The Euro and Corporate Valuations*

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Abstract

In this paper we study the changes in corporate valuations induced by the adoption of the euro as the common currency in Europe. We use corporate–level data from ten countries that adopted the euro, the three EU countries that did not start using the euro, as well as Norway and Switzerland. We show that the introduction of the euro has increased Tobin's Q-ratios by 16.7% in the euro-countries that previously had weak currencies. The increase in Q-ratios decreases to 8.7% once we take into account the changes in the interest rates. The increases in Tobin's Q are larger for firms that were exposed to intra-European currency risks, i.e. firms that were ex-ante expected to benefit more from the common currency. Finally, the increases are also more significant for financially unconstrained firms. The evidence supports the view that the introduction of the euro has lowered firms' cost of capital in the euro-countries.

KEYWORDS: Economic and Monetary Union (EMU), the euro, valuation, cost of capital, currency risk, currency union.

JEL classification: F33, F36, G32

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I Introduction

Economic and Monetary Union (EMU) and the resulting introduction of a common currency for Europe in January 1, 1999 is arguably the most important institutional change in international financial markets during the past quarter century. Despite the historic significance of the new currency, it is not clear at all whether the euro has had a positive or negative effect on European economies. The overall macroeconomic performance in the EMU countries[1] has been disappointing, but it is very hard to find the ultimate reasons for this, since the common currency has existed such a short time. This paper aims to address the economic impact of the euro by looking at changes in the valuations of European corporations around the introduction of the common currency. Corporate valuations are a very appropriate way of assessing the impact keeping in mind the short history of the new currency, since stock prices are forward looking and hence are able to react fast to structural changes that have long-term consequences.

The euro can affect corporate valuations through two channels: it can have an impact either on the firms' cost of capital, or on expected cash flows. Cost of capital has two components, the risk free rate and the risk premium, and a common currency like the euro could affect both of them. The real risk free rates may have changed in Europe, because there is now a common monetary policy for the EMU countries. Convergence in nominal interest rates can, however, lead to very divergent real interest rates to the extent that inflation rates differ from country to country. Hence, ex-ante it is very difficult to say if the introduction of the euro should have a positive or negative overall impact on real interest rates and thus on corporate valuations in the EMU countries. Alesina and Barro (2002) show that currency unions should be most beneficial for countries that have suffered from high inflation rates. If some countries have had high real interest rates caused by credibility problems due to time-inconsistency bias in monetary policy (see Barro and Gordon, 1983), then the real interest rate should have unambiguously become lower for those countries, and as a consequence corporate valuations should have increased. Moreover, one of the formal entry criteria for phase III of EMU in the Maastricht Treaty of 1992 was an explicit requirement for the

convergence of nominal long-term interest rates towards the level prevailing in the three best performing European countries, which for some countries meant a significant reduction in the level of real interest rates.

The second component in the cost of capital is the risk premium, including a risk premium for currency risks. The adoption of the euro as a common currency of course means that the nominal intra-European currency risks between the EMU countries have been eliminated. If currency risks can not be fully diversified and are thus priced in financial markets, as implied by the international capital asset pricing model (see, for instance, Adler and Dumas, 1983), then the elimination of those risks should lead to a lower cost of capital. Dumas and Solnik (1995) and De Santis and Gerard (1998), among others, show empirically that currency risks are priced in financial markets, so as a consequence of the elimination of intra-European currency risks the cost of capital should have decreased in the EMU countries, provided that non-EMU currency risks have not increased. However, the economic significance of the elimination of currency risks is debatable. Griffin and Stulz (2001), for example, find that exchange rate shocks have had a trivial effect on the relative performance of U.S. industries with respect to their competitors in Canada, the U.K., France, Germany, and Japan. They conclude that firms efficiently isolate themselves from currency movements, and therefore industry excess returns are not affected by exchange rates. Moreover, even though De Santis et al. (2003) show from the point of view of German investors that exposure to European currency risks (especially to the French, Italian and Spanish currency risks) has been significant and that the exposure has been rewarded with a positive premium in financial markets, non-European currency risks (especially the U.S. dollar risk) have been a larger part of the aggregate currency risk. De Santis et al. (2003) conclude that eliminating intra-European currency risks may only have a small economic impact. Also Sentana (2002) reaches the conclusion that the likely effect of eliminating currency risks among the EMU countries is small. On the other hand, Bartram and Karolyi (2003) show that due to the introduction of the euro, the market risk has been significantly reduced for those firms that have exports to the EMU

countries, implying that currency risks have been a non-diversifiable risk in Europe and that they have been economically significant.

Besides the elimination of currency risks, the introduction of the euro can also affect firms' cost of capital through other channels. Financial market integration can allow foreign investors to have access to local securities with diversification potential, thus reducing the overall cost of capital through better risk sharing opportunities (Bekaert and Harvey, 1995; Stulz, 1999). In particular, the euro may have increased financial integration in Europe and reduced the home equity bias by eliminating investment restrictions that some institutional investors had prior to the adoption of the euro.[2] Errunza and Losq (1985) and Eun and Janakiramanan (1986) show how partial segmentation of capital markets due to investment restrictions leads to a situation where holding local risks needs to be compensated in equilibrium. European pension funds typically have currency matching rules, for example that they can not allocate more than 20 percent of their funds to assets denominated in a foreign currency. Before the common currency was adopted, all securities denominated in another European currency were subject to this restriction. Of course this restriction is now void among the EMU countries. As an indication that the home equity bias was economically important in Europe, Rouwenhorst (1999) finds that during the 1990s country factors were more important than industry factors in determining stock returns in Europe. Hardouvelis et al. (2002a), however, find that European equity markets became more integrated towards the end of 1990s, since the European market factor increased in importance over time in determining asset prices. There is also some evidence from actual asset allocations that investors in the EMU countries have started to diversify their holdings more internationally. Hardouvelis et al. (2002a) report that foreign equity holdings as a proportion of total equity holdings have increased from 29 percent in 1992 to 50 percent in 1999 for pension funds in the EMU countries, whereas for pension funds from other countries the share of foreign equity has remained almost the same (19 percent in 1992, 21 percent in 1999). For life insurance companies the change in equity allocations has been similar: a significant increase in EMU countries, but hardly any

change for life insurance companies from other countries.

The euro may also have decreased the cost of capital through increased competition in European financial markets. Prior to the common currency, the corporate bond market in Europe was fragmented due to the different national currencies. Santos and Tsatsaronis (2002) document that in 1994 the underwriting fees for corporate bonds in Europe were twice the level prevailing in the U.S. corporate bond markets. After the introduction of the euro, the underwriting fees have declined to the U.S. levels. The corporate bond market has become a more important financing source for companies from the EMU countries. Rajan and Zingales (2003) show that the euro has had a significant positive impact on the amount of corporate bond issuance, which almost tripled after the introduction of the common currency. Even though European corporate bond markets have grown tremendously since 1999, the level of corporate bond debt relative to GDP, however, still remains well below the U.S. levels (8 percent in the EMU countries compared to 29 percent in the U.S. at the end of 2001, see Hartmann et al., 2003).

In sum, even if the economic significance of eliminating intra-European currency risks is debatable, corporations can be more valuable after the introduction of the euro because the cost of capital has decreased due to lower real interest rates, due to better risk sharing in European financial markets or due to increased competition among providers of finance.

Finally, firms' cash flows could be expected to increase in the future because of the euro, thus resulting in higher valuations. Rose (2000) and Glick and Rose (2002) argue that common currencies have an enormous impact on bilateral trade flows between countries that share the same currency. Rose and van Wincoop (2001) estimate that the euro would increase intra-European trade by 50 percent and Frenkel and Rose (2002) further argue that every 1 percent increase in trade would lead to 1/3 percent increase in income per capita. Thus the introduction of the euro could increase European incomes per capita between 15 and 20 percent. However, one should bear in mind that these large trade effects have been subject to debate. For example, Persson (2001), on one hand, has argued that the estimated increase in trade is

widely exaggerated due to the possibility of endogeneity in forming common currency areas. Tenreyro and Barro (2003), on the other hand, show that the trade effects are significant even after taking endogeneity problems into consideration. Recent evidence shows that trade effects of the euro are statistically and economically significant even after taking the endogeneity of joining the EMU into account, but not as large as the earlier estimates. Micco et al. (2003) estimate that the euro has increased trade between 4 percent and 16 percent among the EMU countries without any evidence of diverting trade from other countries. Barr et al. (2003) obtain a higher estimate, 29 percent, for the increase in trade among the EMU countries, whereas Bun and Klaassen (2002) find that the euro has increased trade by 4 percent initially and the estimated increase in the long-run would be 40 percent. Even if the estimated increases in trade had an impact in national incomes, corporate profits would not necessarily increase by the same amount. Friberg (2001) develops a model, where firms have a larger incentive to price discriminate between different markets the higher is the variability of the real exchange rate. The reduction of real exchange rate variability through the introduction of the euro would then lead to further goods market integration and lower profits for firms. Engel and Rogers (2001) show with pre-EMU consumer price data that deviations from law of one price, an indication of goods market segmentation, are largely attributable to local-currency pricing. The elimination of local currencies should thus lead to smaller price deviations for similar goods in different European countries. Parsley and Wei (2002) provide evidence of goods market integration by showing that prices of individual goods tend to converge when exchange rate risks are eliminated. This is consistent with increased competition in goods markets and hence currency unions could benefit consumers more than companies. The results, however, for the EMU-countries become insignificant after Parsley and Wei (2002) control for membership in the EU.

We use corporate-level data from ten countries that adopted the euro[3], the three EU countries (Denmark, Sweden, and the U.K.) that did not, as well as Norway and Switzerland. Using data as of December 31 each year we study how the introduction of the euro has affected firm Tobin's Q in panel regressions

that span the years from 1995 to 2000. We use the year 1998 as the benchmark for adoption of the euro for two reasons: on May 2, 1998 the European Council decided on which countries were allowed to enter the final phase of EMU; second, the forward rates in all euro countries converged around the middle of 1998, implying that using the 1997 observation would be premature and using the 1999 observation would be too late.

We show that in the period 1998-2000, Tobin's Q for firms in the EMU countries with a history of recent currency crises increased by 16.7 percent compared to firms in the non–EMU countries, after controlling for firm, country, and time specific effects. The EMU countries that had stable currencies did not experience a significant increase in corporate valuations. The countries that had experienced major currency depreciations are supposedly the countries that were expected to have significant currency risk premia prior to 1998. When we control for changes in monetary policy by including the short-term rate and the term-spread as variables, the increase in Tobin's Q declines to 8.7 percent. This implies that roughly half of the increase in corporate valuations for the EMU countries with recent history of currency depreciations is due to changes in interest rates and half is due to changes in risk premia. Furthermore, we document a significantly higher increase in valuation — 15.9 percent — for firms coming from the weak currency countries that had an exposure to intra–European currency risks prior to 1999. This valuation effect is driven by firms that were harmed by currency depreciations. For those firms, the increase in Q induced by the common currency is 22.2 percent after controlling for changes in monetary policy. In sum — the euro has increased the value of the firms that we expect ex ante to benefit the most from it: firms in countries with weak currencies, and firms directly exposed to currency risks.

The next step is to find out the reasons why firms from the EMU countries have become more valuable. We disentangle the effects of the euro on firms' cash flows and firms' cost of equity by classifying firms depending on how much financially constrained they were before the introduction of the common currency. We formulate a simple theoretical model that shows how the financially unconstrained firms experience

higher value increases as the cost of equity decreases. The intuition is that the opportunity cost of holding cash, i.e. being financially unconstrained, decreases as the cost of equity goes down. Our model also predicts that if the sole effect of the euro has been an increase in firms' expected cash flows, then firms should benefit by the same amount irrespective of financial constraints, after controlling for firm size. We test these propositions by calculating, for each firm in our sample, an index of financial constraints following Kaplan and Zingales (1997). We find that Tobin's Q increased by 20.6 percent for the least financially constrained firms from the weak currency EMU countries. In contrast, constrained firms do not experience significant value increases. These results are consistent with the cost of equity having decreased in the euro area, since we also control for the level of short-term interest rates and the term-spread in the regressions.

We also perform robustness checks to show that our main finding holds after we exclude Germany and the U.K. from the analysis. These are the countries that contribute the most firms to the sample. Besides, we show that the effect of the euro persists after we control for the convergence in macroeconomic factors established in the Maastricht Treaty. Finally, we reject the hypothesis that our results are driven by a significant increase in the volume of cross–border mergers of firms within the EMU countries, which could have indeed caused an increase in firm valuation.

The paper is organized as follows: section II contains the data description, in section III we study the valuation effects of the common currency. In section IV we further analyze the causes for valuation changes and in section V we study if the euro has affected long-run stock returns. Section VI is devoted to additional robustness checks, and section VII concludes.

II Data Description

A Sources

The sample of firms used in this study is gathered from Datastream and covers the period 1995–2000. The sample includes firms from all the countries that adopted the euro, with the exceptions of Greece and Luxembourg. Greece and Luxembourg are excluded because firms from these countries lack data in Datastream for some of the variables we use in the empirical analysis. Moreover, Greece did not join the euro until January 2001. Thus, our sample includes firms from the following ten countries that have adopted the euro: Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, and Spain. The sample also include firms from the three remaining EU, non–EMU countries (Denmark, Sweden, and the U.K.) as well as firms from Norway and Switzerland. We consider these five countries to constitute appropriate benchmark countries for an analysis of the impact of the euro on firm value.

For our 15 sample countries, we include all firms that have stock market and accounting data available for at least the period 1995–1998.[4] We impose this requirement because we want to analyze within–firm changes following the introduction of the euro and thus need firms to exist both before and after the introduction of the euro (as mentioned we consider 1998 to be the effective event–year for the introduction of the euro; see also below). Furthermore, we exclude firms that report (i) zero sales, (ii) negative earnings (EBITDA) in excess of the book value of assets, or (iii) negative book values of equity. These exclusions are done to ensure that speculative or severely distressed firms do not have an undue influence on our results. Our final sample consists of 1,713 firms (9,742 firm–year observations): 794 firms (4,692 firm–year observations) from the EMU countries and 919 firms (5,050 firm–year observations) from the non–EMU countries.[5] Germany contributes the most firms to the EMU sample with 368 firms (2,118 firm–year observations), whereas the U.K. dominates the non–EMU sample with 706 firms (3,850 firm–year observations). However, our results are robust to excluding both of these countries from the sample.

