac{1}{N^2}\frac{n^*}{n+n^*} \tag{A.3}$$

The area, served by the bank shrinks if the number of banks goes up. The rate of decline depends on the difference between interest rates paid on deposits. Notice, that if $m = m^*$, then $n = n^*$, and $\frac{\partial \tau}{\partial N} = -\frac{1}{2N^2}$ as expected.

At last:

$$\frac{\partial^2 \tau}{\partial m \partial m} = -\frac{1}{2}Y\frac{1}{(n+n^*)^2} * \frac{1}{2r}(n - \frac{n^*}{n} - 2), \tag{A.4}$$

and, if we believe that $n \approx n^*$, it is negative for $n > 3$.

$$\frac{\partial^2 \tau}{\partial m \partial \pi} = \frac{1}{4}\frac{Y}{r(n+n^*)^2}(n + n^* - 2 - 2\frac{n^*}{n}) > 0, \tag{A.5}$$

when $n + n^* > 4$.

We also calculated the following derivatives, which we will need for future calculations:

$$\frac{\partial^2 \tau}{\partial m \partial N} = \frac{1}{4}Y(1 - \frac{1}{n})\frac{n^*}{(n+n^*)^2}\frac{1}{\frac{1}{N} - \tau}\frac{1}{N^2} \tag{A.6}$$

$$= -\frac{1}{4}Y(1 - \frac{1}{n})\frac{1}{n+n^*}\frac{\partial \tau}{\partial N}\frac{1}{\frac{1}{N} - \tau} > 0. \tag{A.7}$$

Bank problem.

The bank problem is

$$\max_m \{mY\tau(1 - \frac{2}{3n}) - F\}$$

$$FOC : Y\tau(1 - \frac{2}{3n}) = -mY\frac{\partial \tau}{\partial m}(1 - \frac{1}{n}) + mY\tau\frac{1}{3nr}. \tag{A.8}$$

Hence, as usual, the first order condition equalizes the marginal benefits with the marginal costs. The second term on the right hand side of equation (A.8) stands for the marginal costs of an increase in m, originating from the change in the position of the marginal customer.

The SOC:

$$Y\frac{\partial\tau}{\partial m}(1-\frac{1}{n}(1+\frac{m}{r}))-Y\frac{\tau}{6nr}(2+\frac{m}{r})+mY\frac{\partial^2\tau}{\partial m\partial m}(1-\frac{1}{n})-\frac{m}{2n\tau}Y(\frac{\partial\tau}{\partial m})^2<0$$

holds, when m is not substantially larger than r[1] , and $n>3$ (this is a very strong sufficient condition for the SOC to hold). By applying the implicit function theorem to the FOC (A.8), and by substituting in expressions (A.1-A.6):

$$\begin{aligned}\frac{\partial m}{\partial\pi} &= \frac{Y\frac{\partial\tau}{\partial\pi}(1-\frac{1}{n}-\frac{m}{r}\frac{1}{2n})+Y\frac{\tau}{r}\frac{1}{6n}(2+\frac{m}{r})-Y\frac{\partial\tau}{\partial m}m\frac{1}{2n}(\frac{1}{\tau}\frac{\partial\tau}{\partial\pi}-\frac{1}{r})}{-SOC}\\ &+\frac{mY\frac{\partial^2\tau}{\partial m\partial\pi}(1-\frac{1}{n})}{-SOC}\end{aligned}$$

When $m=m^*$:

$$\frac{\partial m}{\partial\pi}_{m=m^*}=\frac{Y\frac{\tau}{r}\frac{1}{6n}(2+\frac{m}{r})+\frac{1}{4}Y\tau\frac{m}{r^2}(1-\frac{1}{n})(m-3)}{-SOC}>0,$$

if $m>3$.

Therefore, banks do not pass the increase in inflation one to one into the deposit interest rate. In the same way:

$$\frac{\partial m}{\partial N}=\frac{\partial\tau}{\partial N}Y\frac{(1-\frac{1}{n})(1-\frac{1}{4}\frac{1}{n+n^*}\frac{1}{\frac{1}{N}-\tau})+\frac{m}{r}\frac{1}{2n}(\frac{n(n-1)}{n+n^*}-1)}{-SOC}.$$

Generally, the sign of this effect is unclear. However, at $m=m^*$:

$$\frac{\partial m}{\partial N}_{m=m^*}=Y\frac{\partial\tau}{\partial N}\frac{(1-\frac{1}{n})(1-\frac{1}{4}\frac{N}{n})+\frac{m}{r}\frac{1}{4n}(n-3)}{-SOC}>0$$

if $n>\frac{1}{4}N$, and $n>3$.

[1] $mn<\pi(n-1)$

Equilibrium number of banks.

The zero profit condition, which always holds in equilibrium, is

$$mY\tau(1-\frac{2}{3n})-F=0.$$

By differentiating this equality and substituting in the derivatives calculated in the previous section, the effect of inflation on the equilibrium number of banks can be calculated and it's sign can be determined:

$$\frac{\partial N}{\partial \pi}=-\frac{\frac{\partial m}{\partial \pi}\tau(1-\frac{2}{3n}-\frac{m}{r}\frac{1}{3n})+\frac{\partial \tau}{\partial \pi}m(1-\frac{1}{n})}{\frac{\partial m}{\partial N}\tau(1-\frac{2}{3n}-\frac{m}{r}\frac{1}{3n})+\frac{\partial \tau}{\partial N}m(1-\frac{1}{n})}>0$$

at $m=m^*$

A. Monopoly

There is only one bank in the economy, which maximizes it's profit given by the equation (2.4) with respect to m and N .

FOC:

(1) $N=(\frac{1}{6}m\sqrt{\frac{Y}{r}}\frac{1}{F})^{\frac{2}{3}}$,

(2) $Y-\frac{1}{3}\sqrt{\frac{Y}{r}}\frac{1}{\sqrt{N}}(2+\frac{m}{r})=0$.

Therefore, by differentiating the FOC and rearranging the expression:

$$\frac{\partial m}{\partial \pi}=\frac{rm+2m^2}{2rm+2m^2-r^2}.$$

When inflation is large[2], the denominator tends to be negative, so the bank prefers to increase the real deposit rate to attract more deposits. However, when inflation is small, this behavior is not necessarily optimal.

Finally,

[2] $\pi > m(2+\sqrt{3})$. This condition is likely to hold when π is relatively large, if we expect the real deposit interest rate to be positive. For example, if m is equal to 5, than π should be larger than 19.

$$\frac{\partial N}{\partial \pi} = \frac{1}{3} N r^{-\frac{1}{3}} (2m^{\frac{1}{3}} \frac{\partial m}{\partial \pi} - r^2) < 0,$$

when inflation is large[3]. Thus, when inflation is large, a monopolistic bank decreases the number of branches, and at the same time decreases the interest margins (increases deposit rates on deposits) and by so doing attracts more deposits, and saves on fixed costs. However, if inflation is small, this conclusion is not necessarily true.

[3]For N to be decreasing with π , π can be smaller that for m *to* be decreasing with π.

A.2 Comparison of available datasets

Table A.1, contains the country's mean shares of

- Financial sector, real estate, insurance, and business services in GDP
- Financial sector in GDP
- Employees' compensation in the financial sector in the total employees' compensation
- Employees' compensation plus operational profit in the financial sector in the sum of the total employees' compensation and the total operational profit in the economy.

Table A.2, contains, calculated for each country, correlations between the share of the financial sector, real estate, insurance, and business services in the GDP and the:

- Share of the employees' compensation in the financial sector in the total employees' compensation
- Share of the employees' compensation plus operational profit in the financial sector in the sum of the total employees' compensation and total operational profit in the economy
- Share of the financial sector in GDP

The Table A.3, contains the correlations between the changes in these variables.

