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ABSTRACT

The Euro is Good After All: Evidence from Corporate Valuations*

In this Paper we study the changes in corporate valuation induced by the formation of Economic and Monetary Union (EMU) in Europe. We use corporate-level data from ten countries that adopted the euro, the three EU countries that did not join EMU, as well as Norway and Switzerland. We show that the introduction of the euro has increased Tobin's Q-ratios in EMU countries by 7.4%. The effects prevail even if we account for the decrease in long-term interest rates. The increases in Tobin's Q are larger for firms that are *ex ante* expected to benefit more, i.e. firms from countries that had weak currencies and firms that were exposed to intra-European currency risks. Finally, the increases are also more significant for firms that are financially unconstrained. The evidence provided here supports the view that the introduction of the euro has lowered firms' cost of capital in EMU countries.

JEL Classification: F33, F36 and G32
Keywords: cost of capital, currency risk, currency union, Economic and Monetary Union (EMU), the euro and valuation

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I Introduction

Economic and Monetary Union (EMU) and the creation of a new common currency for Europe is arguably the most significant institutional change in international financial markets during the past quarter century. Even though most observers agree on the historic significance of the new currency, there has been a lot of scepticism about the wisdom of the endeavour. It is not clear at all whether EMU has had a positive or negative effect on European corporations. This paper aims to address this issue by looking at changes in the value of European corporations around the introduction of the common currency.

EMU 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 might have changed in Europe, because there is now a common monetary policy for the whole of EMU. 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 has had a positive or negative overall impact on real interest rates and thus on corporate valuations in 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 suffered from 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 unambiguously be lower for those countries, and as a consequence corporate valuations should have increased. In addition, one of the formal entry criteria for EMU stipulated 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 introduction of the euro of course means that the nominal intra-European currency risks between the EMU countries have been eliminated. If currency risks are priced in financial markets, then the elimination of those risks should lead to a lower cost of capital[1]. Allayannis and Ihrig (2001), Adler and Dumas (1983) and Dumas and Solnik (1995), among others, show empirically that currency risks are priced, so as a consequence the cost of capital should have decreased in EMU countries. However, the economic significance of the elimination of currency risks is debatable. De Santis and Gerard (1988) show that the currency risk has been a significant part of the overall systematic risk, but 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. Griffin and Stulz (2001) 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. (1999) provide evidence that currency risks have been priced in European equity markets, oddly enough it is the impact of the U.S. dollar risk that has been more important than the intra-European currency risks. Hence the direct impact on corporate valuations of elimination of currency risks within Europe could be small.

The effect of the euro on firms' cost of capital has additional 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, EMU may have increased financial integration in Europe by reducing investment restrictions that some institutional investors had prior to the adoption of the euro.[2] For example, European pension funds typically have a restriction 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 EMU countries. As a result, the cost of capital may have decreased. Moreover, the adoption of the euro could have diminished the home equity bias among European investors.[3] Consistent with the view that home equity bias was significant in Europe, Rouwenhorst (1999) finds that even during the 1990s country factors were more important than industry factors in determining stock returns in Europe. If the adoption of the euro has lead to a less severe home equity bias, then again the cost of capital should have decreased in EMU countries because of better risk sharing among investors. In sum, even if the effect of elimination of intra-European currency risk on corporate valuations might be economically quite small, corporations can be more valuable after the introduction of the euro because cost of capital has decreased due to lower real interest rates or due to better risk sharing in European financial markets.

Finally, the 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 EMU 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. Moreover, even if the estimated large increases in trade and as a result in national incomes were to materialize, corporate profits would not necessarily increase by the same amount. Parsley and Wei 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. So in the end it is an empirical issue how much corporations will benefit from increasing international trade and goods market integration.

We use corporate level data from ten countries that adopted the euro[4], the three EU countries (Denmark, Sweden, and the U.K.) that did not join EMU, as well as Norway and Switzerland. Using yearly data 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, instead of the official beginning of EMU in January 1, 1999 for two reasons: in May 1998 the European Council decided on which countries where allowed to join EMU; second, already in January 1998 there was a consensus on which countries would adopt the euro as their currency[5].