B Country Classifications

First we classify firms into two groups, depending on whether they are EMU countries or not. Next we further group firms within the EMU group, depending on the strength of their home countries currencies prior to the common currency. We call *weak–EMU countries* those that suffered a currency crisis in the years before the introduction of the euro. These countries are Finland, Ireland, Italy, Portugal, and Spain.[6] The other euro countries – Germany, France, Netherlands, Belgium, and Austria – did not experience significant currency depreciations during the European Monetary System crisis in early 1990s, hence the label *strong–EMU countries*. An alternative way of classifying countries would be to measure exchange rate uncertainty with the exchange rate volatility in the years before the implementation of the euro. However, we do not deem such a measure appropriate, because different countries had different bands of fluctuation within the system. The classification into weak– and strong–EMU countries is important, because the previous monetary arrangements in Europe did not manage to provide exchange rate stability for the weak–EMU countries and hence the introduction of a common currency could be especially significant for these countries. Notice that the labels of weak- and strong–EMU countries only apply to the weakness and strength of the currencies prior to the EMU, and not to the overall economic performance of the respective countries.

C Firm Characteristics

Our measure of firm value is Tobin's Q, which is calculated in the paper as the book value of total assets (Datastream company account item #392), minus the book value of the common equity (Datastream company account item #305), plus the market value of the common equity (number of shares outstanding times end–of–year stock price), divided by the book value of total assets. Table 1 reports descriptive statistics for Tobin's Q as well as for other firm characteristics that we use in our analysis. All data are recorded as of December 31 each year. Table 1 shows that average and median Qs are significantly larger

in the non–EMU countries when calculated over the entire sample period. The table also shows that EMU firms are, relative to non–EMU firms: (i) larger, (ii) more levered, and (iii) have more intangible assets. These average differences in firm characteristics between the EMU and non-EMU countries are taken into account in our analysis through the use of fixed firm effects (see below).

[Insert Table 1]

III The Euro and Firm Value

A Choice of Post-Euro Time Period

The aim of this study is to analyze whether the introduction of the euro has led to a structural change in corporate valuations for the participating countries. Thus, we need to identify the point in time when the structural change occurs. The euro was officially introduced on January 1, 1999. However, already on May 2, 1998 the European Council decided on which countries were allowed to enter the final phase of the EMU. Thus, since our data is as of December 31 each year, choosing (the end of) 1998 as the first year of the euro seems reasonable. One objection to this choice is that forward looking markets are likely to have taken into account the effects of the introduction of the euro already at the end of 1997, or even earlier. As a robustness check, we later run our main regression with an alternative time-period of 1997-2000 as the euro period. The results are very similar. Moreover, we also show that no individual year before 1998 has a significant impact on our corporate valuation measure (see section VI for details).

Hardouvelis et al. (2002a) use the forward interest rate differential with Germany as a measure of convergence to the EMU and show that financial integration among European markets was positively related to that measure. We also calculate forward rate differentials as in Hardouvelis et al. (2002a) to get an indication of the likelihood of countries joining the EMU. The calculations are outlined in Appendix A. Favero et al. (2000) criticize deriving the probabilities for joining the EMU from simple forward rate

spread calculations. They show that probabilities based on average forward rates overestimate the true probabilities. Hence we do not try to interpret the spreads in terms of probabilities, since this would require an assessment of what the theoretical instantaneous forward rate would be, for every country and at any point in time, under the assumption that such country did not join the EMU. However, to the extent that actual forward rate spreads are different from zero, their magnitude reflects that the markets assign some positive probability to a country not joining the EMU.

[Insert Figure 1]

Figure 1 shows the average forward rate spread for the non–EMU countries, as well as for the strong–EMU and weak–EMU countries. While spreads outside the EMU do not converge to zero, it is clear from the figure that, following a sharp decline in the years 1996 and 1997, forward rate spreads converge to zero in mid–1998 in the EMU countries. This is especially true for the weak–EMU countries.

In order to avoid drawing inferences from the forward rate spread levels, we estimate the incremental changes on forward rate spreads by regressing the absolute value of the monthly forward spreads[7] on country and time dummy variables that are constructed in the following way: For each year T, we construct a dummy variable that takes value one whenever $t \geq T$, and zero otherwise, where t is the date when we observe the corresponding forward spread. The coefficients for such time dummies measure the incremental effect on spreads for each corresponding year. The results in Table 2 show that there are significant reductions in spreads for all countries in years 1996 and 1997. However, the regression results show a final convergence in spreads, that becomes permanent, in 1998, both in the weak– and strong–EMU countries. Indeed, the reduction in the absolute spread is 2.3 percent in the weak–EMU countries, and 0.4 percent in the strong–EMU countries. The average spreads as of December 1998 in the non–EMU, weak–EMU, and strong–EMU countries are, respectively, 5.37 percent, 0.27 percent, and 0.00 percent, and they do not change afterwards in the EMU area.[8] We can thus conclude that it is not until 1998 that the uncertainty regarding which countries would adopt the euro disappears. Based on these results, we

consider the end of 1998 to be a reasonable and conservative choice for the start of the post-euro time period. But because the above results show that markets already in 1997 anticipated the strong–EMU countries to adopt the euro, we will also test the robustness of our results to alternative definitions of the post-euro time period.

[Insert Table 2]

B Univariate Analysis

Table 3 reports the median Tobin's Q of sample firms, for the 15 countries we consider. We classify countries by their EMU membership. The first observation is that, while in the EMU countries median Q increases 4.3 percent in the period 1995–2000, it falls 13.5 percent in the non–EMU–countries. Among the weak–EMU countries, increases in Tobin's Q are 20.4 percent in Italy, 12.8 percent in Finland, 10.8 percent in Spain, 5.0 percent in Portugal , and 1.3 percent in Ireland. These are in general higher than in the strong–EMU countries: 7.2 percent in France, 5.9 percent in Belgium, 1.4 percent in the Netherlands, -2.4 percent in Germany, and -4.6 percent in Austria. Moreover, while Q increases in some non–EMU countries (24.0 percent and 7.9 percent increases in Switzerland and Sweden, respectively), it decreases in Denmark (-0.9 percent), Norway (-8.2 percent), and the U.K. (-17.9 percent). Firm values in the pre–euro period are significantly larger in the non–EMU area. Basing our results on non–parametric tests, we show in Table 3 that the EMU countries have higher Tobin's Q in 1998. This suggests a positive valuation effect of the euro. In the post–euro period, we do not find any significant difference between the EMU– and non–EMU countries.

[Insert Table 3]

C Regression Analysis: Method and Main Results

C.1 Method

In order to analyze the effects of the introduction of the euro, we estimate a fixed-effects panel regression model for the 1995-2000 time period. The dependent variable is the logarithm of Tobin's Q. The impact of the euro is measured using three different dummy variables. The first dummy variable, "EMU country x post-euro time period", takes the value one for firms in the EMU countries, during years 1998, 1999, and 2000, and zero otherwise. Similarly, we construct two dummy variables indicating firms in the strong- and weak-EMU countries, respectively, in the post-euro time period ("Strong-EMU country x post-euro time period" and "Weak-EMU country x post-euro time period"). More formally, let Q_{ict} be Tobin's Q for firm i in country c at time t, and $EURO_{ct}$ be the dummy variable(s) indicating whether the euro was adopted or not by country c at time t. We then estimate the following regression model with OLS:

$$\log Q_{ict} = Y_t + F_i + \beta X_{ict} + \gamma Z_{ct} + \delta EURO_{ct} + \varepsilon_{ict}, \tag{1}$$

where Y_t is the fixed time effect for year t, F_i is the fixed firm effect for firm i, X_{ict} represent firm characteristics, and Z_{ct} represents country characteristics. The estimated effect of the euro is captured by $\widehat{\delta}$.

The fixed year effects capture common time trends across both EMU- and non-EMU-firms. By using firm–specific fixed effects, we simultaneously control for both constant country factors (e.g., taxation, accounting rules, legal environment) and for constant firm factors (e.g., industry effects). Furthermore, because we use fixed effects, estimators will be based on the time-series within-firm variation in variables. Thus, since the objective of our study is to investigate whether there is a regime–switch in firms' valuations after the introduction of the euro, fixed effects regressions seem particularly suitable.

The firm characteristics used as controls (X_{ict}) are: size, measured as the log of the firm's sales (in

euros); profitability, measured as the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets; the ratio of fixed tangible assets to total assets; and leverage, measured as the book value of non-equity liabilities divided by total assets. Firm size is included because smaller firms tend to have greater growth opportunities. Bartram and Karolyi (2003) show that large firms have benefitted more from European monetary integration in terms of reduction in market risk. In addition, Dahlquist and Robertsson (2001) and Kang and Stulz (1997) also show that large firms benefit more from financial market integration because foreigners tend to invest in large firms. Investment opportunities and leverage positively affect Tobin's Q (McConnell and Servaes, 1990). Profitability directly affects a firm's value. The ratio of fixed tangible assets to total assets is a proxy for agency costs. If a large fraction of the assets are tangible, then the firm is easier to monitor. Moreover, the tangibility of assets also reflects the firm's investment opportunities.

As country controls (Z_{ct}), we use the real GDP growth rate to account cross–country differences in the business cycle. Furthermore, over the period January 1998 to December 2000, the euro depreciated 25 percent with respect to the dollar. Therefore, we also include the yearly change in the domestic currency/USD exchange rate as a control to make sure that our results are not caused by a significant depreciation of the euro or its legacy currencies with respect to the dollar. We gather data on the exchange rate of domestic currency/USD during the sample period from Datastream. After 1998, the exchange rate for each EMU country is implicitly obtained from the euro/dollar exchange rate. We then calculate the change in the exchange rate for each country and year in the sample.

We further want to find out if the possible changes in Q are due to changes in the level of interest rates induced by the new monetary policy environment. Central banks have a major influence over short-term interest rates. Therefore, we control for the level of short-term interest rates by including the 6-month risk free rate in our Q regressions for each country. In addition, monetary policy is also an important determinant of the term structure spread (see, for instance, Estrella and Mishkin, 1997). Hence we include

the term-spread as an explanatory variable as well (10 year government bond rate minus the 6-month t-bill rate).

The regression model outlined above is a typical example of a differences-in-differences (DD) estimation, where we try to identify a causal relationship between a treatment (the introduction of the euro) and an endogenous variable for a large number of firms from both affected and unaffected countries. Bertrand et al. (2004) point out the weakness of results based on the DD methodology because of the strong bias in the standard errors created by serial correlation. In our setting this problem is particularly important, since the intervention date is the same for all observations in the sample. Bertrand et al. (2004) suggest several methods to address this problem, and test their effectiveness.[9] For a small number of countries, such as our sample, Bertrand et al. (2004) suggest either bootstrapping or an arbitrary variance-covariance matrix as a remedy. In this paper we use the latter methodology as our main approach. We estimate robust standard errors that are adjusted for clustering of observations by country. In particular we use the following variance–covariance estimator:

$$V_{\text{CLUSTER}} = (X'X)^{-1} \cdot \sum_{j=1}^{N_c} u_j' \cdot u_j \cdot (X'X)^{-1}, \tag{2}$$

where

$$u_j = \sum_{t=1}^{T} e_{jt} \cdot x_{jt} \tag{3}$$

and N_c is the total number of clusters—the number of countries in the sample, X is the matrix of explanatory variables, e_{jt} is the residual for country j in year t, and x_j is the vector of corresponding values for the explanatory variables.

As an alternative way of dealing with serial correlation in DD estimators, Bertrand et al. (2004) suggest a time-series, simple aggregation of the data. The method consists of ignoring all time-series effects by averaging the data before and after the regime change. Simple aggregation in this way only works when the

intervention—the introduction of the euro in our case—happens in all countries at the same time. We also run our main Tobin's Q regressions using this method as a robustness test. To this end, we first calculate pre– and post–euro averages for all the variables in the dataset. In this way, we obtain two observations per firm, one corresponding to the pre–1998 period, one corresponding to the post-1998 period, for both EMU and non–EMU countries. In particular, we calculate the average Q for each firm as the average market value of the firm in the corresponding period, divided by the average book value of assets over the same period. We then run the standard Q regressions using the resulting dataset, controlling for firm– and time–fixed effects.[10] Note that we satisfy the Bertrand et al. (2004) requirement that all observations are treated in the same period, in our case the year 1998.

C.2 Main Estimation Results

Panel A of Table 4 presents the results of DD-estimation using the full panel of data with standard errors adjusted for clustering at the country level. Because the endogenous variable in our regression is the log of Q, the interpretation of the coefficients is straightforward and represents the percentage change in Q induced by either being a strong EMU country, being a weak EMU country, or in general adopting the euro in 1998.

[Insert Table 4]

Focusing on model (1), our first important result is that firm value in the EMU countries has increased by 7.7 percent compared to non–euro countries from 1998 onwards. The coefficient is significant at the 10 percent level. The magnitude of the coefficient is important if we take into account that the average increase in Q over the whole sample period is 4.6 percent. That is, *ceteris paribus* EMU–firms grew in value in 1998–2000 relative to the pre–euro period, and compared to non–EMU firms.

In model (2) of Table 4, we distinguish between the strong and weak–EMU countries. Our results show, in line with Dumas and Solnik (1995), and Bodart and Reding (1999), that firms in countries with

weaker currencies benefited more from the introduction of the euro. While firms in Finland, Italy, Ireland, Portugal, and Spain witnessed a 16.7 percent increase in Q relative to non–euro countries starting from 1998, the same increase equals 4.6 percent for the strong–EMU countries (not significantly different from zero). These results are consistent with Alesina and Barro (2002), since our weak countries are precisely the countries that had credibility problems in their monetary policies manifested by periodic currency depreciations. Another possibility for not finding a significant increase in Q for the strong-EMU countries is that their entry—with the possible exception of Belgium—to the common currency area was no surprise to anybody. Hence it is entirely possible that the positive effects had already been incorporated into stock prices before 1998. Consistent with this reasoning Hardouvelis et al. (2002b) find a significant decrease in cost of equity for the core-EMU countries (except for Germany) prior to the introduction of the euro. We will test this conjecture in section VI.C.

Because interest rates have decreased in many EMU-countries (especially in the weak countries), our results could simply reflect the impact of the monetary union on participating countries' risk-free interest rates. To control for this we include the short-term nominal interest rate for each country and year in models (3) and (4), as well as the term-spread. While interest rates are statistically insignificant, we find a positive relationship between the term-spread and firm values. We think that there are two reasons for this: a more positive term-spread indicates that monetary policy has become less restrictive, and a more positive term-spread is a predictor for higher economic growth in the future[11]. In economic terms, a 1 percent increase in the term-spread increased the median firm's Tobin's Q 4.7 percent over the period 1995–2000. Not surprisingly, both the magnitude and significance of the effect of the euro decrease after controlling for the changes in short-term interest rate and term-spread. Model (4) shows, however, that the effect of the euro on the weak–EMU countries is still significant at the 1 percent level. This result establishes that all the positive effects in firm valuations can not be credited to changes in monetary conditions. Since we want to find out the ultimate causes for the increases in Q beyond the impact of

interest rates, we henceforth always include the short-term nominal interest rate and the term premium as controls in our regressions.