Table A.1: Comparison of means

Country name	Financial sector, real estate, insurance, business services	Financial sector	Employees' compensation in the financial sector	Employees' compensation plus operational profit in the financial sector
All countries	0.117	0.038	0.039	0.040
Algeria	0.067	0.021	0.012	0.029
Bolivia	0.108	0.018	0.027	0.020
British Virgin Islands	0.201	0.056	0.051	0.065
Cameroon	0.128	0.039	0.038	0.040
Canada	0.157	0.015	0.019	0.016
Colombia	0.129	0.066	0.094	0.070
Benin	0.063	0.017	0.020	0.016
Denmark	0.144	0.023	0.032	0.028
Ecuador	0.094	0.025	0.074	0.027
Estonia	0.084	0.023	0.019	0.028
Fiji	0.121	0.041	0.033	0.047
Finland	0.133	0.026	0.029	0.033
Germany Fed. Rep(former)	0.113	0.036	0.043	0.030
Hong Kong	0.290	0.066	0.060	0.070
Iceland	0.142	0.036	0.032	0.054
Lesotho	0.106	0.022	0.030	0.026
Luxembourg	0.152	0.147	0.114	0.156
Netherlands	0.159	0.031	0.028	0.035
Niger	0.070	0.012	0.017	0.011
Nigeria	0.059	0.032	0.043	0.024
Norway	0.111	0.031	0.026	0.047
Peru	0.130	0.026	0.053	0.030
Portugal	0.091	0.057	0.040	0.055
Rwanda	0.055	0.006	0.022	0.005
Seychelles	0.116	0.038	0.033	0.048
Sierra Leone	0.081	0.021	0.037	0.021
Zimbabwe	0.061	0.042	0.041	0.046
Spain	0.157	0.067	0.066	0.073
Sudan	0.083	0.023	0.017	0.028
Swaziland	0.116	0.040	0.044	0.045
Sweden	0.150	0.020	0.017	0.022
Thailand	0.081	0.030	NA	NA
Turkey	0.085	0.026	NA	NA
US	0.234	0.039	0.035	0.042
Burkina Faso	0.044	0.017	0.031	0.018
Venezuela	0.140	0.037	0.038	0.038

Table A.2: Correlations between shares

Country name	WF and F+	W+PF and F+	F and F+
All countries	0.07	0.35	0.33
Algeria	0.65	-0.43	-0.56
Bolivia	0.06	0.01	0.12
British Virgin Islands	0.54	0.90	0.92
Cameroon	-0.86	-0.73	-0.82
Canada	0.84	0.90	0.91
Colombia	-0.07	0.26	0.26
Benin	0.81	0.89	0.76
Denmark	0.94	-0.22	-0.24
Ecuador	-0.76	0.67	0.71
Estonia	0.99	0.99	0.97
Fiji	0.28	0.40	0.41
Finland	0.63	0.63	0.60
Germany Fed. Rep(former)	0.93	0.94	0.95
Hong Kong	0.45	0.82	0.84
Iceland	0.78	0.88	0.94
Lesotho	0.26	-0.06	-0.03
Luxembourg	0.52	1.00	1.00
Netherlands	0.93	0.81	0.84
Niger	0.98	-0.97	-0.80
Nigeria	-0.36	0.56	0.62
Norway	0.94	0.94	0.88
Peru	0.57	-0.41	-0.37
Portugal	-0.16	0.88	0.76
Rwanda	-0.01	0.29	0.44
Seychelles	-0.64	-0.25	-0.18
Sierra Leone	0.38	0.27	0.34
Zimbabwe	-0.25	-0.29	-0.15
Spain	-0.64	0.49	0.63
Sudan	-0.85	0.80	0.75
Swaziland	0.74	0.63	0.77
Sweden	0.95	0.89	0.90
Thailand	NA	NA	0.86
Turkey	NA	NA	-0.47
US	0.97	0.96	0.97
Burkina Faso	-0.15	0.47	0.43
Venezuela	0.53	0.47	0.57

Table A.3: Correlations between changes

Country name	chWF and chF+	chW+PF and chF+	chF and chF+
All countries	0.05	0.18	0.05
Algeria	0.01	0.89	0.82
Bolivia	0.25	0.54	0.56
British Virgin Islands	0.59	0.88	0.91
Cameroon	-0.14	0.25	0.21
Canada	0.36	0.67	0.71
Colombia	0.13	0.81	0.83
Benin	-0.05	0.94	0.20
Denmark	0.09	0.63	0.64
Ecuador	0.12	0.76	0.81
Fiji	-0.02	0.58	0.59
Finland	0.17	0.66	0.51
Germany Fed. Rep(former)	0.62	0.82	0.85
Hong Kong	0.37	0.58	0.62
Iceland	-0.33	0.83	0.83
Lesotho	-0.19	0.73	0.75
Luxembourg	-0.61	1.00	1.00
Netherlands	-0.21	-0.10	0.23
Nigeria	0.70	0.49	0.54
Norway	0.36	0.84	0.85
Peru	0.32	0.08	0.11
Portugal	0.31	0.89	0.84
Rwanda	-0.38	0.61	0.80
Seychelles	-0.10	0.60	0.62
Sierra Leone	0.02	0.37	0.41
Zimbabwe	-0.28	0.67	0.69
Spain	-0.40	0.37	0.70
Sudan	-0.51	0.91	0.82
Swaziland	0.48	0.70	0.75
Sweden	-0.02	-0.14	-0.80
US	0.68	0.62	0.65
Burkina Faso	-0.34	0.85	0.92
Venezuela	0.06	0.63	0.69

Table A.4: Dependent variable change in log(share+1)

	cpi(n-(n-1))	cpi((n+1)-n)	dummy1	dummy3	dummy5
inflation	-3.51E-07	4.050E-07	8.70E-03	1.42E-02	0.013
	(-0.192)	(0.250)	(1.735)	(3.858)	(3.639)
ch(log real GDP per cap.)	0.029	0.029	0.027	0.0271	0.027
	(14.494)	(14.180)	(14.735)	(14.791)	(14.780)
	10<infl<30	30<infl<100	infl>30	infl>70	f1
inflation	-0.006	-0.005	-0.001	0.007	-0.011
	(-4.040)	(-1.637)	(-0.235)	(1.860)	(-1.900)
ch(log GDP per cap.)	0.276	0.027	0.027	0.027	0.027
	(15.022)	(14.755)	(14.707)	(14.746)	(14.712)

t-statistics in parentheses

A.3 Alternative specifications of equations, estimated in the section 3

Table A.4 presents the results of the estimations of regressions corresponding to the ones estimated in Section 3, using the first differences in the shares of the financial sector as a dependent variable. The meanings of the dummy variables are the same as in the text.

Tables A.5 and A.6 present the estimations of the corresponding equations, using the share of employees' compensation paid in the financial sector in the total employees' compensation as the dependent variable. For the regressions presented in Table A.5, Hausman's test was sometimes an issue. However, using OLS with corrected for heteroscedasticity standard errors showed that most of problems come from the 'log real GDP' variables. Therefore, for comparability with previous results, in Table A.5 we present random effect estimation results.

Table A.5: Dependent variable share of the employees' compensation in the financial sector in the total employees' compensation

Analysis of means					
Inflation	All	infl<10	10<inf<30	30<inf<100	infl>100
Mean share	0.04	0.04	0.04	0.06	0.06
st. dev.	0.02	0.02	0.02	0.04	0.01
# of observations	504	285	174	39	6
Regression results:					
	CPI	dummy1	dummy2	dummy3	f2
inflation	5.38E-06	0.011	0.007	0.008	-0.003
	(2.356)	(2.150)	(2.143)	(2.553)	(-0.846)
log real GDP per cap.	0.011	0.011	0.011	0.011	-0.011
	(6.499)	(6.469)	(6.449)	(6.491)	(-6.353)
	10<inf<30	30<inf<100	infl>30	infl>50	infl>70
inflation	-0.001	-0.003	-0.001	-0.005	0.006
	(-1.452)	(-1.435)	(-0.295)	(-0.142)	(1.507)
log real GDP per cap.	0.010	0.011	0.011	0.011	0.011
	(6.103)	(6.287)	(6.291)	(6.305)	(6.429)

t-statistics in parentheses

Table A.6: Dependent Variable Change in Share of the Employees' Compensation in the Financial Sector in the Total Employees' Compensation

	cpi(n-(n-1))	cpi((n+1)-n)	dummy1	dummy2	dummy3
inflation	-7.91E-07	1.01E-06	-0.0016	0.0017	0.0015
	(-0.676)	(1.487)	(-0.865)	(1.448)	(1.475)
ch(log real GDP per cap.)	-1.0E-04	4.0E-05	-8.0E-05	-7.0E-05	-7.0E-05
	(-0.140)	(0.040)	(-0.187)	(-0.158)	(-0.162)
	30<inf<100	infl>30	infl>50	infl>70	f1
inflation	-0.0007	-0.0003	-0.0005	0.0002	-0.0014
	(-1.147)	(-0.735)	(-0.720)	(0.227	(-0.754)
ch(log real GDP per cap.)	-8.0E-05	-8.0E-05	-8.0E-05	-7.0E-05	-1.0E-04
	(-0.181)	(-0.181)	(-0.181)	(-0.165)	(0.100)