We show that in the period 1998-2000, Tobin's Q for firms in the Euroland has increased by 7.4 percent compared to firms in non-EMU countries, after controlling for firm, country, and time specific effects. When we divide EMU-countries into two groups, we show that the increase in valuation is concentrated in firms from euro countries with a history of recent currency crises (an increase of 16.4 percent) compared to the euro countries that managed to stay within in the European Monetary System during the turmoil of the early 1990s (no significant increase). The countries that experienced major currency depreciations are supposedly the countries that were expected to have significant currency risk premia prior to 1998. Furthermore, we document a significant increase in valuation — 11.2 percent — for firms that had significant exposure to intra–European currency risks prior to 1999. This valuation effect is driven by firms that were harmed by domestic currency depreciations. For those firms, the increase in Q induced by the common currency is 15.7 percent. 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. Finally, the increase in firm value is also induced by changes in long–term interest rates. Indeed we show that a 1 percent reduction in real interest rates increased the average firm's

Tobin's Q 3.1 percent over the period 1995–2000. However, the valuation effects of the euro still persist after controlling for the change in interest rates that followed the introduction of the euro.

The next step is to find the ultimate reasons why EMU firms have become more valuable. We disentangle the effects of the euro on firms' cash flows and firms' cost of capital 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 capital decrease . The intuition is that financially unconstrained firms benefit from the increase in value experienced by the firm's internal funds when the cost of capital decreases, while constrained firms must give part of the value increase away to outside investors, since they have to fund new investments with external capital. Our model also predicts that if the effect of the euro has been an increase in firms' expected cash flows, then firms should benefit by the same amount irrespective of how much financially constrained they are, after controlling for 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 after 1998, Tobin's Q has increased 11.1 percent, relative to firms outside the euro area, for firms that are in the lowest KZ–index quartile, that is, the least financially constrained firms. The effect of the euro is lower for the most financially constrained firms: their value increases 5.8 percent, relative to non–euro firms, after 1998. These results are consistent with the cost of capital having decreased in the euro area. We provide further evidence in favor of the cost of capital reduction by showing that the difference between unconstrained and constrained firms is much larger for firms in the weak–EMU area. These are the firms that we expect *a priori* to benefit the most from a reduction in the cost of capital. Notwithstanding, we cannot reject the hypothesis that the euro has increased expected cash flows as well: as mentioned above, value increases are also significant for financially constrained firms, although of a lower magnitude.

We also perform robustness checks to show that our main finding also holds after controlling for other currency risks, in particular controlling for the depreciation of European currencies against the dollar. The results also hold when we exclude Germany and the U.K. from the analysis. These are the countries that dominate the sample. Besides, we show that the effect of the euro persists after we control for the convergence in magnitudes of macroeconomic factors that was 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 Euroland, which could have indeed caused an increase in firm valuation.

Our results are based on a large sample of firms from several different countries. In studies of this kind, an easy way of inflating the power of the estimates is to use firm–level rather than

country–level data. If firms behave similarly within a country, firm–level data is just a replication of country results, but with lots of highly correlated observations, and hence with artificially high t-statistics. We are instead fair to the reader. The significance of our estimates is free of cross-dependencies, since we estimate panel regressions with standard errors that are adjusted for clustering of observations by country and year. This means that, if firms in our sample solely replicate the other firms in the same country, our t-statistics should be close to zero. The power of our results thus comes from the use of many observations—something that is not possible to achieve by using only country-level data—corresponding to firms with different characteristics and controlling for within–country dependencies. Then we remove firm, country, and time effects, and isolate the direct effect of the common currency on firm behavior. The final result is that there is a positive and significant relationship between the common currency and firm value.