In a non-reported estimation where we split the firms between large and small firms, respectively, we fail to find significant differences. This is in contrast with the intuition that larger firms benefit more from integration, since large firms are more exposed to currency risks, and foreign investors prefer to invest in large firms (Dahlquist and Robertsson, 2001; Kang and Stulz, 1997). Bartram and Karolyi (2003) find that the decrease in systematic risk is bigger for large firms, indicating that cost of capital should have decreased more for larger firms. One reason we do not find any indication for this could be that Datastream mainly has data about large firms in the first place.

We find our controls to have the expected signs. As a measure of firm-level growth opportunities, size is negatively related to value. More profitable firms are more valuable (significant coefficients in all estimations at the 1 percent level). As predicted by finance theory, firm value increases with leverage (significant at the 1 percent level).[12] The ratio of tangible assets to total assets displays a negative but insignificant coefficient. Maybe not so surprisingly, increases in concurrent domestic economic growth have a positive impact on firm value (significant at the 5 percent level). Finally, there is no conclusive evidence that the coefficient on the relative change in the domestic currency with respect to the US dollar is different from zero across the different model specifications.

In Panel B of Table 4 we repeat the analysis in Panel A using the time-series aggregation method. The pooled dataset consists of $3,426$ firm–period observations (two observations per firm). Since the euro-dummy is significant at least at the 5 percent level both with and without the short-term interest rate and term-spread as controls, we confirm the results that the increase in Q is not only due to changes in monetary policy. As in Panel A, the effects of the euro are mainly attributable to the weak–EMU countries. Because our results using the aggregated sample do not differ significantly from the results in Panel A, we will in the remainder of the paper present results using the DD-methodology adjusted with an arbitrary

variance-covariance matrix. Bertrand et al. (2004) prefer the latter to the former as well.

D Exchange Rate Exposure and Firm Value

Although all firms can benefit from the elimination of currency risks, the common currency should benefit firms even more to the extent that they are exposed to currency movements. For a firm whose suppliers operate in the local market, that sells only within a country's boundaries, and that finances its operations domestically, the benefits of the euro should be smaller. Therefore, it is worth analyzing the effect of the common currency on firm value depending on the firm's currency exposure. We sort companies within a country into three groups by using individual companies' stock market returns. In the first group we have companies whose stock returns significantly increase when the domestic currency depreciates with respect to the euro (positive–exposure companies), in the second group we place those companies whose stock returns significantly decrease (negative–exposure companies), and the third group is for companies that did not have a significant currency exposure. We detail the computation of the exchange rate beta coefficients (ERBs) in Appendix B.

Positive ERBs imply that a firm's revenues are generated mostly in foreign markets, that the firm's currency exposure is not hedged by other means –derivatives or foreign financing, or the firm's liabilities are mostly denominated in the domestic currency. Conversely, a negative ERB is an indication that the firm's exposure to currency risk is not hedged, the firm's suppliers are mainly located in another euro–country, or the firm's liabilities are mostly denominated in a foreign currency. As a result, firms with positive ERBs have their assets (investments) positively exposed to currency depreciations. Similarly, firms with negative ERBs have their liabilities (financing) positively influenced by currency depreciations. Our procedure is a useful simplification and not very demanding in terms of data. An alternative to the stock–based exposure is to have detailed information on each company's balance sheet (foreign sales, foreign liabilities), as well as on hedging practices. Data on hedging practices is currently not available.

Table B1 in Appendix B shows the percentage of firms in each country with either positive or negative ERBs. We also report the median exchange rate beta among all firms in a given country. Only four countries in the EMU area have positive exposure: Germany, France, the Netherlands, and Portugal. Norway and Switzerland have positive exposure as well. On average, 12.3 percent of the firms in EMU countries display a significant currency exposure at the 10 percent level in double–sided t–tests (or, equivalently, at the 5 percent level in one–sided t–tests), and 17.3 percent in the non–EMU countries. In Table 5 we present the results of the fixed effects model from the previous section with a further classification of EMU-firms into significantly positive, significantly negative, and insignificant ERB firms.

[Insert Table 5]

We find that if firms are exposed to exchange rate movements, their gains from the introduction of the euro are higher. For firms with significant currency exposure, the euro has induced an incremental 4.8 percent increase in Tobin's Q. The estimate for the overall effect of the euro turns out to be insignificant for the full EMU sample. As before, results are stronger for weak–EMU firms. In Column (3) in Table 4 we show that, while all firms in the weak-EMU area experience significant increases in Q of 6.9 percent, firms with significant currency exposure enjoy an additional 9.0 percent increase in value. Column (4) in Table 4 shows that this result is driven by firms with significantly negative exposure in weak-EMU countries, which have enjoyed a significant additional 15.2 percent increase in Q, relative to firms outside the euro–zone. Firms with significant and positive exposure do not receive any additional benefit from the euro. As a consequence of this asymmetric result it seems that there has been no revaluation risk that has been priced for the weak-EMU countries. Instead, a devaluation risk has commanded a high premium for those firms that were negatively exposed to currency depreciations. This is consistent with the view that perhaps the major benefit from the euro has been the added exchange rate and monetary policy credibility that the weak-EMU countries have gained by adopting the common currency.

To summarize—in the first part of the study we document a significant, sizeable effect of the euro

on firm value. Such an effect is stronger for (i) firms in countries that previously experienced currency depreciations, and (ii) firms with significant exposure to exchange rate movements, particularly those firms that were harmed by a depreciation of their own currency with respect to the euro.

IV Explanation of the Results

A Cost of Equity and Financial Constraints

In this section we take as given the positive valuation effects of the common currency and pose the question of where these valuation increases come from. From the previous analysis, we already know that part of the answer is lower interest rates. Apart from the interest rates, the euro can affect corporate valuations through two channels: it can have a further impact on the firms' cost of capital by lowering the risk premium investors demand – in another words, cost of equity –, or the euro can affect firms' expected cash flows. The potential effect of the euro on expected cash flows results from higher sales due to an increase in intra-European trade.

It is difficult to empirically disentangle these two effects of the common currency because mechanically a reduction in the cost of equity, or in the cost capital in general, increases a firm's investment opportunity set. This is so because the set of investment projects that have positive net present value increases. Therefore there is an indirect effect of cost of capital reductions on expected cash flows.

One way to separate the two hypotheses out is to distinguish between financially constrained firms and financially unconstrained firms. A reduction in cost of equity increases the present value of both existing cash flows and cash flows coming from new investments, keeping the size of the cash flows constant. Increase in the cash flows from existing assets and new investments has exactly the same effect keeping the cost of equity fixed. The difference, however, comes from the opportunity cost of financial slack, i.e. keeping extra cash on the balance sheet. Reduction in the cost of equity lowers the opportunity cost of financial slack,

while an increase in cash flows keeps the opportunity cost the same. Hence a reduction in the cost of equity must in principle have a stronger effect on those firms that have financial slack to fund their investments – financially unconstrained firms. An increase in the expected cash flows treats both the unconstrained and constrained firms equally. We formulate this intuition in a theoretical model which is described in detail in Appendix B. We formally show that a reduction in the cost of capital benefits firms, and the benefits are larger the less financially constrained firms are. However, the value increases induced by an increase in the value of cashflows are independent of financial constraints.

It is important to note that we only test the cost of equity hypothesis by examining the differences in valuation increases between financially unconstrained and constrained firms. This hypothesis will be rejected if we find that the valuation effect of the euro is independent of financial constraints. With this test it is not possible to reject the cash flow hypothesis. In order to be able to reject the cash flow hypothesis we would have to have a situation where some firms – either financially unconstrained or constrained – experienced an increase in valuations while some other firms did not show any increase at all.

In the next section, we empirically test such predictions. To that end, we first calculate indices of financial constraints following Kaplan and Zingales (1997). We then explore the effects of the euro on the value of firms depending on those measures.

B Empirical Analysis

In this section we provide evidence on the two explanations for value increases following the introduction of the euro. In a nutshell, this section shows that firm value increases are consistent with the view that the euro has reduced firms' cost of equity.

Decomposing increases in firm value into reductions in discount rates and increases in expected cash flow has been the objective of several asset–pricing papers. Campbell (1991) obtains a decomposition of returns into news about future cash flows, and news about discount rates. Campbell and Vuolteenaho

(2003) implement such a decomposition empirically using a VAR model. However, cash flow news are calculated as the difference between the estimated unexpected returns and news about the discount rate. Therefore the estimate of cash flow news includes all the estimation errors, and it is therefore hard to interpret.

We disentangle the effect of the euro on firm's cash flows and cost of equity by characterizing firms depending on how much financially constrained they are. In order to capture the potential effects of the euro on cost of equity, we have to control for the level of interest rates. We do this by including the short-term nominal interest rate and the term-spread as control variables, as in our previous regressions. In light of the theoretical model discussed above, if the euro has led to a reduction in firms' cost of equity, the valuation impact of the euro should be greater for those firms that were financially unconstrained prior to 1998. However, if expected cash flows have increased as a result of the euro, then the effect of the common currency should be the same across firms irrespective of financial constraints.

We compute a measure of financial constraints for all the firms in our sample using the methodology in Kaplan and Zingales (1997). They estimate an ordered logit regression using a sample of 49 manufacturing firms. One can construct a synthetic index of financial constraints using the coefficients in their estimation, as in Lamont et al. (2001), Rajan and Zingales (1998), and Baker et al. (2003), among others. Although this index ("KZ-index") was developed using US firms, it has been used by Rajan and Zingales (1998) for non-US firms as well. Furthermore, by using this measure, rather than constructing one ourselves, we avoid data mining concerns. We compute the KZ-index as in Baker et al. (2003), because Q is the left–hand–side variable in our estimations.[13] The index we compute is:

$$KZ_{it} = -1.002\frac{CF_{it}}{A_{it}} - 39.368\frac{DIV_{it}}{A_{it}} - 1.315\frac{C_{it}}{A_{it}} + 3.139\frac{D_{it}}{A_{it}} \tag{4}$$

where CF_{it}/A_{it} is cash flow over assets, DIV_{it}/A_{it} is cash dividends over assets, C_{it}/A_{it} is cash balances over assets, and D_{it}/A_{it} is the debt ratio. The debt ratio is calculated as the book value of nonequity

liabilities, divided by the book value of total assets (Datastream item #392). The book value of total nonequity liabilities is calculated by deducting total book value of equity (Datastream company account item #307) from the book value of total assets (Datastream item #392). Our measure of cash flow is EBITDA (Datastream item #1502). Dividends are calculated as the current annualized dividend rate (Datastream Item DPSC), times the number of shares outstanding. Cash is total cash and equivalents (Datastream item #375). A larger value of the index indicates a more financially constrained firm. We compute the index based on data from 1995. We use the current value of the assets, rather than the lagged variable, to limit the number of missing observations. Our sample still shrinks to 1,595 firms.

We next classify firms according to their within–country KZ-index quartiles, and estimate the Q regression (see Section III.C.2) by quartiles. Results are in Table 6.

[Insert Table 6]

Like with the regressions in the previous sections, firms from the strong-EMU countries do not show any statistically significant increases in firms' values after controlling for the interest rates. On the contrary, the evidence is very strong for the firms from the weak-EMU countries. All the four quartiles display positive valuation effects, when we do not control for the short-term interest rate and the term-spread. Firms in the lowest KZ-index quartile have an increase of 31.4 percent, while the increases are 12.0, 9.1 and 11.8 percents in the second, third and fourth quartiles, respectively (the increase for the first quartile firms is statistically different from other quartiles at the 1 percent level according to the Wald-test). This result already gives evidence that the least financially constrained firms have benefitted the most. In order to differentiate between the cost of equity and cost of debt effects, the interest rates need to be controlled for. When we do that, we observe that firms in the lowest KZ–index quartile experience a 20.6 percent increase in Tobin's Q after the introduction of the euro (significant at the 1 percent level). Firms in the second quartile show a 5.7 percent increase (significant at the 10 percent level), while firms in the third and fourth quartile do not experience any increases in Tobin's Q. The value increases shown by the least financially

constrained firms are statistically different from those of the remaining three quartiles (according to the Wald-test, the p-values are 0.016, 0.002 and 0.009, when we compare first quartile firms to the firms in the second, third and fourth quartiles, respectively). This is clear evidence that the valuation effect of the euro has been also caused by cost of equity reduction for the firms from the weak-EMU countries, in addition to the cost of debt effect. This result fits well with our results from the previous sections showing significant increases in Tobin's Q for the firms from the weak-EMU countries and for the firms that were exposed to currency risks. These firms are supposedly the firms that would have been expected to have had the highest cost of equity prior to the introduction of the euro, if currency risks were a major component of the overall cost of equity. A decrease in cost of equity through the elimination of currency risks would hence benefit these firms the most. A reduction in the cost of equity is also consistent with Hardouvelis et al (2002b), who show with earlier data that cost of equity has decreased significantly for the EMU countries, except for Germany. We are also able to reject the hypothesis that the increase in firms' values for the weak-EMU countries is caused by an increase in the expected cash flows, because the more financially constrained firms (the firms in the third and fourth quartiles) do not experience any increases in their valuations at all relative to the firms from the non-EMU countries. Had the expected cash flows increased, all the quartiles should have shown positive increases in Tobin's Q.

To confirm the robustness of our calculations, we also calculate measures of external financing (i.e. equity and debt issuance) by the firms in the sample, depending of financial constrains. If the KZ-index is the appropriate measure, then we should find that the most financially constrained firms from the EMU countries raise more external financing compared to the corresponding non-EMU firms, provided that the firms have experienced an increase in their valuations. We derive a measure of external financing by deducting the change in retained earnings from the change in total assets (following the method in Baker and Wurgler, 2002).[14] Our results—not reported—show that the most financially constrained firms from the weak-EMU countries raise more external financing compared to the corresponding non-EMU firms.

The increase in external financing is also larger (statistically different at the 1 percent level) compared to the least financially constrained firms, which do not show any increase compared to the non-EMU firms. Among the strong-EMU firms, the most financially constrained firms also raise more external financing compared to the corresponding firms from the non-EMU countries, but there is no difference compared to the least financially constrained firms.

V Long-run Returns

In this section we provide further evidence on the effects of the euro by performing an analysis of long-run stock returns for firms in our sample. Our abnormal returns are calculated using two different procedures. Lyon et al. (1999) propose the traditional buy-and-hold abnormal returns (BHAR) to measure long-run performance.[15] However, Mitchell and Stafford (2000) show that BHARs can be flawed because the abnormal return for event firms may not be independent. In this setting, Fama (1998) proposes a method of calculating calendar-time abnormal returns (CTAR), which consists of calculating abnormal returns each period for all of firms that had an event within the period of interest. Then the abnormal return for the calendar month is calculated by averaging abnormal returns across the stocks in the portfolio of event firms. Such a portfolio is re-formed every period. In this way CTARs capture the correlation of returns across event firms. Unlike BHARs, tests of significance for CTARs are based on the time-series variation of the cross-sectional averages of abnormal returns.