t-statistics in parentheses

A.4 Augmented Dickey-Fuller Test

Table A.7: 4 lags, no trend, all countries

country	mean	min	max	st. d.	persist.	n. obs	m./s.d.	t-stat
Argentina	413.0	14.0	3080.0	752	0.52	43	0.5	2.407
Austria	4.8	1.4	9.5	2	0.72	41	2.4	5.341
Bangladesh	14.3	0.0	54.8	14	0.61	37	1.0	3.229
Belgium	6.5	1.2	12.8	3	0.89	42	2.2	9.847
Bolivia	610.0	3.6	111749	2443	0.01	42	0.2	0.032
Brazil	343.0	12.7	2937.8	656	0.83	34	0.5	4.008
Canada	6.6	1.5	12.5	3	0.89	42	2.2	9.867
Sri Lanka	10.5	1.2	26.2	6	0.77	43	1.8	5.052
Chile	81.3	9.9	504.7	138	0.79	42	0.6	8.142
Colombia	22.4	6.9	33.1	7	0.76	43	3.2	5.347
Costa Rica	19.1	3.1	90.1	18	0.62	41	1.1	3.216
Cyprus	6.2	1.2	15.2	3	0.76	41	2.1	5.024
Denmark	7.4	2.1	15.3	4	0.84	42	1.9	6.940
Dominican Republic	18.6	3.5	59.4	17	0.86	42	1.1	6.399
El Salvador	14.3	0.5	31.9	8	0.89	43	1.8	8.647
Finland	9.4	2.6	17.8	4	0.72	43	2.4	4.198
Gambia	13.1	-2.0	56.6	12	0.44	30	1.1	1.742
Germany	3.9	-0.1	7.0	2	0.73	42	2.0	6.525
Greece	16.2	2.9	26.9	7	0.90	43	2.3	9.595
Guatemala	12.8	-0.5	41.2	11	0.80	43	1.2	5.227
Guyana	12.8	1.0	39.9	10	0.72	31	1.3	3.497
Haiti	9.3	-11.5	22.7	8	0.65	38	1.2	2.714
Honduras	9.0	2.2	33.7	7	0.96	43	1.3	5.766
Iceland	20.9	2.5	84.2	20	0.86	42	1.0	7.181
Indonesia	12.1	4.4	40.6	9	0.32	34	1.3	1.053
Iran	14.0	0.7	28.7	9	1.00	43	1.6	6.252
Ireland	10.0	2.2	20.9	6	0.92	32	1.7	9.796
Israel	72.6	6.1	373.9	95	0.74	43	0.8	5.565
Italy	11.0	4.7	21.3	6	0.87	43	1.8	10.956
Jamaica	20.8	5.3	77.3	17	0.86	38	1.2	3.936

Table A.7: continued

country	mean	min	max	st. d.	persist.	n. obs	m./s.d.	t-stat
Japan	5.4	0.1	23.1	5	0.66	43	1.1	4.239
Jordan	8.3	-0.2	25.7	6	0.17	22	1.4	0.448
Kenya	12.7	2.2	29.6	6	0.67	32	2.1	2.931
Korea	11.0	2.3	28.7	8	0.73	25	1.4	2.913
Malaysia	4.5	0.3	17.3	4	0.56	42	1.1	3.116
Malta	4.3	-0.9	15.8	4	0.57	43	1.1	2.911
Mauritius	10.8	0.3	42.0	9	0.38	28	1.2	1.184
Mexico	39.2	5.0	131.8	37	0.80	43	1.1	7.193
Morocco	7.6	1.3	17.6	4	0.64	37	1.9	3.267
Nepal	9.9	-3.1	19.8	6	-0.25	26	1.7	-0.514
Netherlands	4.7	-0.7	10.2	3	0.78	42	1.6	6.169
New Zealand	10.3	1.0	17.1	5	0.90	43	2.1	8.164
Nigeria	19.7	3.5	54.5	15	1.19	38	1.3	5.745
Norway	7.7	3.1	13.6	3	0.84	43	2.6	5.687
Pakistan	9.6	3.5	26.7	6	0.52	35	1.6	2.907
Panama	4.2	-0.1	16.3	4	0.74	43	1.1	4.986
Peru	567.1	5.0	7481.7	1663	0.31	43	0.3	1.202
Philippines	14.1	0.8	50.3	11	0.55	42	1.3	2.490
Senegal	7.2	-4.1	31.7	8	-0.01	24	0.9	-0.017
Singapore	3.8	-1.8	22.4	6	0.37	31	0.6	1.375
South Africa	12.4	4.1	18.6	4	0.89	32	3.1	12.636
Sweden	8.1	2.3	13.7	3	0.75	32	2.7	3.720
Syria	15.6	2.1	59.5	13	0.67	32	1.2	3.421
Thailand	6.7	-0.1	24.3	6	0.57	38	1.1	2.490
Trinidad and Tobago	11.1	2.5	22.0	5	0.83	39	2.2	6.778
Turkey	41.0	6.9	110.2	25	0.99	38	1.6	7.550
United Kingdom	9.6	3.4	24.2	5	0.80	32	1.9	5.224
Uruguay	61.0	16.3	112.5	26	0.68	43	2.3	4.669
Venezuela	17.5	2.5	84.5	18	1.24	43	1.0	9.204

Table A.8: 5 lags, trend, some countries

country	st.. D.	persist.	t-stat	n. obs
Brazil	656	0.4	1.283	33
Finland	4	0.9	5.151	42
Iceland	20	0.9	6.576	42
Iran	9	0.6	2.232	42
Ireland	6	0.9	9.645	31
Jamaica	17	-0.1	-0.012	37
Mexico	37	0.5	2.877	42
Nepal	6	-1.9	-1.922	25
Nigeria	15	0.6	1.001	37
Senegal	8	-1.0	-1.614	24
South Africa	4	1.2	5.885	31
Turkey	25	0.2	0.792	37
Venezuela	18	1.0	4.104	42

A.5 Comments on data

A.5.1 GDP produced in the financial sector, insurance, real estate and business services:

Angola: Only Financial sector and insurance is included.

Myanmar: Only financial sector included

Zaire: Only financial sector included

Dominican Republic: Business services are not included

Ethiopia: Business services are not included

Germany: Business services and real estate are not included

Greece: Business services are not included

Guyana: Business services are not included

Indonesia: Business services are not included

Iraq: Business services are not included

Kenya: Business services are not included

Luxembourg: Business services are not included

Malta: Business services are not included

Mauritius: The item 'Less: imputed bank services charges' is netted out

Namibia: The item 'Less: imputed bank services charges' is netted out

Netherlands: Real estate brokers are not included in 1985, 1991, 1992

Nicaragua: Business services are not included

Portugal: Business services and real estate dwellings are not included

Rwanda: The item 'Less: imputed bank services charges' is netted out

Zimbabwe: Business services are not included

Spain: Business services and real estate dwellings are not included

Sweden: The item 'Less: imputed bank services charges' is netted out

Tunisia: Finance and insurance only

A.5.2 Employees' compensation in the financial sector:

Colombia: Business services included into financial institutions

Finland: finance institutions include activities auxiliary to finance and insurance.

Appendix B

Notes to Chapter 2

B.1 A simple model of the stock market reaction to devaluation

Consider a small open economy. The exchange rate is set at the rate e units of local currency for a unit of foreign currency. The money supply adjusts to satisfy money demand. There are two goods in the economy: a tradable and a non-tradable. The price of the tradable good is set by the foreign market, and fixed at one unit of foreign currency for one unit of the tradable good. Therefore, the price of a unit of the tradable good in local currency is equal to the exchange rate. The non-tradable good is produced by local non-competitive (monopolistic or oligopolistic) producers, who know the demand for the good, and set the price and the quantity produced in a way, which maximizes the stock market value of the firms. For simplicity, we assume that there are costs of changing the price of the non-tradable good, so it is fixed at the level $p = 1$ units of local currency for a unit of the non-tradable good.[1] The wage is fixed at the rate $\overline{w}$. At this rate firms can hire as many workers as they want.

B.1.1 Consumers

Only workers consume non-tradable goods in the economy. (We assume that if there are any local capitalists, they prefer to do their haircuts in Paris.) Workers have the following CES utility function:

[1] This assumption alows us to neglect the effect of expected inflation and exchange rate appreciation on the interest rate.

$$c = \left[\gamma^{\frac{1}{\theta}} c_T^{\frac{\theta-1}{\theta}} + (1-\gamma)^{\frac{1}{\theta}} c_N^{\frac{\theta-1}{\theta}})^{\frac{\theta}{\theta-1}}\right] \tag{B.1}$$

Therefore, the demand for the non-tradable good, takes the following form:

$$C_{Nt} = \frac{1-\gamma}{\gamma e^{1-\theta} + (1-\gamma)} * Z_t \tag{B.2}$$

where

$$Z = \overline{w} L_t \tag{B.3}$$

is the total spendings in the economy in year t, and L_t is the employment in the year t.