EMU and its impact on financial markets has been a subject of several other studies. Galati and Tsatsaronis (2001) give a good overview of the recent developments in European financial markets fostered by the new currency. They document a threefold increase in European corporate bond issuance. In addition, Santos and Tsatsaronis (2002) show that euro has induced a significant reduction of underwriting fees for European corporate bonds. Hardouvelis et al. (2001) find that there has been increasing integration in European equity markets towards the end of 1990s. They also show that currency risk has been a significant part of the total risk of equity investing. Bartram and Karolyi (2003) show that due to the introduction of the euro, the market risk has been reduced for those firms that have significant exports to EMU countries implying that the currency risk has been a part of non-diversifiable risk in Europe. Sentana (2002) tests whether the European Monetary System of the early nineties reduced European firms' cost of capital by estimating a multi-period version of the APT and demonstrates a small decrease. However his focus is on country returns, so there is no firm–specific evidence.

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. Section V is devoted to 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 countries adopting 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 June 2000. 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.[6] 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). 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.[7] 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 and Firm Classifications

First we classify firms into two groups, depending on whether they are from EMU countries or from other European countries. Next we further group firms within the EMU group, depending on whether the country is a weak EMU member, or a strong EMU member. For our purposes, weak EMU countries are those that suffered a currency crisis in the years before the introduction of the euro. These countries are Finland, Ireland, Italy, Portugal, and Spain.[8] The other euro countries (Germany, France, Netherlands, Belgium, and Austria) did not suffer significant currency depreciations during the EMS 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 would be especially significant for these countries. Notice that the labels of *weak* and *strong* EMU countries only applies

to the weakness and strength of the currencies prior to the EMU, and not to the overall economic performance of the respective countries.

Firms are also classified depending on their size. Within each country, we calculate the median size (measured as total sales) of the firms in the sample as of December 1995. Then we split the total sample of firms between large and small companies, depending on whether their size is above or below the country median. Bartram and Karolyi (2003) show that large firms have benefitted more from European monetary integration in terms of reduction in market risk. Dahlquist and Robertsson (2001) and Kang and Stulz (1997) have shown as well that large firms benefit more from market integration because foreigners tend to invest in large firms.

We also analyze firm performance depending on the firm's exposure to exchange rate movements. 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 A.

Positive ERBs therefore imply

1. that a firm's assets derive primarily from exports,

2. that the firm's currency exposure is not hedged by other means –derivatives or foreign financing, or

3. the firm's liabilities are mostly denominated in the domestic currency.

Conversely, a negative ERB is an indication that

1. the firm's exposure to currency risk is not hedged

2. the firm's suppliers are mainly located in another euro–country, or

3. 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 1 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.

[Insert Table 1]

III Firm Value and the Euro

A Main Results

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 2 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 2 that countries in Euroland 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 EMU– and non–EMU countries.

[Insert Table 2]

In order to analyze the effects of the introduction of the euro, we next estimate a fixed effects model. The dependent variable is the logarithm of Tobin's Q for the firms in the sample. We control for year– and firm–fixed effects. By using firm–specific fixed effects, we simultaneously

control for both constant country factors (e.g., taxation, accounting rules, legal environment, and so forth) 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. We use three dummy variables to measure the impact of the euro on firm value. The first dummy variable, "EMU country x post-euro time period", takes the value one for firms in countries in the euro zone, during years 1998, 1999, and 2000, and zero otherwise. Similarly we construct two dummy variables indicating firms in 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").

Our additional controls include: size, measured as the log of the firm's sales (in euro); 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; leverage, measured as the book value of non-equity liabilities divided by total assets; and the current year real GDP growth. Firm size is included because smaller firms tend to have greater growth opportunities. 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. Finally, the current year real GDP growth accounts for cross–country differences in the business cycle.

Because we use firm-level data to estimate what essentially amounts to country-level effects, one important concern regards the possibility of dependence between firms within a country for a particular year. If this cross-dependence is not controlled for, the size of the estimated standard errors can be severely underestimated. We deal with this problem by calculating robust standard errors that are adjusted for clustering of observations by country and year. In particular we use the following variance–estimator:

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

where

$$u_j = \sum_{j_{\mathrm{cluster}}} e_i \cdot x_i \tag{2}$$

and n_c is the total number of clusters–the number of country–years in the sample, X is the matrix of explanatory variables, e_i is the residual for firm-year observation i, and x_i is the vector of corresponding values for the explanatory variables.