In order to compute BHARs, we first obtain monthly returns for all firms in our sample from Datastream. We additionally obtain monthly returns on the MSCI European index[16]. Our computation of abnormal returns is based on a three-factor model that includes market returns, as well as the book-to-market (HML) and size (SMB) factors computed using European data. The HML factor is obtained from Kenneth French's website.[17] The SMB factor is computed by sorting stocks into country-size deciles using the market capitalization in the previous December, and calculating the weighted average return of the two

extreme portfolios for the entire sample. We estimate the coefficients using monthly returns, and compute buy-and-hold abnormal returns for the period January 1996 - December 2000. Panel A in Table 7 shows annualized BHARs for seven different subperiods.

We compute CTAR following Fama (1998). Because our event date is common for all the event firms, we do not need to re-form our portfolio of event companies every month after 1998. Moreover, we can calculate CTARs also for the pre-euro period, just by averaging abnormal returns across stocks, calculated based on a three-factor benchmark. Panel B in Table 7 shows annualized CTARs for seven different subperiods.

[Insert Table 7]

We calculate abnormal returns around January 1998. Unlike the standard event study, joining the EMU is not an event that is announced at a certain, discernible date in each country. We therefore report CARs for a long window from January 1996 to December 2000. Section III.A argues that 1998, the mid–point in this period, is a reasonable choice as event date.

The BHAR calculation in Panel A of Table 7 confirms the different performance of EMU firms relative to non–EMU firms, both before and after 1998. While EMU firms do not experience significant abnormal returns in the period January 1996 - December 1997, non–EMU firms experience negative BHARs of -4.42 percent per year (significant at the 1 percent level). The difference in BHARs is significantly different from zero at the 1 percent level. However, between January 1998 and December 2000, EMU firms experience positive BHARs of 14.38 percent per year, on average. This is in contrast with the non–EMU firms, which do not display significant abnormal returns in the same period.

The differences in the period January 1998 - December 1998 are considerable as well. EMU firms experience positive BHARs of 13.24 percent (significant at the 1 percent level), while non–EMU firms experience negative BHARs of -14.20 percent (significant at the 1 percent level, their difference is also significant).

Within the EMU, strong–EMU firms experience larger price effects between January 1998 and December 2000 (14.53 percent versus 13.92 percent for weak–EMU firms, with the difference significant at the 1 percent level). However, the result is driven by post-January 1999 returns, since in the period January 1998 - December 1998, weak–EMU firms display a better abnormal performance than strong–EMU firms (a 2.08 percent difference in BHARs, significant at the 1 percent level). It is worth noting in the dramatic change in performance among the EMU firms during 1998. This is exactly what would be expected if there was a one-time permanent decline in cost of capital because of the euro.

As expected, our results using CTAR are qualitatively similar but weaker relative to BHARs (see Panel B of Table 7). We confirm that weak–EMU firms perform better than both strong–EMU firms and non–EMU firms prior to January 1998. In the period January 1998 - December 2000, CTARs are bigger: (i) for weak–EMU firms relative to both strong–EMU firms and non–EMU firms (both differences significant at the 1 percent level), and (ii) for strong–EMU firms relative to non–EMU firms (0.74 percent CTAR versus an insignificant 0.07 percent CTAR for non–EMU firms). Note that for the entire sample, non–EMU firms perform better than EMU firms (but not better than weak-EMU firms) in the period January 1998 - December 2000 (0.65 percent annual return versus 0.56 percent, with the difference significantly different from zero at the 1 percent level). The better performance for the non-EMU firms, however, is caused by the abnormal returns after January 1999. During the year 1998 firms from both the weak- and strong-EMU countries perform better than the non-EMU firms. Again this is what would be expected if the cost of capital declined during year 1998.

While the results of this subsection are weaker than in the previous sections, the methods applied obviously ignore a lot of the differences across firms within each group. The results in section III.C.2 are robust to such differences.

VI Additional Robustness Checks

To test the robustness of our findings, we first document that the positive effect of the euro is significant after controlling for the process of macroeconomic convergence and the concurrent increase in cross-border mergers. We then examine the sensitivity of the results to the choice of the event year. Next we consider the significance of country– and industry–specific effects in our results. We finally exclude Germany and the U.K. from the analysis.

A The Value of Macroeconomic Convergence

The results that we presented in the previous section could be due to the introduction of the common currency, but also to macroeconomic developments caused by the oncoming monetary union. In fact, most of the countries that adopted the euro in 1999 went through a severe period of macroeconomic convergence. The Maastricht Treaty of February 1992 established the time frame and procedures for implementing the monetary union, including the determination of fiscal criteria required for EU members to qualify for the third phase of the EMU. Our objective in this section is to determine the extent to which the valuation effects we have identified are driven by the euro itself, rather than by the convergence process that lowered interest rates, reduced budged deficits and government spending, and reduced inflation. Some of the changes the EMU countries implemented were actually dramatic: Belgium had a government deficit representing 8 percent of GDP in 1992. The deficit was 2 percent in 1998, and already in 2000 the budgetary position was completely balanced. Long–term interest rates went down in Spain from 14.7 percent in 1990 to 5.8 percent in 1997.

We therefore construct measures of macroeconomic convergence. Article 104c of the Maastricht Treaty assesses the degree of convergence achieved by the Member States by reference to the following criteria:[18]

1. Price stability: the average rate of inflation, observed over a period of one year before the examination, should not exceed by more than 1.5 percentage points that of, at most, the three best performing

Member States in terms of price stability.

2. Government financial position: the deficit should not exceed 3 percent of GDP, unless it has declined substantially and continuously, and reached a level that comes close to 3 percent. In addition, the public debt should not exceed 60 percent of GDP, unless it is sufficiently diminishing and approaching 60 percent at a satisfactory pace.

3. Observance of the (normal) fluctuation margins provided for by the Exchange Rate Mechanism of the European Monetary System (EMS), without severe tensions for at least two years.

4. Durability of convergence: the average of the long–term interest rate, observed over a period of one year before the examination, should not exceed by more than 2 percentage points that of, at most, the three best performing Member States in terms of price stability.

We gather data on inflation, government deficit over GDP, long–term interest rates, and public debt over GDP from the Economist Intelligence Unit (EIU) database. We ignore convergence criterion (3) because it is already considered in our classification of countries into weak and strong–EMU countries. We calculate convergence requirements for each of the macro variables, and calculate the position of each country, in each of the variables, during each of the years 1995 to 2000. If a country satisfies the corresponding convergence criterion, we assign a value of zero. Otherwise we compute the difference between the corresponding macroeconomic variable and the convergence requirements. The government budget convergence measure takes either zero or negative values. We calculate those for all the 15 countries in our sample, including the non–EMU countries. In fact Denmark fully satisfied the convergence requirements in 1997, but they opted out of the system. The UK also satisfied the convergence requirements, except that it was not member of the EMS. We call these indices the *Adjusted Convergence Variables*. We alternatively use the raw convergence variables in the regressions. Because we use the nominal long-term interest rate in these specifications, we do not include the short-term rate and the the term-spread as explanatory

variables, for obvious reasons.

We also take into account changes in taxation. Indeed, corporate tax rates have declined in Europe over the period 1995–2000 by an average 9.5 percent.[19] Interestingly, they have fallen more in EMU countries (an average of 11.38 percent) than in non–EMU countries (5.8 percent on average), with significant tax reductions in Ireland (where corporate tax rates have fallen from 36 percent in 1996 to 16 percent in 2000) and Italy (from 53.2 percent to 40.25). Thus, changes in corporate taxation could also be a potential explanation of our results. To control for this, we include the corporate tax rate for each country and year.[20]

[Insert Table 8]

In Table 8 we show that the valuation effect we identify is caused by the introduction of the common currency itself, and not by the convergence process. The coefficient of the overall euro dummy is insignificant. More importantly, we still find that the euro yields positive valuation effects for firms from the weak–EMU countries (13.9 percent increase, significant at the 1 percent level) . The coefficients for the convergence criteria dummies are insignificant. One methodological reason for this is that we estimate standard errors clustered by country. Therefore the explanatory power of country and year–specific variables is small. In any case, our results are consistent with Henry (2002), who shows with a sample including 21 emerging markets that there is no market response to lowering the inflation levels when the starting inflation rate is below 40 percent.

We also regress Tobin's Q on the values of the raw macroeconomic variables themselves, without adjusting for convergence. Once more, the effect of the euro on the weak–EMU firms is economically and statistically significant (an increase of 11.4 percent, significant at the 1 percent level). Finally, taxation does not help explain valuation effects, at least at the firm level. This may be an indication that firms have been able to avoid taxes to a large extent before and as a result the decrease in nominal corporate taxes does not reflect a corresponding decrease in taxes actually paid.

B The Effect of Cross-Border Mergers

An alternative explanation for the increase in Tobin's Q we document in the previous sections is an increase in the frequency of cross-border mergers. Firms in the EMU countries may have become very lucrative targets for other firms, since by acquiring firms within the EMU other firms coming from outside would gain better market access. If high premia are paid in cross-border mergers and if firms in the EMU countries are targets more often than other firms, firms in the EMU countries will on average display valuation increases relative to other firms.

In this section we attempt to identify the contribution of cross-border mergers to the positive valuation effect of the euro. In order to do this, we construct two measures of cross-border merger activity in the sample countries, using the data and methodology described in Bris and Cabolis (2003). The first measure is the ratio of the number of cross-border mergers of firms in a given country and year, divided by the total number of listed firms in such country. The second measure equals the euro value of all cross-border mergers of firms in a given country and year, divided by the country's stock market capitalization. Merger information is obtained from Securities Data Corporation and comprises a sample of acquirors from 49 countries. Information on the number of listed firms and stock market capitalization is from the IFC manuals.

[Insert Table 9]

In Table 9 we aggregate the cross-border merger ratios by region. We classify countries into EMU, other European countries (the five countries in our non-EMU sample), and the rest of the world. We aggregate within–country measures of cross-border merger activity and calculate, for example, the ratio of other European firms that are acquired by EMU firms. Table 9 shows that, while the frequency of cross-border mergers of firms in the three regions increases, the largest increase occurs in other European countries (116 percent increase from 1995 to 2000, versus a 9.57 percent increase in the EMU, and 74.5

percent in the rest of the world). Results are similar in euro terms.[21] Therefore, it does not seem that cross-border mergers of EMU targets by firms outside the Euroland have increased substantially after the introduction of the euro.

[Insert Table 10]

We analyze now the effect of cross-border mergers on Tobin's Q in a panel regression. We include in the estimation described in section III.C.2 the number of cross-border acquisitions of firms in a given country, divided by the total number of firms in that country. We prefer the number ratio rather than the value ratio because the latter is more affected by outliers. Results are in Table 10. The effect of cross-border acquisitions is insignificant, and the effect of the euro alone still remains the same: it is positive—but insignificant—for the overall sample, but positive and significant (representing an 8.6 percent increase, significant at the 1 percent level) for weak–EMU firms.

C Alternative Post-Euro Time Period and Individual Year Effects

Another important robustness check concerns the choice of the post-euro event time period. In Section III.A we argue and show that the uncertainty about what countries would adopt the Euro is not completely resolved until mid-1998. However, we also showed that for strong-EMU firms the markets seem to have strongly anticipated the adoption of the euro already during 1997. Thus, by choosing the end of 1998 as the first year of the post-euro time period instead of the end of 1997 our results may understate the real effects of the common currency, especially for strong-EMU countries. We test this by redefining the post-euro time period to 1997-2000, and rerunning models (2) and (4) in Panel A of Table 4 using this new definition. The results are displayed in models (1) and (2) in Table 11. The magnitude and significance of the effect for strong-EMU countries increases to 6.3 percent (significant at the 10 percent level). There is thus some weak evidence that the correct event year for firms from the strong-EMU countries is 1997. However, once we add the short-term interest rate and the term-spread as explanatory variables, the positive effect of

the euro disappears. Using 1997 as the event year further increases the magnitude of the euro-dummy for the weak-EMU countries. Thus, if anything, these results support our previous conclusions that it is mainly firms from the weak-EMU countries that have benefitted from the introduction of the euro, and also suggests that we may actually have understated this effect by choosing a conservative definition of the post-euro time period.

[Insert Table 11]

We further test the robustness of our results to the choice of post-euro time period by considering individual year effects. In particular, we regress the log of Tobin's Q on five dummy variables each for strong and weak countries. Each dummy variable takes the value 1 for firms in the EMU countries, and in years 1996, 1997, 1998, 1999, and 2000 respectively. Therefore, the coefficient of each of the dummy variables represents the impact of the euro on firm value, in each of the corresponding years.

We find evidence that for weak countries 1998 is the year when the effect of the common currency starts affecting corporate valuations. In 1998, the average firm in the weak–euro countries increases market value by 27.8 percent relative to non–EMU firms and strong–EMU firms (significant at the 1 percent level, in model [4]). Moreover, we can also conclude that there has been no reversal in Tobin's Qs, so that the increase seems to be permanent and not transitory for firms coming from weak EMU-countries. Note that the significant coefficients in 1998 and after do not reflect an incremental effect of the euro on those years. Indeed, pairwise tests for the difference in coefficients with respect to the 1998 coefficients fail to reject the null that all the effects of the common currency take place in 1998 and then stay the same.[22] For firms coming from the strong EMU countries, the effect of the common currency is only significant in 1998 (an 11.4 percent increase in Q, significant at the 1 percent level, in model [3]). Thus the increase in Tobin's Q is only temporary for the firms from the strong-EMU countries. This is consistent with the results from our main regressions, as well as the results of the event study in Section V.

D Country-and-Industry–Specific Effects

We are interested in determining whether the positive effect of the euro is driven by one particular country. We extend our Q-regressions by interacting the euro dummy with country–specific dummy variables. This method allows us to obtain different effects by country, while using the entire sample in the estimation. Results are reported in Table 12.

[Insert Table 12]

We find significant valuation effects for four out of five of the weak–EMU countries (the euro dummy is not significant in Ireland). This result is consistent with Table 3, and confirms that our results for the area are not driven by a particular country. Similarly, in the strong–EMU area, the effect of the euro is marginally significant in France (12.3 percent increase in Q, significant at the 10 percent level), and significant in Belgium (8.9 percent increase in Q, significant at the 1 percent level). As shown in Table 14, our results hold when we exclude Germany. Indeed the valuation effect of the euro is insignificant in Germany.