B.1.2 Tradable Sector

There is one representative firm in the tradable sector. The production process is $F(K_s, L_{sT})$. The stock market value of the firm is equal to, assuming no bubbles, the discounted value of the dividends:

$$V_t = \sum_{s=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{s-t} d_s \tag{B.4}$$

where r is the interest rate, which is exogenously given. For simplicity, let's consider a two period model. The price of the firm at the end of period zero is $V_{1T=}\frac{d_{1T}}{1+r}$.We assume, that the capital stock is given, and it is sector specific. Hence dividends are equal to the revenue minus labor expenses:

$$d_{sT} = eF(\overline{K_{sT}}, L_{sT}) - wL_{sT} \tag{B.5}$$

We assume that capital is a tradable good, so the firm pays e for each unit of capital. The firm chooses labor to maximize its current and future dividends. The first order condition is given by:

$$eF_L(\overline{K_{sT}}, L_{sT}) = \overline{w}; \tag{B.6}$$

Labor can be hired instantaneously, so condition (B.6) hold exactly in each period.

B.1.3 Non-tradable Sector

The non-tradable good is produced by the monopolistic producer, who maximizes the value of the firm, given the demand for the non-tradable good. The production function is $G(K_N, L_{sN})$. We assume that the firm uses some given stock of capital $\overline{K_N}$. We also assume that each unit of labor produces a units of the good ($a > \overline{w}$). However, non-tradable goods cannot be produced without capital. Therefore, the value of this stock is equal to the value of the firm. The demand for labor in the non-tradable sector equalizes supply and demand for the good:

$$\frac{1-\gamma}{\gamma e^{1-\theta} + (1-\gamma)} * \overline{w}(L_{1T} + L_{1N}) = aL_{1N} \tag{B.7}$$

Hence, the labor demand in the non-tradable sector takes the form:

$$L_{1N} = \frac{(1-\gamma)\overline{w}}{\gamma e^{1-\theta} a - (1-\gamma)(a-\overline{w})} * L_{1T} = \zeta(e) L_{1T} \tag{B.8}$$

and the value of the non-tradable firm is:

$$V_{1N} = \frac{d_1}{1+r} = \frac{1}{1+r}(a-\overline{w})L_{1N} = \frac{1}{1+r}(a-\overline{w})\zeta(e)L_{1T} \tag{B.9}$$

B.1.4 Effect of an Unexpected Devaluation

Now imagine, that the currency was unexpectedly devalued between periods 0 and 1, when the prices of the firms have already been set. What would be the effect of this devaluation on the stock market? Since the firm, which produces the tradable good experiences a positive price shock, the value of this firm does up. This is true whether the value of the firm is measured in local or in foreign currency. On the other hand, the value of the non-tradable firm in foreign currency falls. However, the effect of devaluation on the price of the non-tradable firm in local currency is not clear, and depends on the effect of devaluation on demand for the non-tradable good. Since the demand for the non-tradable good by each worker decreases, but the number of workers in the tradable sector increases, the total effect of devaluation on employment, and on the value of the firm producing non-tradable good is ambiguous. However, the total effect

of devaluation on the stock market is likely to be positive, unless the share of the non-tradable sector in the economy is much larger than the share of the tradable sector, and the demand for the non-tradable good is very elastic.

B.2 Data

B.2.1 UK

Information on the stock market prices, shares of domestic sales, and employment, and cover ratios are taken from Datastream. The initial list of companies consists of 99 companies, information on which is available from the "Trading Volume in Major Stocks" section of the Financial Times issues in September 1992. For most calculations presented in the chapter we used the smaller set of companies for which we managed to get the relevant data. Financial companies were generally excluded from the calculations, although some of the big ones, such as Barclays and Natwest, were sometimes included in the dataset.[2] In most regressions we use the dataset on 83 companies for which the information on the shares of domestic sales and the cover ratio was available. Usually, the share of domestic sales in 1991, the year proceeding the devaluation, were used to instrument for the degree of export orientation, and the share of imported intermediate goods. In cases where data for 1991 was not available, the numbers from other years were used instead. The data on the share of domestic labor for 1996, the only year for which such data was available, was used to instrument for the share of domestic inputs. In cases, when it was clear from the description of a company that all company's output is being produced domestically, we set the share of domestic labor equal to 100 percent.

This data selection process resulted in the dataset of the biggest UK companies which publish information on their domestic and foreign sales, and on their domestic and foreign employment. Hence, most of the companies in our sample are big multinational companies. The relationships of the value of such companies, and the exchange rate can be more complicated, and less clear than the same relationships for other companies. Therefore we believe that our results can only be reinforced in the sample consisting of less structurally complicated firms.

[2]We used these banks since they have substancial international operations. They were excluded from the regressions using cover ratio.

Daily data for the period from 1-1-86 to 9-30-97 is used for calculations in the chapter. The time span of data can be smaller in some regressions for computational reasons.

B.2.2 Spain

The sample consists of 25 firms traded on the Madrid stock exchange, for which we were able to get daily data on stock market prices for the period from 1-1-90 to 3-25-98. Firms, which are not often traded on the stock market, and have the same stock prices for a period of more than a week for more than one time, were excluded from the sample. Of the firms for which we have stock market data, only those for which we have the data on the shares of domestic sales were kept in the sample. We could not find the information on the share of domestic labor in the firms. Since most of the Spanish firms have a very large share of domestic sales, we assume that most firms employ only domestic labor. We use the information on the firm's cover ratio in 1990. Data on stock market prices and on the cover ratio are taken from Datastream. Some of the data on the shares of domestic sales are from the web-sites of the companies. The rest are taken from Datastream.

B.3 Tables of Results

Table B.1: UK. Model: rst=a+b*uksale91

Date	WDays	Stock Return bhat*10e5	t-stat	Abnormal St. Return, -90 bhat*10e5	t-stat	Joint Estimates bhat*10e5	t-stat
24-Jun-92	-60	5.160	0.899	6.090	1.043	-2.435	-1.262
5-Aug-92	-30	1.080	0.174	1.870	0.309	0.214	0.111
19-Aug-92	-20	-11.020	-1.446	-10.700	-1.401	2.326	1.206
2-Sep-92	-10	-21.020	-2.227	-20.750	-2.190	-5.346	-2.777
4-Sep-92	-8	3.430	0.501	4.220	0.616	2.988	1.550
8-Sep-92	-6	19.600	1.869	206.900	1.988	5.409	2.805
10-Sep-92	-4	-5.920	-0.655	-5.670	-0.629	-2.327	-1.208
11-Sep-92	-3	14.760	1.434	14.650	1.442	3.382	1.740
14-Sep-92	-2	-24.790	-2.298	-25.260	-2.371	-1.441	-0.742
15-Sep-92	-1	-7.110	0.806	-5.690	-0.638	-1.148	-0.589
16-Sep-92	0	-51.670	-4.146	-51.060	-4.115	-14.945	-7.495
17-Sep-92	1	-1.050	-0.062	-2.690	-0.159	18.288	8.718
18-Sep-92	2	19.620	1.494	18.460	1.376	8.990	4.596
21-Sep-92	3	7.880	0.732	8.290	0.768	4.130	2.131
22-Sep-92	4	24.610	2.598	24.590	2.572	4.565	2.356
24-Sep-92	6	8.130	0.843	7.900	0.822	7.387	3.847
28-Sep-92	8	0.141	0.018	1.310	0.173	-4.381	-2.265
30-Sep-92	10	5.090	0.588	5.750	0.670	-2.934	-1.522
14-Oct-92	20	-5.270	-0.809	-4.620	-0.711	2.719	1.408
28-Oct-92	30	9.840	1.397	10.580	1.498	3.153	1.635
9-Dec-92	60	-14.470	-2.349	-13.710	-2.240	-2.705	-1.403