Since 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. Table 3 presents the results of the estimation. The first panel reports results for the whole sample, and the second and third panels report results for large and small firms, respectively.

[Insert Table 3]

Focusing on the overall sample in model (1), our first important result is that firm value in the EMU countries has increased by 7.4 percent compared to non–euro countries after 1997. The coefficient is significant at the 5 percent level. The magnitude of the coefficient is important if we take into account that the average annual 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 3, we distinguish between 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 16.4 percent increase in Q relative to non–euro countries after 1997, the same increase equals 4.3 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 exchange rate policies.

Because real 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 long-term (10 year) real interest rate for each country and year in models (3) and (4). We confirm that firm values increase as interest rates in the euro area have decreased. In economic terms, a 1 percent reduction in real interest rates increased the median firm's Tobin's Q 3.1 percent over the period 1995–2000. However, although the magnitude of the effect of the euro decreases, the valuation effects of the euro still persist after controlling for the change in interest rates that follows the introduction of the euro. Since the main focus of this paper is on the effects of the euro beyond its impact on risk-free interest rates, we henceforth always include the long-term real interest rate as a control in our regressions.

In models (5) and (6) and models (7) and (8), we split the firms between large and small firms, respectively. Large firms enjoy a larger increase in Q (7.2 percent increase in Q for large firms versus a 6.3 percent increase for small firms), but the difference is insignificant—p-value of 0.842,based on a Wald test. 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). For the subsample of larger firms the results when distinguishing between strong and weak EMU countries are similar to the results for the total sample (11.8 percent increase for weak countries versus 5.9 percent increase for strong countries). For small firms, the effect of the euro on value is insignificant for firms in the strong EMU area, while firms in the weak EMU area experience a 15 percent increase in Q. The differences in results between large and small firms are, however, not statistically significant (according to Wald-tests, the p-values are respectively 0.642 and 0.266).

We find our controls to have the expected signs. As a measure of growth opportunities, size is negatively related to value. More profitable firms are more valuable (significant coefficients in all estimations at the 1 percent level). The ratio of tangible assets to total assets displays a negative and significant sign for small firms, and a positive and significant sign for large firms. For large firms we interpret the coefficient as an indication that the ability to monitor firms with tangible assets is valued by the market. For small firms, intangible assets are a proxy for growth opportunities. Finally, as predicted by finance theory, firm value increases with leverage.

B Firm Value and the Exchange Rate Exposure

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, we deem the benefits of the euro to be smaller. Therefore, it is worth analyzing the effect of the common currency on firm value, depending on the firm's currency exposure, as calculated in section II.B. In Table 4 we present the results of the fixed effects model from the previous section with a further classification of firms into significantly positive, significantly negative, and insignificant ERB firms.

[Insert Table 4]

We find that the more firms are exposed to exchange rate movements, the higher their gains from the introduction of the euro. For firms with significant currency exposure, the euro has induced an incremental 5.1 percent increase in Tobin's Q . The estimate for the overall effect of

the euro is still significant, which demonstrates that currency risk is an explanation for the value increases, but that there is some additional factor. The effect of the currency exposure is driven by negative–exposure firms, as model (2) in Table 4 shows: these are firms that are harmed by a currency depreciation. Therefore, our results confirm that, by eliminating currency risks, the euro has made importing firms and firms that finance their operations using securities denominated in a foreign currency more valuable. While firms with significant positive exposure experience an average value increase of 6.1 percent, relative to non-euro firms, firms with negative exposure experience an average increase in Tobin's Q of 15.7 percent.

As before, results are even stronger for weak–EMU firms. Column (4) in Table 4 shows that firms with negative and significant exposure to the euro, in weak EMU countries, have enjoyed a significant 21.1 percent increase in Q, relative to firms outside the euro–zone. Results are similar within the two size–subgroups.

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. Furthermore, the valuation impact of the euro is independent of firm size.