We also want to study in this section in what industries the effects of the common currency have been stronger. Hardouvelis et al. (2002b) study the impact of EMU on the equity cost of capital. They analyze data from 6 countries and 10 major industries in Europe, and find that globalization—integration of European markets during the nineties—has led to a reduction in the cost of equity in all industrial sectors, except for information technology and cyclical consumer goods, where there are no significant changes.

We follow the industrial classification into ten major groups from Datastream, similar to the classification in Hardouvelis et al. (2002b). Datastream industrial classifications are based on the sector definitions published by the FTSE Actuaries, and they are: basic industries, general industries, cyclical consumer goods, non-cyclical consumer goods, cyclical services, non-cyclical services, utilities, natural resources, and

information technology. We interact industry dummies with the euro post-1998 indicator.[23] Results are displayed in Table 13.

[Insert Table 13]

We find that all the industrial groups display positive coefficients, except non-cyclical services. The coefficients are significant at the 1 percent level in cyclical consumer goods (22.7 percent increase in Q), financial services (31.9 percent increase in Q), and natural resources (47.4 percent increase in Q).[24] These results are somewhat in contrast with Hardouvelis et al. (2002b). However, they consider a period from June 1991 to December 1998, and their focus is the integration of European markets rather than the introduction of the euro. Finally, what we identify in Table 12 are the *incremental* effects of the euro in EMU firms relative to similar firms in the same industry, in non–EMU countries.

E Excluding Germany and the U.K.

Table 3 shows that firms from Germany account for 45.1 percent of the observations from EMU countries. Similarly, U.K. firms represent 76.2 percent of the observations from non–EMU countries. Therefore one could conclude that our results do not reflect differences in valuation between the EMU and non-EMU countries, but between German and British firms instead.

In Table 14 we demonstrate that this is not the case. Although the sample size drops to only 3,774 firm-year observations, even when we exclude German and British firms from the Tobin's Q regressions, we still find a positive and significant effect of the euro on firm value. For the overall sample, Tobin's Q increases a 5.2 percent for EMU countries compared to non–EMU countries—however the increase is insignificant. We again find that the effect is more pronounced for the weak–EMU countries than in the strong–EMU countries (11.1 and 8.1 percent increases in two different specifications, significant at the 5 and 10 percent level).

[Insert Table 14]

VII Conclusion

Economic and Monetary Union and the adoption of a common currency for 12 countries within the European Union is a major social experiment that has also significant economic and financial implications. This article is a first attempt to study the effects of the euro on firm value using corporate-level data. We use data from ten countries that adopted the euro and exclude Greece and Luxembourg because of lack of data. We also use data from the three EU countries (Denmark, Sweden, and the U.K.) that did not join the EMU, as well as Norway and Switzerland. We show that valuations for firms from the EMU countries that had weak currencies prior to the euro have grown by 16.7 percent in the period 1998–2000 compared to the five non–EMU countries. Since we use a control sample of five non–EMU countries, we are able to reject the possibility that the business cycle and the high stock prices in the late 1990's are the reasons for increases in firm values. The strong results for the weak-EMU countries throughout the whole paper are consistent with the theoretical results of Alesina and Barro (2002), who show that currency unions should be most beneficial for countries that have suffered from high inflation rates. After we control for the level of short-term interest rates and the term spread, the increase in valuations decreases to 8.7 percent for firms from the weak-EMU countries. Thus roughly half of the increases in corporate valuations are accounted for by changes in the monetary policy. Lower real interest rates and improved monetary policy credibility are thus important ingredients in explaining the positive impacts that the euro has caused on corporate valuations.

We show that the increase in corporate valuations is even larger for firms from the weak-EMU countries, when the firms are financially unconstrained. We do not find any increase in corporate valuations for firms from the weak-EMU countries, when the firms are financial constrained. We argue in the paper that this effect is due to a reduction in the cost of equity, as opposed to increase in expected cash flows. Furthermore, we provide evidence that the effects of the euro have been bigger for firms from weak-EMU countries that were exposed to currency risks before the adoption of the common currency, especially firms that were

harmed by the depreciation of their domestic currencies. Thus it seems that ruling out the periodic currency devaluations that the weak-EMU countries experienced when they had independent currencies is a major factor in explaining the positive valuation effects. All of this evidence points to a conclusion that the cost of equity has decreased significantly for the weak-EMU countries and the denying individual countries the possibility to devalue their currencies is a major factor behind the cost of equity reduction. This conclusion is at odds with the view that currency risks are not that important. Maybe part of the reason that most studies find exposures to currency fluctuations to be of secondary importance is that currency risks are indeed economically insignificant most of the time, but become very important when there are dramatic changes in exchange rates – typically large currency devaluations. This view is very consistent with our strong results for firms from the weak-EMU countries.

Our paper documents a positive market reaction to the common currency. An interesting question is whether such a valuation effect has translated into more real effects. For instance, the Tobin's Q theory of investment predicts that increases in Q should be accompanied by increases in firm investment. This argument also raises the question of how these investments have been financed, that is, whether the reduction in firm's cost of capital has induced a preference for either debt or equity. In our current research, we provide preliminary results documenting a significant increase in investments in the euro zone in the period 1998-2000. These investments have been financed mostly with debt.[25]

We have documented significant increases in corporate valuations due to the introduction of the euro. Do these results imply that all European countries should join the EMU? It might be tempting to say yes, but as in economics in general, the right answer should be that it depends. We have shown in this paper that the prior strength or weakness of a country's currency is decisive. If a candidate country's currency has experienced regular devaluations, then the answer should be yes. If the candidate country's currency has been stable, there seems to be very small benefits in joining the common currency.

A Appendix: Calculation of Forward Rate Differentials

Following Hardouvelis et al. (2002a), we calculate monthly forward rate differentials from swap rates between fixed and floating rate government bonds. We calculate 8-year forward rates in 2 years, and then calculate spreads for each country with respect to Germany, as $s_{it} = \ln(1 + f^8_{i,2,t}) - \ln(1 + f^8_{GE,2,t})$, where s_{it} is the forward rate spread for country i in month t, and $f^8_{i,2,t}$ and $f^8_{GE,2,t}$ are respectively the 8-year forward rates in 2 years for country i and Germany (in Hardouvelis et al. (2002a) spreads are calculated as $f^8_{i,2,t} - f^8_{GE,2,t}$; we do not find any difference in the results using either approach). As in Hardouvelis et al. (2002a), we use the spread between the German forward rate and the ECU forward rate as a measure of the German spread. Moreover, we adjust for market conventions on national swap markets. In all countries in the sample coupons are paid annually, except for Ireland and the UK, where they are paid semiannually. We annualize interest rates in both countries. We additionally convert swap yields to a 360 days in Belgium, Ireland, and the UK, where the convention is 365 day-years. Swap data is from Datastream.

B Appendix: Exchange Rate Exposure Calculation

We characterize firms by their responses to exchange rate movements. To that end, we calculate exchange rate betas for the firms in our sample. In this section we describe the procedure.

A commonly used method of calculating a firm's exposure to currency risk is to estimate the following regression:

$$R_{ijt} = \alpha_i + \varpi_i R^j_{mt} + \beta^x_i R^j_{xt} + + u_{ijt}, \tag{5}$$

where R_{ij} is the stock return of firm i in country j, $R^j_m$is the monthly return on the domestic market portfolio in country j, R^j_x is the monthly change in the exchange rate in country j, and the β^x_i's are then measures of currency exposure. Such an approach is used by Jorion (1990), Bodnar and Gentry (1993), and

Amihud (1994). Jorion (1991) uses a version of this two–factor model, in which the return of the market portfolio is the first factor and the component of innovations in the exchange rate that is orthogonal to the market return is the second factor. However the procedure affects only the estimates of the market beta, not the exchange rate exposures. Therefore, we follow the simple method of Jorion (1990). We estimate the model in (5) using monthly data from January 1992 through December 1994.[26] We purposely choose an estimation period that is before our sample period, in order to avoid potential endogeneity problems.

We calculate exchange rate betas (ERBs) with respect to the euro. Although the euro existed only after January 1, 1999, Datastream computes a synthetic euro rate based on the weights each currency has in the real euro. The exchange rates are expressed as units of domestic currency per euro. Because some firms lack stock return data before 1995, the ERB sample is smaller than our original sample.

[Insert Table B1]

C Appendix: Theoretical Model

This is a one–period model. At $t = 0$, we assume a firm with assets in place with book value A_o, debt outstanding with face value D, payable at $t = 1$, and internal funds in amount F. We summarize the firm's investment projects in the following way. The firm can invest I at time $t = 0$, and get a return $(1 + \rho)I$, where ρ is the profitability of the project. The value of the firm's assets in place at $t = 1$ is uncertain, and can take the value A_h with probability α, and A_l with probability $1 - \alpha$, where $A_h > D > A_l = 0$. Therefore, corporate debt is risky. Moreover, we set $\alpha A_h = (1+\rho)A_o$, so that ρ measures the profitability of existing assets, as well as the profitability of the firm's new investment projects. We make this assumption without loss of generality.

We consider two types of firms. Unconstrained firms have internal funds F^u such that $F^u > I$, so that they can finance their projects internally. Constrained firms need external financing—we assume they can only finance investments with equity—because for constrained firms $F^c < I$. Investors in both firms

require a return r, where r is therefore the firm's cost of equity. We further assume that new projects are small enough so they cannot make the firm's debt riskless. Moreover, debt is risky even if internal funds are used to finance investments. Formally, both conditions require $(1+\rho)I + F^u - I < D$. Note that this implies that, if the firm has excess internal funds at $t = 0$, it is optimal for shareholders that the firm distributes the excess funds as a dividend in period 1. Because the dividend at $t = 0$ represents an expropriation of bondholders, we assume that bond covenants prevent the firm from paying out any excess cash at $t = 0$. Those funds are invested in marketable securities that yield a risk–free return that we assume for simplicity to be equal to zero.

C.1 Unconstrained firm

Let V_e^u denote the unconstrained firm's equity value. The firm finances the project with internal funds and carries the excess cash $F - I$ forward to $t = 1$. Because debt is risky, V_e^u equals:

$$E[V_e^u] = \frac{\alpha\left[A_h + (1+\rho)I + F^u - I - D\right]}{1+r} \tag{6}$$

$$= \frac{\alpha\left[A_h + \rho I + F^u - D\right]}{1+r} \tag{7}$$

which is essentially the market value of the firm at $t = 0$.

Similarly, the market value of the debt at time $t = 0$ will be $\frac{\alpha D + (1-\alpha)[A_l + \rho I + F^u]}{1+r}$

Therefore, and because the value of the firm's assets once investment is undertaken is $A_o + I + (F^u - I) = A_o + F^u$ (assets + investment + excess cash), the firm's Q will be:

$$\begin{aligned} Q^u &= \frac{\alpha\left[A_h + \rho I + F^u - D\right]}{(1+r)(A_o + F^u)} + \frac{\alpha D + (1-\alpha)\left[A_l + \rho I + F^u\right]}{(1+r)(A_o + F^u)} \\ &= \frac{\alpha A_h + (1-\alpha)A_l + \rho I + F^u}{(1+r)(A_o + F^u)} \\ &= \frac{(1+\rho)A_o + \rho I + F^u}{(1+r)(A_o + F^u)} \end{aligned} \tag{8}$$

C.2 Constrained firm

Let V_e^c denote the constrained firm's equity value. Because $F^c < I$, the constrained firm needs to raise $I - F^c$ in the equity markets. Therefore the firm's current shareholders must promise the new shareholders a fraction θ of the firm such that, at $t = 1$

$$\frac{\theta V_e^c}{1+r} = I - F^c \tag{9}$$

where

$$V_e^c = \alpha \left[A_h + (1+\rho)I - D\right] \tag{10}$$

Therefore, it must be that $\theta = \frac{(I-F^c)(1+r)}{\alpha[A_h+(1+\rho)I-D]}$, and the expected value of the firm's equity to the current shareholders is:

$$\begin{aligned} E[V_e^c] &= \left[1 - \frac{(I-F^c)(1+r)}{\alpha\left[A_h + (1+\rho)I - D\right]}\right] \frac{\alpha\left[A_h + (1+\rho)I - D\right]}{1+r} \\ &= \frac{\alpha\left[A_h + (1+\rho)I - D\right]}{1+r} - \left[I - F^c\right] \end{aligned}$$

In a similar fashion, the market value of the debt for the constrained firm will be $\frac{\alpha D + (1-\alpha)[A_l + (1+\rho)I]}{1+r}$.

Finally the Tobin's Q for the constrained firm will be:

$$\begin{aligned} Q^c &= \frac{\alpha\left[A_h + (1+\rho)I - D\right]}{(1+r)(A_o + F^c)} - \frac{I - F^c}{A_o + F^c} + \frac{\alpha D + (1-\alpha)\left[A_l + (1+\rho)I\right]}{(1+r)(A_o + F^c)} \\ &= \frac{(1+\rho)(A_o + I)}{(1+r)(A_o + F^c)} - \frac{I - F^c}{A_o + F^c} \end{aligned}$$

because the value of the firm's assets that belong to the current shareholders is $A_o + F^c$.

Therefore, Q^c relates to Q^u in the following way:

$$Q^c = Q^u \frac{A_o + F^u}{A_o + F^c} - \frac{I - F^c}{A_o + F^c} - \frac{F^u - I}{(1+r)(A_o + F^c)} \tag{11}$$

Note that $\frac{A_o+F^u}{A_o+F^c} > 1$ and $F^u - I > 0$.

C.3 Results

It is straightforward to show, from equation (8), that Q is decreasing in the cost of capital r, and increasing in the profitability of investments ρ.

The most important result is shown in the next proposition:

Proposition 1. *Controlling for firm size, a change in the firm´s cost of capital changes the Q of the unconstrained firm more than the Q of the constrained firm. That is:*

$$(A_o + F^c)\frac{\partial Q^c}{\partial r} > (A_o + F^u)\frac{\partial Q^u}{\partial r}$$

Moreover, controlling for firm size, a change in cash flows affects equally both the constrained and the unconstrained firm, i.e. $(A_o + F^c)\frac{\partial Q^c}{\partial \rho} = (A_o + F^u)\frac{\partial Q^u}{\partial \rho}$

Proof. The first result follows from (11), because:

$$\frac{\partial Q^c}{\partial r} = \frac{\partial Q^u}{\partial r}\frac{A_o + F^u}{A_o + F^c} + \frac{F^u - I}{(1+r)^2(A_o + F^c)}$$

With respect to the second result, from (11):

$$\frac{\partial Q^c}{\partial \rho} = \frac{\partial Q^u}{\partial \rho}\frac{A_o + F^u}{A_o + F^c} > \frac{\partial Q^u}{\partial \rho}$$

■

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Notes

1. Throughout this paper, when we refer to the EMU countries, we mean the countries that have entered phase III of the EMU, i.e. adopted the euro as their currency. So for example Sweden, which has entered phases I and II of the EMU, but has not adopted the euro as its currency, is not classified as an EMU country.