Table B.2: UK. Model: rst=a+b1*uksale91+b2*cratio91

Stock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
24-Jun-92	-60	4.880	0.754	-247.350	-0.758
5-Aug-92	-30	-0.050	-0.007	-451.660	-1.330
19-Aug-92	-20	8.080	-0.980	-521.420	-1.253
2-Sep-92	-10	-18.130	-1.730	-815.131	-1.542
4-Sep-92	-8	5.410	0.733	-640.330	-1.719
8-Sep-92	-6	31.000	3.210	-3059.670	-6.278
10-Sep-92	-4	-13.530	-1.447	1871.510	3.968
11-Sep-92	-3	6.110	0.581	2040.300	3.844
14-Sep-92	-2	-28.940	-2.535	1926.310	3.331
15-Sep-92	-1	-8.560	-0.909	-683.820	-1.440
16-Sep-92	0	-58.110	-4.346	896.840	1.329
17-Sep-92	1	-15.310	-0.934	7881.600	4.580
18-Sep-92	2	29.960	2.060	-644.740	-0.879
21-Sep-92	3	12.400	1.040	273.110	0.454
22-Sep-92	4	23.120	2.298	1453.800	2.864
24-Sep-92	6	9.410	0.907	-64.110	-0.122
28-Sep-92	8	0.987	0.119	-912.970	-2.180
30-Sep-92	10	1.740	0.190	254.000	0.549
14-Oct-92	20	-73.900	-1.091	60.970	0.179
28-Oct-92	30	9.110	1.158	644.800	1.626
9-Dec-92	60	-13.010	-1.933	-330.370	-0.972
Abnormal Stock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
24-Jun-92	-60	6.120	0.927	-202.790	-0.609
5-Aug-92	-30	0.973	0.149	-415.910	-1.259
19-Aug-92	-20	-7.790	-0.943	-514.930	-1.235
2-Sep-92	-10	-17.910	-1.700	-811.700	-1.527
4-Sep-92	-8	6.430	0.866	-504.740	-1.615
8-Sep-92	-6	32.480	3.362	-3005.960	-6.168
10-Sep-92	-4	-13.340	-1.429	1873.780	3.978
11-Sep-92	-3	5.750	0.553	2020.890	3.853
14-Sep-92	-2	-29.840	-2.644	1885.290	3.311
15-Sep-92	-1	-6.580	-0.677	-610.060	-1.245
16-Sep-92	0	-57.380	-4.307	921.180	1.371
17-Sep-92	1	-18.030	-1.070	3674.970	4.323
18-Sep-92	2	28.000	1.862	-728.000	-0.960
21-Sep-92	3	12.820	1.074	285.000	0.473
22-Sep-92	4	22.890	2.248	1439.770	2.802
24-Sep-92	6	8.870	0.852	-90.640	-0.172

Table B.2: continued

Abnormal Stock Return (continued)					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
28-Sep-92	8	2.590	0.316	-854.270	-2.068
30-Sep-92	10	2.550	0.281	281.540	0.613
14-Oct-92	20	-6.580	-0.976	88.000	0.259
28-Oct-92	30	10.060	1.280	677.600	1.709
9-Dec-92	60	-12.040	-1.796	-296.640	-0.877
Joint Estimates					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
24-Jun-92	-60	-3.385	-1.378	2.161	0.645
5-Aug-92	-30	2.285	0.929	-4.116	-1.231
19-Aug-92	-20	8.121	3.331	-11.850	-3.574
2-Sep-92	-10	-3.282	-1.338	-3.201	-0.956
4-Sep-92	-8	2.762	1.122	1.198	0.357
8-Sep-92	-6	18.696	7.846	-24.030	-7.330
10-Sep-92	-4	-8.570	-3.469	9.309	2.768
11-Sep-92	-3	-5.124	-2.088	14.217	4.262
14-Sep-92	-2	-7.804	-3.149	10.257	3.039
15-Sep-92	-1	-0.275	-0.111	-1.613	-0.478
16-Sep-92	0	-24.279	-9.779	17.229	5.231
17-Sep-92	1	1.009	0.393	26.435	7.604
18-Sep-92	2	19.983	8.144	-19.000	-5.633
21-Sep-92	3	6.014	2.454	-4.848	-1.451
22-Sep-92	4	-0.978	-0.398	9.320	2.789
24-Sep-92	6	7.003	2.845	1.716	0.511
28-Sep-92	8	0.133	0.054	-8.638	-2.582
30-Sep-92	10	-3.990	-1.628	1.557	0.465
14-Oct-92	20	2.839	1.154	-0.605	-0.181
28-Oct-92	30	2.320	0.945	0.066	0.020
9-Dec-92	60	-0.075	-0.030	-5.673	-1.698

Table B.3: UK. Model: rst=a+b*uklabor91

Date	WDays	Stock Return bhat*10e5	t-stat	Abnormal St. Return, -90 bhat*10e5	t-stat
24-Jun-92	-60	4.520	0.842	4.870	0.886
5-Aug-92	-30	10.000	0.136	1.300	0.182
19-Aug-92	-20	-13.170	-1.595	-13.040	-1.580
2-Sep-92	-10	-6.640	-0.652	-6.520	-0.636
4-Sep-92	-8	0.581	0.092	0.882	0.138
8-Sep-92	-6	27.580	2.452	27.990	2.498
10-Sep-92	-4	-8.040	-0.812	-7.930	-0.808
11-Sep-92	-3	0.692	0.059	0.668	0.058
14-Sep-92	-2	-43.320	-3.687	-43.470	-3.798
15-Sep-92	-1	5.400	0.553	5.930	0.605
16-Sep-92	0	-46.210	-3.410	-45.970	-3.408
17-Sep-92	1	-12.300	-0.663	-12.880	0.704
18-Sep-92	2	15.410	1.181	15.000	1.109
21-Sep-92	3	1.780	0.152	1.940	0.165
22-Sep-92	4	2.890	0.276	2.900	0.276
24-Sep-92	6	6.640	0.603	6.580	0.605
28-Sep-92	8	7.140	0.904	7.580	0.994
30-Sep-92	10	9.290	1.121	9.540	1.167
14-Oct-92	20	3.080	0.439	3.330	0.475
28-Oct-92	30	2.380	0.307	2.670	0.343
9-Dec-92	60	-26.390	-4.182	-26.100	-4.156

Table B.4: UK.Model: rst=a+b1*uksale91+b2*uklabor

Stock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
24-Jun-92	-60	4.280	0.376	2.920	0.282
5-Aug-92	-30	3.450	0.219	0.194	0.014
19-Aug-92	-20	6.900	0.366	-19.180	-1.117
2-Sep-92	-10	-36.340	-1.598	20.610	0.994
4-Sep-92	-8	10.860	0.813	-6.460	-0.530
8-Sep-92	-6	-25.620	-0.999	47.790	2.043
10-Sep-92	-4	6.570	0.294	-13.130	-0.645
11-Sep-92	-3	61.340	2.433	-45.530	-1.980
14-Sep-92	-2	19.430	0.736	-58.450	-2.429
15-Sep-92	-1	-21.710	-1.001	23.730	1.200
16-Sep-92	0	-32.660	-1.161	-11.860	-0.463
17-Sep-92	1	57.430	1.431	-64.830	-1.771
18-Sep-92	2	-23.600	-0.808	31.670	1.190
21-Sep-92	3	-30.900	-1.265	32.660	1.477
22-Sep-92	4	43.610	1.891	-33.370	-1.587
24-Sep-92	6	17.870	0.764	-12.210	-0.573
28-Sep-92	8	-17.060	-0.985	22.300	1.411
30-Sep-92	10	27.090	1.479	-14.440	-0.864
14-Oct-92	20	-26.920	-1.752	23.920	1.707
28-Oct-92	30	19.960	1.142	-15.520	-0.974
9-Dec-92	60	6.560	0.504	-29.510	-2.484
Abnormal Stock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
24-Jun-92	-60	7.960	0.684	0.322	0.030
5-Aug-92	-30	6.170	0.401	-1.680	-0.120
19-Aug-92	-20	6.440	0.342	-18.650	-1.086
2-Sep-92	-10	-37.110	-1.619	21.390	1.024
4-Sep-92	-8	13.560	1.012	-8.320	-0.681
8-Sep-92	-6	-20.950	-0.817	44.430	1.901
10-Sep-92	-4	5.650	0.255	-12.240	-0.605
11-Sep-92	-3	58.060	2.320	-42.850	-1.878
14-Sep-92	-2	13.810	0.536	-53.990	-2.300
15-Sep-92	-1	-14.860	-0.675	18.720	0.933
16-Sep-92	0	-31.180	-1.112	-12.790	-0.501
17-Sep-92	1	43.970	1.096	-54.410	-1.488
18-Sep-92	2	-33.810	-1.111	39.620	1.428
21-Sep-92	3	-30.560	-1.259	32.750	1.479
22-Sep-92	4	40.920	1.757	-31.140	-1.466
24-Sep-92	6	13.820	0.595	-8.950	-0.422

Table B.4: continued

Abnormal Stock Return (continued)					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
28-Sep-92	8	-11.850	-0.702	18.530	1.204
30-Sep-92	10	28.920	1.607	-15.630	-0.953
14-Oct-92	20	-25.150	-1.629	22.770	1.618
28-Oct-92	30	22.350	1.279	-17.150	-1.077
9-Dec-92	60	9.060	0.699	-31.220	-2.639