IV Explanation of the results

A Theory

In this section we take as given the positive valuation effects of the common currency and pose the question of where these value increases come from. EMU can affect corporate valuations through two channels: it can have an impact either on the firms' cost of capital, or on expected cash flows. The reduction in the cost of capital is the result of lower interest rates in the euro–zone, a reduction in the market risk premium—including a risk premium for currency risks—, and the result of the integration of European financial markets.. The effect of the euro on expected cash flows results from an increase in intra-European trade. Trade flows between euro countries are expected to increase because transaction costs have decreased drastically.

It is difficult to empirically disentangle these two effects of the common currency because mechanically a reduction in the cost of capital 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. In order to be able to formulate testable implications, in what follows we set up a simple theoretical model where we

distinguish between firms that are financially unconstrained, and firms that need to rely on capital markets to finance their investments.

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.

A.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:

$$E[V_e^u] = \frac{\alpha\left[A_h + (1+\rho)I + F^u - I - D\right]}{1+r} \tag{3}$$

$$= \frac{\alpha\left[A_h + \rho I + F^u - D\right]}{1+r} \tag{4}$$

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:

$$
\begin{aligned}
Q^u &= \frac{\alpha\left[A_h+\rho I+F^u-D\right]}{(1+r)(A_o+F^u)}+\frac{\alpha D+(1-\alpha)\left[A_l+\rho I+F^u\right]}{1+r} \\
&= \frac{\alpha A_h+(1-\alpha)A_l+\rho I+F^u}{(1+r)(A_o+F^u)} \\
&= \frac{(1+\rho)A_o+\rho I+F^u}{(1+r)(A_o+F^u)}
\end{aligned} \tag{5}
$$

A.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 $t = 1$

$$
\frac{\theta V_e^c}{1+r} = I - F^c \tag{6}
$$

where

$$
V_e^c = \alpha\left[A_h+(1+\rho)I-D\right] \tag{7}
$$

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:

$$
Q^c = Q^u\frac{A_o+F^u}{A_o+F^c}-\frac{I-F^c}{A_o+F^c}-\frac{F^u-I}{(1+r)(A_o+F^c)} \tag{8}
$$

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

A.3 Results

It is straightforward to show, from equation (5), 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 *A reduction in the firm´s cost of capital increases the Q of the unconstrained firm more than the Q of the constrained firm. That is:*

$$\frac{\partial Q^c}{\partial r} > \frac{\partial Q^u}{\partial r}$$

Moreover, an increase in the profitability of investment increases the Q of the constrained firm more than the Q of the unconstrained firm, i.e. $\frac{\partial Q^c}{\partial \rho} > \frac{\partial Q^u}{\partial \rho}$

Proof. The first result follows from (8), because:

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

With respect to the second result, from (8):

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

■

The intuition for the result is that the unconstrained firm benefits from a reduction of the cost of capital more because of a higher expected value of the excess funds reinvested in the firm. However, financially constrained have to share the value increases induced by a lower cost of capital with outside investors. With respect to cash flows, increasing the expected cash flows does not affect the value of financial slack, and therefore the increases in Q coming from higher expected cash flows are independent of financial constraints. That is, controlling for size, the effect of an increase in expected cash flows is equal across firms irrespective of their financial constraints, i.e. $(A_o + F^u)\frac{\partial Q^u}{\partial \rho} = (A_o + F^c)\frac{\partial Q^c}{\partial \rho}$.

There are two main empirical implications that ensue from Proposition 1. Regarding the effects of the euro on firms' value, the previous results imply that, if the main effect of the common currency is a reduction on the firms' cost of capital, then we should expect a higher effect on value for those firms that are financially unconstrained and need not to rely on outside financing. Moreover, holding firm size constant, Proposition 1 implies that if the euro entails an increase in investment opportunities and consequently on expected cash flows, then the increase in firm value should be independent on how much financially constrained firms are.

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 EMU has reduced firms' cost of capital.