2. For home equity bias, see French and Poterba (1991), Cooper and Kaplanis (1994), and Tesar and Werner (1995). Lewis (1999) provides an extensive recent survey of the literature.

3. Greece is excluded due to lack of data and because it adopted the euro as its currency in January 1, 20001, two years after the other countries. Luxembourg is excluded only because of lack of data.

4. The variables are : Tobin's Q, the book value of total assets, the book value of fixed tangible assets, the book value of non-equity liabilities, and earnings before interest, taxes, depreciation, and amortization (EBITDA).

5. As a comparison, 4,108 firms from the sample countries have data available on the required variables for at least one year during the sample period.

6. In the autumn of 1992 a wave of speculative attacks hit the European exchange rate mechanism (ERM) and its periphery. Before the end of the year, five countries (Finland, Italy, Norway, Sweden, and the U.K.) had floated their currencies. Despite attempts by a number of countries to remain in the ERM with the assistance of devaluations (Ireland, Portugal, and Spain), the system was unsalvageable.

7. Some countries, like Switzerland and the Netherlands, consistently display negative spreads.

8. We obtain the average spread by adding the intercept in the regression to the coefficients for the years 1996, 1997, and 1998.

9. These methods are: parametric methods, block bootstrap, within-firm time series aggregation of the data, estimation of an empirical variance-covariance matrix, and the use of an arbitrary variance-covariance matrix.

10. Because there are only two periods per firm, we only have one common time dummy.

11. Fama (1990) and Mishkin (1990), among others, show that the term spread predicts future real interest rates. Estrella and Hardouvelis (1991) and Jorion and Mishkin (1991), for instance, show that the term spread predicts future real activity.

12. According to Jensen (1986), Hart and Moore (1995), Zwiebel (1996), and Stulz (1990), high leverage limits managerial discretion by committing cashflows to the repayment of creditors. Ross (1977) predicts a positive relationship between firm value and leverage because debt is a costly signal of good firm's prospects. Myers and Majluf (1984) also find a positive

effect of debt financing because it avoids the issuance of undervalued equity, in the presence of information asymmetries. In Jensen (1986), debt increases firm value because it reduces the costs of free cash flow. Therefore there is a positive relationship between leverage and firm value. Similar result is obtained by Harris and Raviv (1990) and Hirshleifer and Thakor (1989). However, Myers (1977) demonstrates that too much debt induces managers to forego positive NPV projects. For a complete survey of the literature, see Harris and Raviv (1991).

Empirically, McConnell and Servaes (1990, 1995) show a significantly positive relationship between leverage and Tobin's Q. Masulis (1983) reports a positive and significant announcement effect of debt–for–equity exchanges. Harvey et al. (2003) find that the value created by debt is concentrated in firms with few growth opportunities. A positive relationship between firm value and leverage is found by Cornett and Travlos (1989). On the other hand, Mikkelson and Partch (1986) report negative returns to announcements of a debt issue.

13. We have also run the regressions with the five–variable version of the index. Because of the way the index is constructed—Tobin's Q has a positive effect on the KZ index—the results are even stronger. We have opted for the more conservative approach.

14. The data used to estimate external financing is from Datastream. The book value of total assets is Datastream item # 392. Changes in retained earnings are measured as profits after tax, minority interest, dividends, extraordinary items, director bonuses and allocations to untaxed reserves (Datastream item #196). The results are available from the authors upon request.

15. In contrast, cumulative abnormal returns lead to incorrect inferences (Barber and Lyon, 1997).

16. The MSCI European index we use in the regressions includes the U.K. We have also estimated abnormal returns using the MSCI World index, with no significant change in the results. We therefore report results using the European index only. This index includes the most liquid and largest securities in Europe. Therefore, and because our average abnormal returns are unweighted, sometimes we find positive (negative) abnormal returns for all firms in the sample. This would not happen if we used an equally-weighted index comprising all firms in Europe.

17. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#International

18. The text of the Treaty is available at http://europa.eu.int/en/record/mt/top.html

19. Data on corporate tax rates in Europe are from KPMG Corporate Tax Rate Survey, 1995–2001.

20. It should be noted that the resulting within-country change in tax rates does not take into account potential concurrent changes in tax deferrals and tax credits. Thus, our measure does not necessarily capture changes in the effective corporate

tax rates. Furthermore, some countries like Germany, have a split–rate system that taxes differently earnings that are retained and earnings that are paid out. In such cases we use the highest tax-rate.

21. In 1999, 4.38% of the EMU market capitalization was acquired by European, non-EMU acquirors. This is caused by the acquisition of German Mannesmann AG by U.K. Vodafone AirTouch PLC in November 1999. The value of this acquisition was $202 billion.

22. When we include the interest rate variables as control variables, the p-value for the difference between the coefficients for 1998 and 1999 is 0.0215. Hence the euro-effect is significantly lower for 1999. However, the p-value for the difference between the coefficients for 1998 and 2000 is 0.2078.

23. We use industry dummies for all firms in the sample, and interact the corresponding industry dummy with the post-euro time dummy for the subsample of EMU firms. Therefore we identify the incremental effect of the euro on EMU firms, relative to similar firms in the same industry, in non-EMU countries. However this forces us to drop the year dummies for identification purposes.

24. Cyclical consumer goods include: Automobiles and Parts, and Household Goods and Textiles.

25. In a previous version of this paper, we show that the euro has had a positive effect on investments for firms in the euro–zone. This effect is stronger for firms that come from EMU countries that used to suffer from currency crises, and for large firms. We identify an incremental increase in investments in the Euroland of 3.3% per year with respect to non–euro countries, after 1997. The estimate is significant at the 1% level. Such an increase is larger for (i) larger firms (4.2% increase for larger firms versus 2.2% increase in smaller firms), and (ii) firms in weak EMU countries (5.1% increase versus 3.0% increase in the strong EMU area). Moreover, the increase in investments have mainly been financed with debt, but firms that would have benefitted from currency depreciations have also issued more equity. This version of the paper is available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=321260

26. If there are fewer than 18 observations available per firm, we exclude it from the estimation.

Table 1. Sample characteristics

The sample covers the time period 1995-2000 and includes all firms from the euro-countries (except Luxembourg and Greece) and five non-euro countries (Denmark, Norway, Sweden, Switzerland, and UK) with valid data available in Datastream for at least the time period 1995-1998. The total number of firm-year observations is 9,742 (4,629 observations from euro countries and 5,113 observations from non-euro countries).

Panel A: All firms

Variable	Mean	Median	St. Dev.	Min.	Max.
Tobin's Q	1.659	1.268	1.346	0.277	18.121
Sales (in millions of euro)	2,004	305.4	6,523	0.024	91,200
EBITDA/ total assets	0.135	0.134	0.108	-0.810	0.898
Fixed tangible assets / total assets	0.349	0.316	0.210	0.000	0.999
Non-equity liabilities / total assets	0.598	0.610	0.177	0.009	1.000

Panel B: Euro firms

Variable	Mean	Median	St. Dev.	Min.	Max.
Tobin's Q	1.539	1.220	1.151	0.348	16.814
Sales (in millions of Euro)	2,804	456.8	8,120	0.036	91,200
EBITDA/ total assets	0.139	0.133	0.099	-0.597	0.898
Fixed tangible assets / total assets	0.336	0.312	0.194	0.000	0.999
Non-equity liabilities / total assets	0.649	0.665	0.171	0.020	1.000

Panel C: Non-euro firms

Variable	Mean	Median	St. Dev.	Min.	Max.
Tobin's Q	1.768	1.321	1.492	0.277	18.121
Sales (in millions of Euro)	1,279	205.9	4,503	0.024	83,400
EBITDA/ total assets	0.130	0.135	0.116	-0.810	0.751
Fixed tangible assets / total assets	0.360	0.321	0.223	0.000	0.982
Non-equity liabilities / total assets	0.552	0.559	0.169	0.009	0.998

Panel D: Test of difference between euro and non-euro firms

	T-test of change in means		Wilcoxon-test of medians	
Variable	Statistic	p-value	Statistic	p-value
Tobin's Q	8.53	0.000	7.54	0.000
Sales (in millions of Euro)	11.30	0.000	18.37	0.000
EBITDA/ total assets	4.07	0.000	0.653	0.514
Fixed tangible assets / total assets	28.29	0.000	28.70	0.000
Non-equity liabilities / total assets	5.67	0.000	3.70	0.000

Table 2: Convergence of forward rates

We calculate monthly forward rate differentials from swap rates between fixed and floating rate government bonds. We calculate 8-year forward rates in 2 years, and then calculate spreads for each country with respect to Germany, as $s_{it}=\ln(1+f^{8}_{i,2,t})- \ln(1+f^{8}_{GE,2,t})$, where s_{it} is the forward rate spread for country i in month t, and $f^{8}_{i,2,t}$ and $f^{8}_{GE,2,t}$ are respectively the 8-year forward rates in 2 years for country i and Germany. We use the spread between the German forward rate and the ECU forward rate as a measure of the German spread. Swap data is from Datastream. As in Hardouvelis (2002a), we adjust for market conventions on national swap markets. In all countries in the sample coupons are paid annually, except for Ireland and the UK, where they are paid semiannually. We annualize interest rates in both countries. We additionally convert swap yields to a 360 days in Belgium, Ireland, and the UK, where the convention is 365 day-years. We then regress the resulting forward rate differentials on time dummies. We construct time dummies as follows, for each year T, T=1996...2000, the variable $I_T=1$ for $t \geq T$, where t is the date--month and year--of the corresponding observation, zero otherwise.

	Total Sample		**No EMU countries**		**Weak EMU countries**		**Strong EMU countries**	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Intercept	0.0101 ***	13.86	0.0913 ***	22.21	0.1459 ***	28.91	0.0160 ***	13.48
1996 and After	-0.0052 ***	-6.73	-0.0187 ***	-3.81	-0.0652 ***	-9.53	-0.0084 ***	-6.15
1997 and After	-0.0026 ***	-7.06	-0.0133 ***	-3.11	-0.0549 ***	-10.82	-0.0031 ***	-3.51
1998 and After	-0.0008 **	-2.38	-0.0056	-1.27	-0.0231 ***	-9.58	-0.0044 ***	-5.29
1999 and After	-0.0002	-0.64	0.0048	1.20	-0.0018	-1.00	0.0013 **	2.02
2000	-0.0003	-1.08	-0.0148 ***	-4.41	-0.0004	-0.22	0.0001	0.26
Country - Fixed Effects	YES		YES		YES		YES	
Adjusted R2	0.559		0.704		0.871		0.633	
Number of Observations	1,016		343		336		337	

Table 3. Median Tobin's Q 1995-2000

The table displays median Tobin's Q over the time-period 1995-2000 for all firms from the EMU-countries (except Luxembourg and Greece) and five Non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. The Tobin's Q is defined as the sum of the market value of common equity and the book value of total non-equity liabilities divided by the book value of total assets. The Wilcoxon rank-sum test in Panel A tests if the median Tobin's Q for EMU-countries is equal to the median Tobin's Q for Non-EMU countries for each year. All data is collected from DataStream

Panel A: EMU vs. Non-EMU countries

	Median Tobin's Q					
	1995	1996	1997	1998	1999	2000
EMU-countries	1.16	1.19	1.28	1.25	1.22	1.21
Number of firms	794	794	794	794	760	693
Non-EMU-countries	1.41	1.43	1.39	1.20	1.29	1.22
Number of firms	919	919	919	919	791	646
Wilcoxon rank-sum test	7.83	7.70	3.72	2.67	1.20	0.02
(p-value)	(<0.001)	(<0.001)	(<0.001)	(0.008)	(0.229)	(0.984)

Panel B: Individual countries

	Median Tobin's Q					
	1995	1996	1997	1998	1999	2000
EMU-countries:						
Germany	1.27	1.22	1.29	1.28	1.25	1.24
Number of firms	368	368	368	368	346	300
Belgium	1.18	1.34	1.40	1.42	1.45	1.25
Number of firms	27	27	27	27	27	26
Spain:	1.20	1.18	1.36	1.56	1.44	1.33
Number of firms	31	31	31	31	31	31
Finland:	0.94	1.02	1.16	1.03	1.09	1.06
Number of firms	44	44	44	44	44	44
France:	1.11	1.18	1.22	1.24	1.22	1.19
Number of firms	139	139	139	139	132	129
Ireland:	1.52	1.89	1.66	1.45	1.54	1.54
Number of firms	6	6	6	6	6	6
Italy:	0.98	0.96	1.09	1.15	1.15	1.18
Number of firms	37	37	37	37	37	36
Netherlands:	1.40	1.60	1.93	1.49	1.37	1.42
Number of firms	62	62	62	62	62	56
Austria:	1.08	1.14	1.12	1.13	1.08	1.03
Number of firms	40	40	40	40	39	39
Portugal:	1.00	1.01	1.11	1.09	0.99	1.05
Number of firms	40	40	40	40	36	26
Non-EMU-countries:						
Denmark:	1.16	1.43	1.38	1.09	1.14	1.15
Number of firms	35	35	35	35	35	34
Norway:	1.22	1.27	1.51	1.11	1.08	1.12
Number of firms	45	45	45	45	45	44
Sweden:	1.14	1.18	1.38	1.32	1.20	1.23
Number of firms	75	75	75	75	74	63
Switzerland	1.00	1.02	1.09	1.14	1.16	1.24
Number of firms	58	58	58	58	58	58
UK	1.51	1.52	1.42	1.24	1.37	1.24
Number of firms	706	706	706	706	579	447

Table 4. The introduction of the euro and firm value

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five Non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in DataStream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as the years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. Panel A reports the regression estimates using all individual years in the panel. T-statistics based on robust standard errors adjusted for firm dependence within countries are reported within parentheses Panel B reports the estimation results from a regression model where the panel is reduced to two-periods by averaging the data before and after the introduction of the euro. T-statistics based on heteroskedasticity-robust standard errors are reported within parentheses *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Panel A: Full panel regression