Table B.5: UK. Model: rst=a+b1*uksale91+b2*uklabor+b3*cratio91

Stock Return							
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat	b3hat*10e5	t-stat
24-Jun-92	-60	9.110	0.670	-2.260	-0.183	-33.89	-0.111
5-Aug-92	-30	7.350	0.401	-6.650	-0.401	-454.99	-1.105
19-Aug-92	-20	33.540	1.639	-41.690	-2.251	-996.12	-2.164
2-Sep-92	-10	-20.980	-0.776	8.470	0.346	-712.71	-1.172
4-Sep-92	-8	19.340	1.360	-14.290	-1.110	-684.72	-2.140
8-Sep-92	-6	25.540	1.089	5.300	0.250	-3074.59	-5.822
10-Sep-92	-4	-23.760	-1.014	12.160	0.573	2085.50	3.953
11-Sep-92	-3	26.860	0.998	-15.580	-0.639	2042.01	3.372
14-Sep-92	-2	-5.460	-0.175	-33.890	-1.203	1542.82	2.203
15-Sep-92	-1	-16.510	-0.665	13.750	0.612	-526.07	-0.942
16-Sep-92	0	-49.440	-1.602	-0.822	-0.029	997.63	1.436
17-Sep-92	1	-11.280	-0.296	-6.700	-0.195	3899.02	4.544
18-Sep-92	2	-14.340	-0.416	30.090	0.964	-183.70	-0.237
21-Sep-92	3	-25.810	-0.909	35.290	1.372	540.17	0.845
22-Sep-92	4	28.370	1.080	-18.100	-0.761	1176.42	1.990
24-Sep-92	6	24.270	0.924	-17.330	-0.729	-389.77	-0.660
28-Sep-92	8	-4.670	-0.243	10.070	0.579	-645.50	-1.492
30-Sep-92	10	18.490	0.945	-9.390	-0.530	182.85	0.415
14-Oct-92	20	-46.390	-3.034	38.720	2.798	413.07	1.201
28-Oct-92	30	15.510	0.742	-10.620	-0.562	686.88	1.461
9-Dec-92	60	17.720	1.244	-40.320	-3.129	-627.52	-1.959
Abnormal Stock Return							
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat	b3hat*10e5	t-stat
24-Jun-92	-60	12.760	0.915	-4.360	-0.345	-2.65	-0.008
5-Aug-92	-30	10.060	0.570	-8.150	-0.510	-430.22	-1.084
19-Aug-92	-20	33.170	1.622	-41.190	-2.225	-992.82	-2.157
2-Sep-92	-10	-21.660	-0.794	9.170	0.371	-711.53	-1.159
4-Sep-92	-8	22.040	1.528	-15.790	-1.209	-660.06	-2.034
8-Sep-92	-6	30.160	1.268	2.570	0.119	-3036.62	-5.672
10-Sep-92	-4	-24.580	-1.054	12.940	0.613	2085.69	3.972
11-Sep-92	-3	23.750	0.886	-13.310	-0.548	2026.29	3.358
14-Sep-92	-2	-10.850	-0.359	-30.140	-1.102	1511.24	2.222
15-Sep-92	-1	-9.790	-0.377	9.650	0.411	-473.40	-0.810
16-Sep-92	0	-47.930	-1.557	-1.540	-0.055	1014.02	1.463
17-Sep-92	1	-24.290	-0.612	19.700	0.055	3814.46	4.271
18-Sep-92	2	-24.190	-0.656	36.720	1.100	-246.29	-0.297
21-Sep-92	3	-25.620	-0.901	35.420	1.377	547.43	0.856
22-Sep-92	4	25.830	0.967	-16.200	-0.670	1164.65	1.939
24-Sep-92	6	20.410	0.775	-14.570	-0.612	-410.71	-0.693

Table B.5: continued

Abnormal Stock Return (continued)							
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat	b3hat*10e5	t-stat
28-Sep-92	8	0.471	0.024	7.000	0.397	-603.88	-1.380
30-Sep-92	10	20.340	1.056	-10.330	-0.593	201.60	0.465
14-Oct-92	20	-44.600	-2.902	37.820	2.719	431.44	1.248
28-Oct-92	30	17.910	0.862	-11.920	-0.634	709.49	1.518
9-Dec-92	60	20.220	1.415	-41.690	-3.223	-604.22	-1.880

Table B.6: Spain. Model: rst=a+b*spsale91

Date	WDays	Stock Return bhat*10e5	t-stat	Abnormal St. Return, -90 bhat*10e5	t-stat	Joint Estimates bhat*10e5	t-stat
25-Jun-92	-60	39.330	1.907	41.070	1.975	-0.737	-0.282
6-Aug-92	-30	-4.040	-0.229	-6.960	-0.388	3.041	1.165
20-Aug-92	-20	5.460	0.252	4.540	0.212	0.641	0.246
3-Sep-92	-10	-47.620	-1.630	-34.060	-1.198	-2.773	-1.061
7-Sep-92	-8	-9.910	0.537	-13.880	-0.781	-0.310	-0.119
9-Sep-92	-6	20.060	0.623	11.650	0.359	2.591	0.993
11-Sep-92	-4	20.140	1.159	21.040	1.214	0.627	0.240
14-Sep-92	-3	-47.500	-2.219	-34.700	-1.528	2.567	0.982
15-Sep-92	-2	2.070	0.134	-2.390	-0.158	0.906	0.347
16-Sep-92	-1	15.950	0.819	7.700	0.372	4.884	1.871
17-Sep-92	0	-63.410	-3.135	-66.000	-3.261	-7.879	-3.022
18-Sep-92	1	-85.690	-2.736	-78.090	-2.581	-3.046	-1.167
21-Sep-92	2	-11.600	-0.527	-23.580	-1.045	-10.505	-4.030
22-Sep-92	3	-8.380	-0.243	-18.170	-0.532	-7.088	-2.716
23-Sep-92	4	18.440	1.015	10.720	0.626	-6.644	-2.547
25-Sep-92	6	23.910	1.034	26.120	1.171	1.131	0.433
29-Sep-92	8	20.480	0.921	14.870	0.646	3.766	1.444
1-Oct-92	10	20.970	0.840	0.364	0.015	-2.214	-0.846
9-Nov-92	-10	-11.700	-0.504	-13.640	-0.582	-2.960	-1.134
11-Nov-92	-8	41.140	2.253	36.360	1.997	7.086	2.717
13-Nov-92	-6	-2.170	-0.232	1.680	0.162	3.392	1.300
17-Nov-92	-4	3.720	0.323	9.130	0.683	4.557	1.740
18-Nov-92	-3	31.260	1.499	42.150	1.967	-5.963	-2.285
19-Nov-92	-2	22.080	1.052	28.340	1.361	3.771	1.447
20-Nov-92	-1	-26.640	-1.724	-35.070	-2.406	-2.925	-1.120
23-Nov-92	0	-21.310	-0.734	-24.960	-0.839	-2.570	-0.985
24-Nov-92	1	-19.630	-1.221	-25.970	-1.559	2.273	0.871
25-Nov-92	2	2.470	0.215	4.680	0.393	3.146	1.205
26-Nov-92	3	20.100	0.808	24.920	0.995	5.408	2.074
27-Nov-92	4	20.940	1.576	20.240	1.519	-1.131	-0.433
1-Dec-92	6	-4.620	-0.222	-10.990	-0.523	0.957	0.366
3-Dec-92	8	26.100	2.180	29.170	2.290	-1.403	-0.538
7-Dec-92	10	-13.410	-0.750	-15.350	-0.871	-0.186	-0.071
29-Apr-93	-10	22.200	2.161	16.690	1.567	2.690	1.031
3-May-93	-8	-15.840	-1.043	-17.680	-1.180	-0.195	-0.075
5-May-93	-6	77.470	0.509	74.230	0.490	-10.106	-3.843
7-May-93	-4	2.870	0.137	-2.180	-0.100	0.468	0.179
10-May-93	-3	-4.500	-0.213	-8.340	-0.382	0.004	0.002
11-May-93	-2	-27.970	-1.921	-26.060	-1.740	-4.917	-1.885
12-May-93	-1	-0.980	-0.067	-3.680	-0.258	-0.715	-0.274
13-May-93	0	-30.030	-1.379	-11.400	-0.451	-4.390	-1.675

Table B.6: continued

Date	WDays	Stock Return bhat*10e5	t-stat	Abnormal St. Return, -90 bhat*10e5	t-stat	Joint Estimates bhat*10e5	t-stat
14-May-93	1	36.260	1.706	38.510	1.752	9.632	3.696
17-May-93	2	-7.390	-0.448	-11.200	-0.675	-0.888	-0.340
18-May-93	3	-3.750	-0.233	-2.170	0.133	0.423	0.162
19-May-93	4	-3.280	-0.244	-8.600	-0.650	2.317	0.880
21-May-93	6	-8.850	-0.404	-8.960	-0.410	-6.584	-2.524
25-May-93	8	1.940	0.122	4.410	0.289	3.496	1.340
27-May-93	10	-3.260	-0.234	1.150	0.081	-6.345	-2.432
10-Jun-93	20	-6.820	-0.625	-6.260	-0.577	2.886	1.106
24-Jun-93	30	1.200	0.093	-2.320	-0.173	0.195	0.075
5-Aug-93	60	21.270	1.040	18.560	0.899	-0.249	-0.095

Table B.6: continued. Average of all devaluations.