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 capital by characterizing firms depending on how much financially constrained they are. In light of the theoretical model presented above, if the euro has led to a reduction in firms' cost of capital, the valuation impact of the euro should have been greater for those firms that were financially unconstrained prior to 1998. However, if expected cash flows have increased as a result of the EMU, 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, we think it is the best measure available that is ready to be used and has received recognition in the finance literature as a measure of financing constraints. Furthermore, by using this measure, rather than constructing one ourselves, we avoid potential data mining problems. We compute the KZ-index as in Baker et al. (2003), because Q is the left–hand–side variable in our estimations.[9] The index we compute is:

$$KZ_{it} = -1.002\frac{CF_{it}}{A_{it}} - 39.368\frac{DIV_{it}}{A_{it}} - 1.315\frac{C_{it}}{A_{it}} + 3.139\frac{D_{it}}{A_{it}} \tag{9}$$

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 Datastream item #375 (Total cash and equivalents). 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. Still, our sample 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.A) by quartiles. Results are in Table 5.

[Insert Table 5]

We find that the positive effect of the euro on firms' value is higher for unconstrained firms. After the introduction of the common currency, firms in the lowest–KZ index quartile experience a 11.1 percent increase in Tobin's Q, relative to non-euro firms. This coefficient is significant at the 5 percent level. In contrast, the more financially constrained firms experience value increases of 5.8 percent, relative to to non-euro firms. The difference is significantly different from zero based on a Wald test. This is evidence that the valuation effect of the euro has been caused by cost of capital reduction. Intuitively, if the main effect of the euro is a reduction in firms' cash flows, we should expect the financially constrained firms—firms that need to rely on external financing—to benefit as much as financially unconstrained firms from the common currency. Our results show this not to be the case. Indeed, the valuation effect is stronger for firms in weak–EMU countries, and equals 26.6 percent for unconstrained firms, and 10.1 percent for constrained firms. This are supposedly the firms for which we expect the benefits of a reduction in the cost of capital to be larger.

Note finally that our results do not imply a rejection of the hypothesis that expected cash flows have increased as well. In conclusion, we find strong support for a positive valuation effect of the euro stemming from a lower cost of capital for firms in the Euroland, and a weak evidence that the valuation increases have been the result of an increase in expected cash flows.

V 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 depreciation of the euro with respect to the U.S. dollar. Next we exclude Germany and the U.K. from the analysis. We then examine the sensitivity of the results to the choice of the event year.

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 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 euro convergence. Article 104c of the Maastricht Treaty assesses the degree of convergence achieved by the Member States by reference to the following criteria:[10]

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 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 macro 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–euro countries. In fact the U.K. and Denmark fully satisfied the convergence requirements in 1997, but they opted out of the system. We call these indices the *Adjusted Convergence Variables*. We alternatively use the raw convergence variables in the regressions. Because we use measures of nominal interest rates and inflation rates in this analysis, we do not include the long-term real interest rate in these specifications, 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.[11] 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.[12]

[Insert Table 6]

In Table 6 we show that the valuation effect we identify is driven by the common currency itself, and not by the convergence process. The coefficient of the euro dummy is reduced in magnitude, but still significant, once we introduce the adjusted convergence variables. Furthermore, we still find that the euro yields positive valuation effects for firms in the weak-EMU countries. The coefficients for the convergence criteria dummies are insignificant. One methodological reason for this is that we estimate standard errors clustered by country and year. Therefore the explanatory power of country and year–specific variables is small. In any case, our results are consistent with

Henry (2002), who shows that there is no market response to lowering the inflation levels when the starting inflation rate is below 40 percent. His sample includes 21 emerging markets.

We also regress Tobin's Q on the values of the macro variables themselves, without adjusting for convergence. Although the euro–dummy becomes insignificant, the effect of the euro on the weak–EMU firms is economically and statistically significant. The long-term interest rate displays an negative and significant coefficient, consistent with Table 3. Finally, taxation does not help explain valuation effects, at least at the firm level.

B The Effect of Cross-Border Mergers

An alternative explanation for the increase in Q we document in the previous sections is an increase in the frequency of cross-border mergers. If currency risks within the euro zone have disappeared, then firms have become more valuable targets. The removal of separate national currencies encourages cross-border investment since the traditional reluctance of acquirors to make payments in another currency is no longer a factor. If high premia are paid in cross-border mergers, firms in Euroland will on average display market value increases.