Explanatory Variable:	(1)	(2)	(3)	(4)
EMU-country x post-euro time period	0.077*		0.048	
	(1.72)		(1.38)	
Strong EMU-country x post-euro time period		0.046		0.037
		(1.14)		(1.03)
Weak EMU-country x post-euro time period		0.167***		0.087***
		(3.77)		(2.57)
Domestic short-term nominal interest rate (%)			-0.012	-0.009
			(-0.98)	(-0.72)
Domestic term spread (%)			0.047***	0.047***
			(2.86)	(2.98)
Log of sales (in thousands of euro)	-0.103***	-0.105***	-0.102***	-0.102***
	(-3.47)	(-3.62)	(-3.86)	(-3.88)
EBITDA/ total assets	0.725***	0.724***	0.730***	0.730***
	(9.91)	(9.82)	(9.89)	(9.88)
Fixed tangible assets / total assets	-0.087	-0.085	-0.086	-0.085
	(-1.17)	(-1.17)	(-1.21)	(-1.21)
Non-equity liabilities / total assets	0.403***	0.404***	0.404***	0.405***
	(3.72)	(3.77)	(3.91)	(3.92)
Real GDP growth (%)	0.035**	0.041**	0.032**	0.035**
	(2.06)	(2.38)	(2.52)	(2.45)
Relative change in the domestic currency/USD-exchange rate	0.082	0.082	-0.217*	-0.195
	(0.61)	(0.61)	(-1.74)	(-1.50)
Year dummies	Yes	Yes	Yes	Yes
Fixed firm effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.759	0.760	0.763	0.764
Number of firm-year (-period) observations	9,742	9,742	9,742	9,742

Panel B: Two-period regression

Explanatory Variable:	(1)	(2)	(3)	(4)
EMU-country x post-euro time period	0.049**		0.040**	
	(2.47)		(1.99)	
Strong EMU-country x post-euro time period		0.003		0.017
		(0.13)		(0.77)
Weak EMU-country x post-euro time period		0.142***		0.109***
		(6.11)		(3.53)
Domestic short-term nominal interest rate (%)			0.023***	0.024***
			(2.70)	(2.71)
Domestic term spread (%)			0.127***	0.088***
			(5.76)	(3.22)
Log of sales (in thousands of euro)	-0.089***	-0.093***	-0.089***	-0.090**
	(-4.41)	(-4.56)	(-4.35)	(-4.40)
EBITDA/ total assets	1.119***	1.119***	1.115***	1.115***
	(7.67)	(7.71)	(7.60)	(7.64)
Fixed tangible assets / total assets	-0.303**	-0.296**	-0.297**	-0.297**
	(-2.22)	(-2.20)	(-2.21)	(-2.20)
Non-equity liabilities / total assets	0.485***	0.489***	0.482***	0.487***
	(4.97)	(5.02)	(4.94)	(4.99)
Real GDP growth (%)	0.062***	0.074***	0.018	0.041***
	(6.04)	(7.10)	(1.40)	(2.66)
Relative change in the domestic currency/USD-exchange rate	0.109	-0.038	-0.393	-0.231
	(0.33)	(-0.12)	(-1.17)	(-0.69)
Dummy for post-euro time period	-0.092***	-0.083***	0.130***	0.068
	(-4.74)	(-4.31)	(3.24)	(1.45)
Fixed firm effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.801	0.804	0.804	0.804
Number of firm-year (-period) observations	3,426	3,426	3,426	3,426

Table 5. The introduction of the euro, exchange rate exposure, and firm value

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five Non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. The euro exchange rate exposure is measured as the exchange rate beta from a two-factor model of stock returns in which changes in the (synthetic) euro exchange rate and the domestic stock market return are the two factors. The estimations of exchange rate betas are performed using monthly data over the time period January 1992 to December 1994. A firm is classified as having significant positive or negative euro exchange rate exposure if the exchange rate beta is significant at the 5%-level according to a one-sided t-test. Control variables (short-term nominal interest rate, term spread, log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) and time dummies are included but not reported. T-statistics based on robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Explanatory Variable:	(1)	(2)	(3)	(4)
EMU-country x post-euro time period	0.043	0.043		
	(1.26)	(1.26)		
EMU-country x post-euro time period x significant euro exposure	0.048**			
	(2.16)			
EMU-country x post-euro time period x significant positive euro exposure		0.022		
		(1.50)		
EMU-country x post-euro time period x significant negative euro exposure		0.081		
		(1.55)		
Strong EMU-country x post-euro time period			0.036	0.036
			(1.01)	(1.01)
Strong EMU-country x post-euro time period x significant euro exposure			0.033	
			(1.52)	
Strong EMU-country x post-euro time period x significant positive euro exposure				0.028*
				(1.93)
Strong EMU-country x post-euro time period x significant negative euro exposure				0.042
				(0.79)
Weak EMU-country x post-euro time period			0.069**	0.070**
			(1.99)	(1.99)
Weak EMU-country x post-euro time period x significant euro exposure			0.090***	
			(2.80)	
Weak EMU-country x post-euro time period x significant positive euro exposure				0.007
				(0.19)
Weak EMU-country x post-euro time period x significant negative euro exposure				0.152**
				(2.34)
Control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Fixed firm effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.771	0.772	0.772	0.772
Number of firm-year observations	8,787	8,787	8,787	8,787

Table 6. The introduction of the euro and firm value: Financially constrained vs. unconstrained firms

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five Non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The The post-euro time period is defined as years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. To classify firms according to financial constraints, we calculate an index of financial constraints based on Kaplan and Zingales (1997). In particular, we follow Baker et al (2003) and use the following four-variable formula to compute a KZ-index of financial constraints: KZ_{it}=-1.002 CF_{it}/A_{it} -39.368 DIV_{it}/A_{it} -1.315 C_{it}/A_{it} + 3.139 D_{it}/A_i , where CF_{it}/A_{it} is cash flow over assets, DIV_{it}/A_{it} is cash dividends over assets, C_{it}/A_{it} is cash balances over assets ,and D_{it}/A_{it} is the debt ratio. A higher KZ-index indicates a more financially constrained firm. Control variables (log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) and time dummies are included but not reported. T-statistics based on robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	KZ-index 1st quartile (unconstrained)		KZ-index 2nd quartile		KZ-index 3rd quartile		KZ-index 4th quartile (constrained)	
Explanatory Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Strong EMU-country x post-euro time period	0.073*	0.059	0.072	0.062	0.007	-0.000	0.041	0.033
	(1.65)	(1.42)	(1.21)	(1.13)	(0.17)	(-0.01)	(1.50)	(1.48)
Weak EMU-country x post euro time period	0.314***	0.206***	0.120**	0.057*	0.091*	0.019	0.118**	0.041
	(5.20)	(2.88)	(2.41)	(1.86)	(1.85)	(0.51)	(0.014)	(1.05)
Domestic short-term nominal interest rate (%)		-0.019		0.002		-0.008		-0.006
		(-1.41)		(0.11)		(-0.46)		8-0.68)
Domestic term spread (%)		0.049**		0.057**		0.043*		0.052***
		(2.23)		(2.15)		(1.78)		(4.54)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed firm effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.782	0.786	0.779	0.781	0.732	0.736	0.707	0.708
Number of firm-year observations	2,391	2,391	2,229	2,229	2,203	2,203	2,242	2,242

Table 7. Buy-and-hold and calendar-time annualized abnormal returns

Annualized Abnormal returns in the period January 1996, December 2000. Monthly returns for all firms in our sample are from Datastream. We additionally obtain monthly returns on the MSCI European index. In Panel A, we compute abnormal returns based on a three-factor model that includes market returns, as well as the HML and SMB factors computed using European data. The HML factor is obtained from Kenneth French's website. The SMB factor is computing by sorting stocks into country-size deciles using the market capitalization in the previous December, and calculating the weighted average return of the two extreme portfolios for the entire sample. We estimate the coefficients using monthly returns. In Panel B, we compute CTARs following Fama (1998). Because our event date is common for all event firms, we do not re-form our portfolio of event companies every month after 1998. We calculate CTARs also for the pre-euro period, just by averaging abnormal returns across stocks, calculated based on a three-factor benchmark. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. P-values for differences in abnormal return are based on a Kolmogorov-Smirnov test.

Panel A: Buy-And-Hold Returns: Three-Factor Model

		Pre-Euro Period			Post-Euro Period			
	N	Jan 1996 - Dec 1997	Jan 1996 - Dec 1996	Jan 1997 - Dec 1997	Jan 1998 - Dec 1998	Jan 1999 - Dec 1999	Jan 1998 - Dec 1999	Jan 1998 - Dec 2000
Euro Countries	2776	6.17%	12.88% ***	-0.14% *	13.24% ***	19.07% ***	16.12% ***	14.38% ***
Weak EMU countries	673	10.25% **	21.29% ***	0.20%	14.82% ***	0.38%	7.36% ***	13.92% ***
Strong EMU Countries	2103	4.84% **	10.19% ***	-0.25% ***	12.74% ***	25.05% ***	18.73% ***	14.53% **
Difference Weak EMU - Strong EMU		(<0.0001)	(<0.0001)	(0.0045)	(<0.0001)	(0.0003)	(<0.0001)	(<0.0001)
Non-Euro Countries	2911	-4.42% ***	-8.13% ***	-0.55% ***	-14.20% ***	7.10% ***	-4.14%	-0.52%
Difference Euro - Non Euro		(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.2403)	(<0.0001)	(<0.0001)

Panel B. Calendar Time Abnormal Returns

		Pre-Euro Period			Post-Euro Period			
	N	Jan 1996 - Dec 1997	Jan 1996 - Dec 1996	Jan 1997 - Dec 1997	Jan 1998 - Dec 1998	Jan 1999 - Dec 1999	Jan 1998 - Dec 1999	Jan 1998 - Dec 2000
Euro Countries	2776	0.36% ***	0.30% ***	0.41% ***	1.13% ***	0.46% ***	0.79% ***	0.56% ***
Weak EMU countries	673	0.61% ***	0.41% ***	0.83% ***	2.23% ***	-0.03%	1.10% ***	1.03% ***
Strong EMU Countries	2103	0.18% ***	0.17% **	0.20% ***	0.74% ***	0.54% ***	0.64% ***	0.48% **
Difference Weak EMU - Strong EMU		(<0.0001)	(<0.0001)	(0.0212)	(<0.0001)	(<0.0001)	(0.0116)	(0.0029)
Non-Euro Countries	2911	-0.36% ***	0.55% ***	-1.26% ***	0.07%	1.73% ***	0.90% ***	0.65% *
Difference Euro - Non Euro		(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.1341)	(<0.0001)	(<0.0001)

Table 8. The introduction of the euro, convergence criteria, corporate taxes, and firm value

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five Non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. The convergence variables are calculated as the deviations from the Maastricht criteria in columns (1) and (2) for each criterion that is not fulfilled, and are set to zero otherwise. In columns (3) and (4) the convergence variables are included without any adjustments. Control variables (log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) and time dummies are included but not reported. T-statistics based on robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	Adjusted convergence variables		Unadjusted convergence variables	
Explanatory Variable:	(1)	(2)	(3)	(4)
EMU-country x post-euro time period	0.065		0.051	
	(1.43)		(0.92)	
Strong EMU-country x post-euro time period		0.041		0.030
		(0.83)		(0.49)
Weak EMU-country x post-euro time period		0.139***		0.114***
		(3.56)		(2.97)
Convergence variables:				-0.008
				(-0.83)
Government deficit (%)	-0.729	-0.668	-0.008	0.000
	(-0.29)	(-0.26)	(-0.77)	(0.05)
Government debt / GDP (%)	-0.076	0.010	-0.001	0.006
	(-0.21)	(0.03)	(-0.37)	(0.42)
Inflation (%)	-2.894	-2.525	0.015	-0.033
	(-0.47)	(-0.42)	(1.35)	(-1.59)
Long-term nominal interest rate (%)	-4.917	-4.150	-0.041**	0.001
	(-1.14)	(-0.97)	(-2.35)	(0.12)
Corporate tax rate (%)	0.005	0.004	0.000	0.030
	(0.69)	(0.54)	(0.08)	(0.49)
Control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Fixed firm effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.760	0,761	0.757	0.757
Number of firm-year observations	9,742	9,742	9,742	9,742

Table 9. Takeover activity 1995-2000

The table shows the Number and euro Value of Consummated Acquisitions of Domestic Firms, relative to the Number of Listed firms, and Total Market Capitalization in euros, respectively, by geographical region and year. The value of consummated acquisitions (€) equals the total value of consideration paid by the acquiror, excluding fees and expenses. The euro value includes the amount paid for all common stock, common stock equivalents, preferred stock, debt, options, assets, warrants, and stake purchases made within six months of the announcement date of the transaction. Liabilities assumed are included in the value if they are publicly disclosed. Preferred stock is included only if it is being acquired as part of a 100% acquisition. If a portion of the consideration paid by the acquiror is common stock, the stock is valued by using the closing price on the last full trading day before the announcement of the terms of the stock swap. If the exchange ratio of shares offered changes, the stock is valued based on its closing price on the last full trading date before the date of the exchange ratio change. For public target 100% acquisitions, the number of shares at date of announcement is used. Data on the number of listed firms and the market capitalization in each country is obtained from the International Finance Corporation manuals. The sample includes all the acquisitions of public companies available in Securities Data Corporation, from January 1, 1995, through December 31, 2000, for the countries considered in Bris and Cabolis (2002). Only completed transactions are considered, and we exclude from the initial sample LBO deals, as well as spin-offs, recapitalizations, self-tender and exchange offers, repurchases, minority stake purchases, acquisitions of remaining interest, and privatizations.