WDays	Stock Return bhat*10e5	t-stat	Abnormal St. Return, -90 bhat*10e5	t-stat	Joint Estimates bhat*10e5	t-stat
-10	-12.370	-0.840	-10.340	-0.811	1.610	1.068
-8	5.130	0.492	1.600	0.159	1.128	0.748
-6	31.780	0.618	29.190	0.572	-1.210	-1.004
-4	8.910	0.902	9.330	0.904	0.171	0.113
-3	-6.910	-0.489	-0.297	-0.022	2.401	1.591
-2	-1.270	-0.122	-0.038	-0.004	-3.298	-2.188
-1	-3.890	-0.397	-10.350	-1.063	2.649	1.756
0	-38.250	-2.554	-34.120	-2.258	-5.109	-3.391
1	-23.020	-1.459	-21.850	-1.514	1.334	0.885
2	-5.510	-0.472	-10.030	-1.001	-3.029	-2.010
3	2.650	0.167	2.970	0.200	-1.190	-0.789
4	12.030	1.181	7.450	0.837	0.362	0.240
6	3.480	0.267	2.060	0.164	-2.083	-1.382
8	16.170	1.567	16.150	1.585	2.712	1.800
10	1.440	0.098	-4.610	-0.426	-6.097	-4.050

Table B.7: Spain. Model: rst=a+b1*spsale+b2*cratio

Stock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
25-Jun-92	-60	-8.870	-0.527	-1425.95	-0.807
6-Aug-92	-30	0.251	0.012	2654.20	0.177
20-Aug-92	-20	-7.460	-0.279	-2293.36	-0.818
3-Sep-92	-10	-23.840	-0.726	1578.89	0.458
7-Sep-92	-8	4.260	0.205	-3207.55	-1.472
9-Sep-92	-6	7.670	0.188	-252.68	-0.059
11-Sep-92	-4	28.390	1.738	251.35	0.147
14-Sep-92	-3	-14.410	-0.769	-2276.69	-1.159
15-Sep-92	-2	30.050	1.896	-1143.46	-0.688
16-Sep-92	-1	1.700	-0.081	3742.03	1.709
17-Sep-92	0	-58.830	-2.620	-1095.70	-0.465
18-Sep-92	1	-67.200	-1.739	3500.72	0.864
21-Sep-92	2	-18.510	-0.693	-3625.05	-1.295
22-Sep-92	3	12.270	0.284	258.21	0.057
23-Sep-92	4	8.770	0.553	-6946.09	-4.179
25-Sep-92	6	1.610	0.057	1313.75	0.448
29-Sep-92	8	25.400	0.940	-649.61	-0.229
1-Oct-92	10	40.480	1.626	-8529.08	-0.265
9-Nov-92	-10	-32.010	-1.133	1521.20	0.513
11-Nov-92	-8	64.920	3.367	-4070.12	-2.013
13-Nov-92	-6	-3.850	-0.325	-640.70	-0.516
17-Nov-92	-4	5.360	0.370	-114.26	-0.075
18-Nov-92	-3	33.620	1.270	-895.11	-0.322
19-Nov-92	-2	14.180	0.549	-3073.47	-1.135
20-Nov-92	-1	-3.570	-0.208	944.26	0.526
23-Nov-92	0	-31.950	-1.028	9299.98	2.852
24-Nov-92	1	-27.000	-1.378	1948.28	0.948
25-Nov-92	2	8.140	0.604	-2313.63	-1.635
26-Nov-92	3	31.420	1.142	-6987.14	-2.420
27-Nov-92	4	5.360	0.370	1168.07	0.770
1-Dec-92	6	-28.950	-1.256	-3477.99	-1.438
3-Dec-92	8	12.570	0.947	-2244.00	-1.612
7-Dec-92	10	-11.450	-0.516	-2379.08	-1.022
29-Apr-93	-10	21.660	1.715	1299.62	0.981
3-May-93	-8	0.810	0.051	-1767.10	-1.056
5-May-93	-6	139.510	1.019	-63622.54	-4.430
7-May-93	-4	-2.350	-0.127	7621.96	3.942
10-May-93	-3	-25.310	-1.362	8149.79	4.183
11-May-93	-2	-18.200	-1.406	-5559.83	-4.093
12-May-93	-1	-24.190	-1.853	-4047.69	-2.956
13-May-93	0	-43.310	-1.905	-5616.51	-2.355

Table B.7: continued

Stock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
14-May-93	1	39.320	1.490	-2209.63	-0.798
17-May-93	2	-6.450	-0.356	-655.92	-0.345
18-May-93	3	-7.520	-0.368	687.69	0.321
19-May-93	4	14.660	0.995	538.04	0.348
21-May-93	6	-26.710	-1.327	-6315.60	-2.992
25-May-93	8	-3.480	-0.178	-1335.81	-0.651
27-May-93	10	-20.150	-1.245	-12.29	-0.007
10-Jun-93	20	-13.290	-1.014	-1318.85	0.959
24-Jun-93	30	5.900	0.367	1151.12	0.682
5-Aug-93	60	15.790	0.624	-1068.19	-0.402
Abnormal Srock Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
25-Jun-92	-60	-6.170	-0.352	-1720.59	-0.936
6-Aug-92	-30	-2.560	-0.118	3032.62	1.335
20-Aug-92	-20	-7.890	-0.298	-2204.95	-0.793
3-Sep-92	-10	-7.180	-0.228	-421.03	-0.127
7-Sep-92	-8	0.214	0.011	-2678.25	-1.264
9-Sep-92	-6	-1.610	-0.039	916.19	0.213
11-Sep-92	-4	30.100	1.853	78.27	0.046
14-Sep-92	-3	1.370	0.072	-4167.63	-2.104
15-Sep-92	-2	25.430	1.641	-543.41	-0.334
16-Sep-92	-1	-10.790	-0.503	4888.32	2.171
17-Sep-92	0	-61.240	-2.728	-765.12	-0.325
18-Sep-92	1	-57.570	-1.537	2359.69	0.601
21-Sep-92	2	-32.000	-1.136	-1941.22	-0.657
22-Sep-92	3	1.350	0.320	1626.67	0.362
23-Sep-92	4	0.297	0.019	-5875.90	-3.512
25-Sep-92	6	4.860	0.180	951.59	0.335
29-Sep-92	8	19.420	0.693	116.68	0.040
1-Oct-92	10	16.780	-0.603	-559.92	-1.919
9-Nov-92	-10	-33.660	-1.179	1757.73	0.587
11-Nov-92	-8	59.910	3.022	-3422.78	-1.646
13-Nov-92	-6	1.350	0.105	-1239.75	-0.916
17-Nov-92	-4	12.400	0.741	-937.93	-0.534
18-Nov-92	-3	47.120	1.766	-2509.12	-0.896
19-Nov-92	-2	22.220	0.886	-4020.24	-1.528
20-Nov-92	-1	-12.890	-0.831	2118.30	1.302
23-Nov-92	0	-35.610	-1.131	9782.31	2.962
24-Nov-92	1	-33.830	-1.701	2818.65	1.351
25-Nov-92	2	11.400	0.833	-2676.25	-1.864
26-Nov-92	3	37.760	1.412	-7725.92	-2.754