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 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 market capitalization is from the IFC manuals.

[Insert Table 7]

In Table 7 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 7 shows that, while the frequency of cross-border mergers of firms in the three regions increases, the largest increase happens 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.[13] 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 8]

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.A 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 8. While the frequency of cross-border acquisitions affects Tobin's Q positively (the coefficients in the two models we estimate are 0.043 and 0.170, insignificant), the effect of the euro alone still remains: the coefficient of the euro dummy is 0.067, significant at the 5 percent level. The magnitude of the coefficient for larger firms is indeed larger now, confirming that cross-border mergers affect the value of large non-Euro firms more than the value of Euro firms. Moreover, the effect of the euro continues to be larger for firms in weak EMU countries than for firms in strong EMU countries (the coefficients are 0.142 and 0.049 respectively, only the former being significant).

C Depreciation of European currencies

Over the period January 1998, December 2000, the euro depreciated 25 percent with respect to the dollar. In the paper we do not control for dollar exposure. Therefore, it is possible that our findings result from a significant depreciation of the euro or its legacy currencies with respect to the dollar.

[Insert Table 9]

We analyze the impact of the changes in dollar exchange rates on Tobin's Q in Table 9. We gather data on the exchange rate of domestic currency / U.S. dollar 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. The coefficient for this variable is insignificantly different from zero for the overall sample, as well as for the subsamples of small and large firms, and the inclusion does not alter our results on the impact of the euro.[14]

D Excluding Germany and the U.K.

Table 2 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 Euro and non-Euro countries, but between German and British firms instead.

In Table 10 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 more every year in EMU than in non-EMU firms, after 1997. We still find that the effect is more pronounced in weak-EMU countries than in the strong-EMU countries.

[Insert Table 10]

E The Date of the Adoption of the Euro

Finally, our last robustness check concerns the choice of the event date for our study. We deem 1998 to be the year in which there was a consensus of the countries that would join the EMU. In any case, it is possible that markets perfectly anticipated such an event earlier. It is also possible that markets reacted late to the introduction of the common currency, and our results understate the real effects of the common currency.

In Table 11, we regress the Tobin's Q in our sample of firms on five dummy variables for strong and weak countries. Each dummy variable takes the value 1 for firms in the Euroland, 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.

[Insert Table 11]

We find evidence that for weak countries 1997 is the year when the effect of the common currency starts affecting corporate valuations. In 1997, the average firm in the weak–euro countries increases market value by 14 percent relative to non-EMU firms. Thus our adoption of 1998 as the launch date of the euro is a conservative choice and in fact underestimates the true effects of the common currency. 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. For firms coming from strong euro countries, the effect of the common currency is either non-significant or transitory. This is consistent with the results from our main regressions.

VI Conclusion

Economic and Monetary Union and the adoption of a common currency for 12 countries within the Union is a major social experiment that has also significant 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 EMU, as well as Norway and Switzerland. We show that valuations for firms in the EMU countries have grown by 7.4 percent in the period 1998–2000 in the Euroland compared to the five non–EMU countries.

We show that the increase in corporate valuations has been larger for firms that are not financially constrained. We argue in the paper that this effect is due to a reduction in the cost of capital, as opposed to increase in expected cash flows. Furthermore, we provide evidence that the effects of the euro have been bigger for firms that were more exposed to exchange rate risk before the adoption of the common currency: firms from countries with previously weak currencies—defined as those countries that suffered currency crises in the early nineties—and firms that were harmed by the depreciation of their domestic currencies. Since we also control for the decrease in long-term interest rates, our results suggest that a major underlying reason for the value increases has been a reduction in risk premium in EMU countries that has consequently reduced firms' cost of capital. In principle, it is possible that the adoption of euro could have increased market risk in Europe, because authorities in individual countries now lack instruments to respond to asymmetric shocks. However, we do not find any support for this view. In addition, Bartram and Karolyi (2003) document declining market risk for firms exposed to European risks, further strengthening our results and interpretations.