	Number of Acquisitions / Number of Listed Companies								
	EMU Targets by			Non-EMU Targets by			Rest of the World Targets by		
Year	All	Non-EMU Acquirors	Rest of world Acquirors	All	EMU Acquirers	Rest of World Acquirors	All	EMU Acquirors	Non-EMU Acquirors
1995	6.06%	3.57%	2.50%	4.66%	0.87%	3.79%	0.89%	0.19%	0.70%
1996	6.77%	3.78%	2.99%	5.30%	1.12%	4.18%	0.74%	0.17%	0.57%
1997	8.87%	4.85%	4.01%	7.92%	1.40%	6.51%	1.00%	0.28%	0.72%
1998	9.16%	4.37%	4.79%	8.48%	1.88%	6.60%	1.10%	0.39%	0.71%
1999	6.48%	3.67%	2.81%	9.09%	2.75%	6.35%	1.33%	0.52%	0.81%
2000	6.64%	4.40%	2.24%	10.10%	4.23%	5.87%	1.55%	0.69%	0.86%

	€ Value of Acquisitions / Market Capitalization								
	EMU Targets by			Non-EMU Targets by			Rest of the World Targets by		
Year	All	Non-EMU Acquirors	Rest of world Acquirors	All	EMU Acquirors	Rest of World Acquirors	All	EMU Acquirors	Non-EMU Acquirors
1995	0.77%	0.28%	0.49%	1.38%	0.36%	1.02%	0.17%	0.10%	0.08%
1996	0.94%	0.70%	0.24%	0.53%	0.14%	0.39%	0.31%	0.16%	0.14%
1997	0.76%	0.44%	0.32%	1.49%	0.32%	1.16%	0.30%	0.09%	0.21%
1998	0.51%	0.22%	0.28%	1.51%	0.65%	0.86%	1.28%	0.44%	0.84%
1999	4.80%	4.38%	0.43%	2.78%	1.46%	1.31%	0.81%	0.47%	0.34%
2000	1.17%	0.73%	0.44%	2.93%	2.16%	0.77%	1.38%	0.88%	0.50%

Table 10. The introduction of the euro, cross-border takeover activity, and firm value

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five Non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain Control variables (short-term nominal interest rate, term spread, log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) and time dummies are included but not reported. T-statistics based on robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Explanatory Variable:	(1)	(2)
EMU-country x post-euro time period	0.045	
	(1.52)	
Strong EMU-country x post-euro time period		0.037
		(1.10)
Weak EMU-country x post-euro time period		0.086***
		(2.73)
Cross-border takeover activity	-0.111	-0.014
(=Domestic targets/ Number of firms in domestic market)	(-0.35)	(-0.04)
Control variables	Yes	Yes
Year dummies	Yes	Yes
Fixed firm effects	Yes	Yes
Adjusted R^2	0.760	0.764
Number of firm-year observations	9,742	9,742

Table 11: The introduction of the euro and firm value: Alternative event period and individual year effects

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The alternative post-euro time period is defined as the years 1997-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. Control variables (log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) and time dummies are included but not reported. T-statistics based robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Explanatory Variable:	(1)	(2)	(3)	(4)
Strong EMU-country x alternative post-euro time period	0.063*	0.026		
	(1.75)	(0.79)		
Weak EMU-country x alternative post-euro time period	0.190***	0.104**		
	(4.01)	(2.48)		
Strong EMU-country x 1996			-0.069	-0.039
			(-0.86)	(-1.00)
Strong EMU-country x 1997			-0.004	-0.029
			(-0.04)	(-0.61)
Strong EMU-country x 1998			0.114***	0.078**
			(2.68)	(2.32)
Strong EMU-country x 1999			-0.040	-0.039
			(-0.79)	(-1.26)
Strong EMU-country x 2000			-0.017	0.007
			(-0.28)	(0.13)
Weak EMU-country x 1996			-0.019	0.019
			(-0.34)	(0.43)
Weak EMU-country x 1997			0.082	0.061
			(1.23)	(1.01)
Weak EMU-country x 1998			0.278***	0.197***
			(5.59)	(4.84)
Weak EMU-country x 1999			0.124**	0.077
			(2.04)	(1.14)
Weak EMU-country x 2000			0.161**	0.133**
			(2.28)	(2.27)
Domestic short-term nominal interest rate (%)		-0.005		-0.000
		(0.38)		(-0.03)
Domestic term spread (%)		0.049***		0.048**
		(2.79)		(2.01)
Control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Fixed firm effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.761	0.764	0.763	0.764
Number of firm-year observations	9,742	9,742	9,742	9,742

Table 12: The introduction of the euro and firm value: Individual country effects

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as the years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. Control variables (log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) and time dummies are included but not reported. T-statistics based robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Explanatory Variable:	(1)	(2)
Strong countries:		
Germany x post-euro time period	0.029	0.031
	(0.87)	(0.79)
France x post-euro time period	0.123*	0.104*
	(2.55)	(1.87)
Netherlands x post-euro time period	0.025	-0.019
	(0.81)	(-0.57)
Austria x post-euro time period	-0.016	-0.020
	(-0.41)	(-0.40)
Belgium x post-euro time period	0.089***	0.093**
	(3.05)	(2.41)
Weak countries:		
Finland x post-euro time period	0.134***	0.134***
	(5.10)	(6.40)
Ireland x post-euro time period	0.001	-0.067
	(0.03)	(-1.44)
Italy x post-euro time period	0.274***	0.130***
	(12.34)	(4.79)
Portugal x post-euro time period	0.125***	0.011
	(4.08)	(0.51)
Spain x post-euro time period	0.174***	0.069***
	(4.75)	(2.74)
Domestic short-term nominal interest rate (%)		-0.015
		(-0.70)
Domestic term spread (%)		0.039
		(1.35)
Control variables	Yes	Yes
Year dummies	Yes	Yes
Fixed firm effects	Yes	Yes
Adjusted R^2	0.762	0.764
Number of firm-year observations	9,742	9,742

Table 13: The introduction of the euro and firm value: Industry effects

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Luxembourg and Greece) and five non-EMU countries (Denmark, Norway, Sweden, Switzerland, and UK) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as the years 1998-2000. Control variables (log of sales, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and relative change in the domestic currency/ USD -exchange rate) are included but not reported. T-statistics based robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Explanatory Variable:	(1)	(2)
Basic industries x Euro country x post-euro time	0.073	0.041
	(1.57)	(1.00)
General industries x Euro country x post-euro time	0.085	0.063
	(1.40)	(0.99)
Cyclical consumer goods x Euro country x post-euro time	0.227***	0.201***
	(4.34)	(4.40)
Non-cyclical consumer goods x Euro country x post-euro time	0.050	0.027
	(0.99)	(0.56)
Cyclical services x Euro country x post-euro time	0.095	0.055
	(1.53)	(0.93)
Non-cyclical services x Euro country x post-euro time	-0.114	-0.158
	(-0.69)	(-1.07)
IT-industry x Euro country x post-euro time	0.222	0.189
	(1.33)	(1.10)
Financial services x Euro country x post-euro time	0.319***	0.297***
	(3.65)	(4.42)
Utilities x Euro country x post-euro time	0.079	0.031
	(1.56)	(0.70)
Natural resources x Euro country x post-euro time	0.474***	0.410***
	(9.87)	(6.96)
Domestic short-term nominal interest rate (%)		-0.002
		(.15)
Domestic term spread (%)		0.031***
		(2.72)
Interactions between industry dummies and post-euro time	Yes	Yes
Control variables	Yes	Yes
Year dummies	No	No
Fixed firm effects	Yes	Yes
Adjusted R^2	0.761	0.765
Number of firm-year observations	9,742	9,742

Table 14. The introduction of the euro and firm value: Excluding UK and Germany

The sample covers the time period 1995-2000 and includes all firms from the EMU-countries (except Germany, Luxembourg and Greece) and four non-EMU countries (Denmark, Norway, Sweden, and Switzerland) with data available in Datastream for at least the time period 1995-1998. Estimation by OLS with fixed firm effects. The dependent variable is the log of the Tobin's Q, defined as the sum of the book value of non-equity liabilities and the market value of common equity divided by the book value of total assets. The Q-values are calculated using end-of-year data. The post-euro time period is defined as the years 1998-2000. The EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. T-statistics based robust standard errors adjusted for firm dependence within countries are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

Explanatory Variable:	(1)	(2)	(3)	(4)
EMU-country x post-euro time period	0.052		0.034	
	(0.97)		(0.62)	
Strong EMU-country x post-euro time period		0.012		0.012
		(0.21)		(0.22)
Weak EMU-country x post-euro time period		0.111**		0.081*
		(2.09)		(1.79)
Domestic short-term nominal interest rate (%)			-0.001	0.002
			(-0.17)	(0.23)
Domestic term spread (%)			0.040***	0.036***
			(2.89)	(3.22)
Log of sales (in thousands of euro)	-0.033*	-0.033*	-0.037**	-0.035**
	(-1.81)	(-1.89)	(-2.05)	(-2.03)
EBITDA/ total assets	1.019***	1.022**	1.030	1.029***
	(5.73)	(5.76)	(5.76)	(5.77)
Fixed tangible assets / total assets	-0.110	-0.109	-0.109	-0.109
	(-0.56)	(-0.56)	(-0.57)	(-0.58)
Non-equity liabilities / total assets	0.248*	0.250*	0.261*	0.261*
	(1.66)	(1.67)	(1.85)	(1.82)
Real GDP growth (%)	0.037**	0.043***	0.034***	0.038***
	(2.51)	(2.86)	(3.28)	(3.27)
Relative change in the domestic currency/USD-exchange rate	0.059	0.057	0.094	0.088
	(0.37)	(0.37)	(0.87)	(0.78)
Year dummies	Yes	Yes	Yes	Yes
Fixed firm effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.798	0.800	0.800	0.801
Number of firm-year (-period) observations	3,774	3,774	3,774	3,774

Figure 1. Forward rate differentials

The figure shows forward rate differentials with Germany, averaged across areas within Europe. We calculate monthly forward rate differentials from swap rates between fixed and floating rate government bonds. We calculate 8-year forward rates in 2 years, and then calculate spreads for each country with respect to Germany, as $s_{it}=\ln(1+f^{8}_{i,2,t})- \ln(1+f^{8}_{GE,2,t})$, where s_{it} is the forward rate spread for country i in month t, and $f^{8}_{i,2,t}$ and $f^{8}_{GE,2,t}$ are respectively the 8-year forward rates in 2 years for country i and Germany. We use the spread between the German forward rate and the ECU forward rate as a measure of the German spread. Swap data is from Datastream. As in Hardouvelis (2002a), we adjust for market conventions on national swap markets. In all countries in the sample coupons are paid annually, except for Ireland and the UK, where they are paid semiannually. We annualize interest rates in both countries. We additionally convert swap yields to a 360 days in Belgium, Ireland, and the UK, where the convention is 365 day-years.

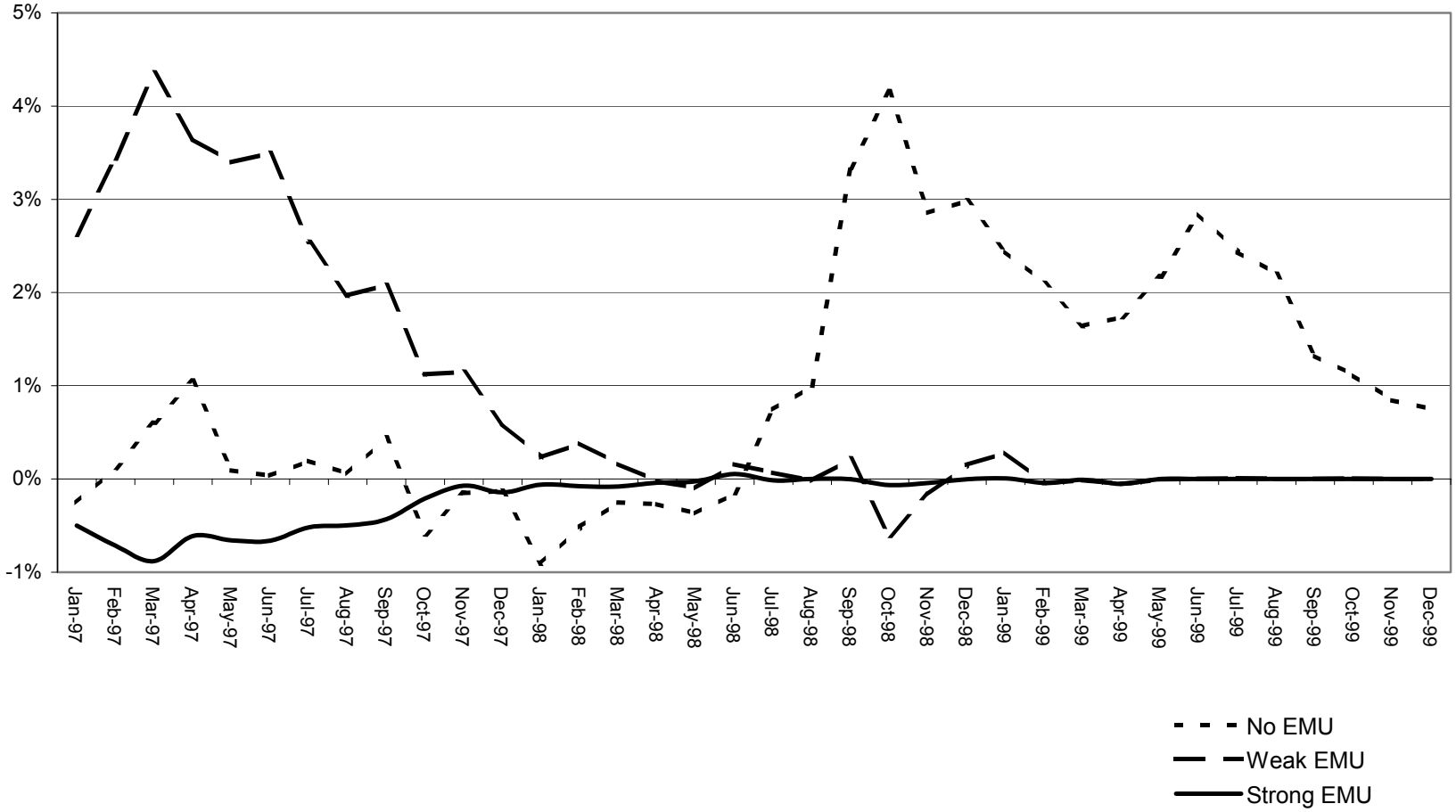

Table B1. Euro exchange rate exposure

The euro exchange rate exposure is measured as the exchange rate beta from a two-factor model of stock returns in which changes in the (synthetic) euro exchange rate and the domestic stock market return are the two factors. The estimations of exchange rate betas are performed using monthly data over the time period January 1992 to December 1994. All data is from DataStream. The % Significant is based on significance at the 5%-level using one-sided t-tests of the exchange rate betas.

Country	N	Median Exchange Rate Beta	Positive Exchange Rate Beta		Negative Exchange Rate Beta	
			% Firms	% Significant	% Firms	% Significant
EMU-countries:						
Germany	344	0.099	56.1	9.8	43.9	11.3
Belgium	25	-0.017	40.0	10.0	60.0	0.0
Spain	30	-0.310	40.0	8.3	60.0	16.7
Finland	31	-0.196	45.2	21.4	54.8	11.8
France	124	0.259	58.9	12.3	41.1	11.8
Ireland	6	0.119	50.0	0.0	50.0	0.0
Italy	37	-0.344	35.1	7.7	64.9	29.2
Netherlands	56	0.862	76.8	25.6	23.2	0.0
Austria	32	-0.322	28.1	11.1	71.9	17.4
Portugal	37	0.540	75.7	14.3	24.3	0.0
Total	722	0.102	55.1	12.6	44.9	12.0
Non-EMU-countries:						
Denmark	33	-0.046	48.5	37.5	51.5	0.0
Norway	40	0.034	52.5	19.0	47.5	15.8
Sweden	60	-0.481	35.0	28.6	65.0	23.1
Switzerland	57	0.068	50.9	10.3	49.1	10.7
UK	632	-0.497	23.6	4.0	76.4	21.1
Total	822	-0.400	28.7	10.6	71.3	20.0