Table B.7: continued

Abnormal Stovk Return					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
27-Nov-92	4	5.170	0.353	1226.80	0.800
1-Dec-92	6	-35.830	-1.509	-2602.63	-1.045
3-Dec-92	8	16.850	1.187	-2730.99	-1.834
7-Dec-92	10	-13.100	-0.596	-2142.54	-0.929
29-Apr-93	-10	15.790	1.249	2051.81	1.547
3-May-93	-8	0.713	0.045	-1545.61	-0.935
5-May-93	-6	136.330	0.997	-63198.56	-4.408
7-May-93	-4	-7.680	-0.412	8308.12	4.249
10-May-93	-3	29.200	-1.549	8661.09	4.381
11-May-93	-2	-15.310	-1.179	-5877.88	-4.317
12-May-93	-1	-26.730	-2.047	-3701.79	-2.702
13-May-93	0	-20.660	-0.821	-8347.36	-3.163
14-May-93	1	42.630	1.569	-2577.96	-0.906
17-May-93	2	10.300	-0.565	-149.56	-0.078
18-May-93	3	0.116	0.006	-209.34	-0.096
19-May-93	4	9.020	0.634	1262.78	0.846
21-May-93	6	-26.190	-1.309	-6343.44	-3.024
25-May-93	8	0.085	0.005	-1735.34	-0.891
27-May-93	10	-14.300	-0.858	-691.51	-0.396
10-Jun-93	20	-11.990	-0.912	1194.79	0.867
24-Jun-93	30	2.390	0.144	1614.62	0.925
5-Aug-93	60	13.240	0.515	-720.16	-0.267
Joint Estimates					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
25-Jun-92	-60	0.438	0.092	-548.34	-0.376
6-Aug-92	-30	-5.543	-1.164	3200.12	2.195
20-Aug-92	-20	6.924	1.455	-2339.18	-1.604
3-Sep-92	-10	-5.425	-1.137	1171.84	0.802
7-Sep-92	-8	3.482	0.731	-1437.12	-0.985
9-Sep-92	-6	3.879	0.814	-541.76	-0.371
11-Sep-92	-4	-6.998	-1.470	2594.59	1.779
14-Sep-92	-3	3.795	0.796	-219.06	-0.150
15-Sep-92	-2	3.450	0.725	-864.96	-0.593
16-Sep-92	-1	-2.952	-0.620	2956.50	2.027
17-Sep-92	0	-5.214	-1.095	-764.34	-0.524
18-Sep-92	1	4.045	0.848	-2621.17	-1.794
21-Sep-92	2	-3.113	-0.653	-2731.29	-1.872
22-Sep-92	3	-0.660	-0.139	-2328.78	-1.596
23-Sep-92	4	1.894	0.398	-3229.95	-2.214
25-Sep-92	6	-10.456	-2.196	4208.54	2.887
29-Sep-92	8	8.362	1.757	-1574.02	-1.079

Table B.7: continued

Joint Estimates					
Date	WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
1-Oct-92	10	17.694	3.711	-7234.63	-4.959
9-Nov-92	-10	-1.967	-0.413	-335.28	-0.230
11-Nov-92	-8	17.198	3.616	-3671.80	-2.518
13-Nov-92	-6	-9.793	-2.058	4766.05	3.271
17-Nov-92	-4	3.703	0.777	340.12	0.233
18-Nov-92	-3	-5.465	-1.147	-223.38	-0.153
19-Nov-92	-2	-2.171	-0.456	2244.08	1.538
20-Nov-92	-1	-11.828	-2.484	3225.59	2.210
23-Nov-92	0	-2.917	-0.613	87.55	0.060
24-Nov-92	1	0.972	0.204	497.01	0.341
25-Nov-92	2	9.416	1.976	-2216.87	-1.518
26-Nov-92	3	-3.706	-0.778	3228.35	2.214
27-Nov-92	4	-2.723	-0.572	638.96	0.438
1-Dec-92	6	-0.660	-0.139	597.04	0.409
3-Dec-92	8	8.966	1.882	-3737.16	-2.560
7-Dec-92	10	-0.357	-0.075	63.55	0.044
29-Apr-93	-10	3.938	0.827	-417.60	-0.286
3-May-93	-8	0.642	0.135	-395.47	-0.271
5-May-93	-6	83.016	17.350	-31396.50	-21.336
7-May-93	-4	-8.794	-1.847	3240.85	2.222
10-May-93	-3	-10.044	-2.109	3626.64	2.486
11-May-93	-2	0.283	0.060	-1950.12	-1.337
12-May-93	-1	0.150	0.031	-408.45	-0.280
13-May-93	0	-0.493	-0.103	-1313.41	-0.897
14-May-93	1	7.837	1.646	752.46	0.516
17-May-93	2	6.662	1.399	-2616.54	-1.794
18-May-93	3	-1.172	-0.246	583.26	0.400
19-May-93	4	8.624	1.811	-2224.87	-1.525
21-May-93	6	12.389	2.604	-6793.16	-4.668
25-May-93	8	9.043	1.900	-1986.68	-1.362
27-May-93	10	-1.591	-0.334	-1796.65	-1.232
10-Jun-93	20	1.912	0.401	319.71	0.219
24-Jun-93	30	3.879	0.815	-1338.36	-0.917
5-Aug-93	60	1.991	0.418	-914.79	-0.627

Table B.7: continued. Average of all devaluations.

Stock Return				
WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
-10	-11.400	-0.693	1466.57	0.850
-8	23.300	2.073	-3014.92	-2.554
-6	477.800	0.809	-21505.31	-3.471
-4	10.470	0.991	2586.35	2.335
-3	-2.030	-0.134	1659.33	1.045
-2	8.680	0.737	-32589.20	-2.639
-1	-9.820	-0.921	212.87	0.190
0	-44.700	-2.501	-862.59	0.460
1	-18.290	-0.994	1079.79	0.559
2	-5.600	-0.407	-2198.20	-1.522
3	12.060	0.612	-2013.75	-0.974
4	9.600	0.835	-1746.66	-1.449
6	-180.200	-1.231	-2826.61	-1.841
8	11.500	0.942	-1409.81	-1.101
10	2.960	0.168	-3640.15	-1.965
Abnormal Stock Return				
WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
-10	-8.350	-0.572	1129.50	0.738
-8	19.800	1.802	-2548.88	-2.211
-6	45.360	0.772	-21174.04	-3.434
-4	11.610	1.038	2482.82	2.117
-3	6.430	0.439	661.45	0.431
-2	10.780	0.992	-3480.51	-3.052
-1	-16.800	-1.627	1101.61	1.017
0	-39.170	-2.196	223.28	0.119
1	-16.260	-0.951	866.79	0.483
2	-10.300	-0.866	-1589.01	-1.273
3	13.080	0.721	-2102.86	-1.106
4	4.830	0.492	-1128.77	-1.096
6	-19.050	-1.362	-2664.83	-1.816
8	12.120	1.009	-1449.88	-1.151
10	-3.540	-0.275	-2811.07	-2.084
Joint Estimates				
WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
-10	-1.547	-0.562	1214.38	1.441
-8	5.384	1.958	-1597.72	-1.897
-6	21.426	7.769	-8070.34	-9.511
-4	-4.585	-1.667	1633.74	1.940
-3	-0.944	-0.343	1289.58	1.528
-2	-0.569	-0.207	-1011.69	-1.200

Table B.7: continued. Average of all devaluations.

Joint Estimates				
WDays	b1hat*10e5	t-stat	b2hat*10e5	t-stat
-1	-1.630	-0.592	1587.99	1.884
0	-6.000	-2.180	418.63	0.496
1	3.058	1.111	-612.75	-0.727
2	1.567	0.570	-1630.33	-1.935
3	2.601	0.946	-1345.71	-1.597
4	2.271	0.826	-742.78	-0.881
6	1.600	0.582	-1351.48	-1.605
8	4.973	1.809	-794.81	-0.943
10	3.766	1.369	-3615.01	-4.298

Appendix C

Notes to chapter 3

C.1 Data

C.1.1 Mexico

Mexican dataset consist of the accounting information for 160 companies for the forth quarter of 1993-1995. The data are taken from the companies reports to the Mexican Stock exchange.[1] All the numbers are in current pesos, although corrected for the effect of inflation within the year.[2] All items are net items.

For the smaller sample of 44 frequently traded companies, we use the information on the monthly stock prices taken from Datastream. The stock prices are in current pesos, not corrected for inflation.

C.1.2 Thailand

Thai dataset consists of the accounting and stock-market data for 230 Thai firms. The data covers the period from 1993 to 1997 for accounting data and the period from January 1996 to March 1998 for the stock market data. Stock market prices are monthly data. Accounting information is yearly data, and usually as of December 31 of the year in question. Accounting numbers are total value items. All the information is taken from Datastream. The list of firms

[1] The data were kindly provided to us by Andres Conesa Labastida and Guillermo Babats.
[2] See Conesa-Labastida (1997) for the details on Mexican accounting.

was obtained from the web site of the Thailand Stock exchange.

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