An additional argument for why euro countries have witnessed a significant positive development in the corporate sector is tax reductions. Our results, however, hold even when we consider changes in taxation in the countries we study. We also show that firms have increased value as an effect of the euro itself, not as a consequence of the severe macroeconomic convergence process some of the countries in the euro zone had to go through nor as a consequence of the depreciation of European currencies against the dollar. Another alternative explanation for the value increases we document is cross-border acquisitions. We show that, while there is a positive relationship between the frequency of cross-border mergers and Tobin's Q in the Euroland, most of the gains come from the introduction of the common currency itself. Finally, because 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 value.

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 finance mostly with debt.[15]

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 EMU? It might be tempting to say yes, but as in economics in general, the right answer should be that it depends. If a country's firms are exposed to euro risks, then the answer should be yes. If, for example, the country's firms are more exposed to the dollar, then the loss of monetary independence might be too high of a price to pay for the benefits of the common currency.

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Notes

1. Adler and Dumas (1983), Solnik (1973), and Stulz (1981) develop international asset pricing models, where assets are priced with respect to their beta with the world market portfolio. This result assumes that there are no restrictions on consumption and investment choices and that the purchasing power parity (PPP) holds. If the PPP does not hold, then currency risks should be priced in capital markets, as shown by Adler and Dumas (1983).

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.

3. 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.

4. Greece is excluded due to lack of data and because it was admitted to EMU in June 2000, more than two years after the other countries. Luxembourg is excluded only because of lack of data.

5. Danthine et al. (2000) report that in a poll taken in January 1998 and covering over 200 financial and economic forecasters, all the countries that would adopt the euro in January 1999 received a minimum of 94% positive responses and in most cases the responses were 100% positive.

6. 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).

7. 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.

8. 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.

9. 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.

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

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

12. 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 necessairly capture changes in the effective corporate tax rates. Furtheremore, 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.

13. 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 million.

14. This specification is similar to regressing Tobin's Q on the change in the exchange rate euro-dollar, but it allows for more within-country variation.

15. 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

A Appendix A: 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:

$$R_{ijt} = \alpha_i + \varpi_i R^j_{mt} + \beta^x_i R^j_{xt} + + u_{ijt}, \tag{10}$$

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 (10) using monthly data from January 1992 through December 1994.[16] 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.

Our results are robust to choice of the estimation method for the exposure coefficients. We have performed the estimation by using the method in Jorion (1991) and Bris et al. (2003). They propose a two–step method, in order to eliminate the exchange rate exposure of the market return itself. Here, we first estimate the regression:

$$R^j_{mt} = \gamma^j_o + \gamma^j_1 R^j_{xt} + \nu^j_{st} \qquad \forall j = 1, ..., 15$$

and then estimate exposure by using the orthogonal component of the market return, $F^j_{mt} = R^j_{mt} - (\widehat{\gamma}^j_o + \widehat{\gamma}^j_1 R^j_{xt})$, in a firm–level regression:

$$R_{ijt} = \delta_i + \beta^x_i R^j_{xt} + \beta^m_i F^j_{mt} + \epsilon_{ijt}$$

Note that, if the $\widehat{\gamma}_1$ coefficients are not significantly different from zero, the orthogonalization induces an error-in-variables problem, and the variance of $\widehat{\beta}_i^x$ will be inflated. Therefore, we calculate F_{mt} with $\widehat{\gamma}_1 = 0$ when its significance level is higher than 5 percent. This happens for all but three countries: Denmark, Sweden, and the U.K.. Therefore, for 12 out of 15 countries in our sample, the ERB estimates collapse to the ones we obtain following Jorion (1990), and there is no qualitative change in the results with respect to the ones we report in the paper.

Table 1. 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

Table 2. 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 3. The introduction of the euro and firm value: Fixed firm-effects regression analysis

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. 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 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. A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	All firms				Large firms		Small firms	
Explanatory Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMU-country x post-euro time period	0.074**		0.066**		0.072**		0.063*	
	(2.22)		(2.01)		(2.38)		(1.62)	
Strong EMU-country x post-euro time period		0.043		0.047		0.059*		0.039
		(1.21)		(1.30)		(1.75)		(0.91)
Weak EMU-country x post-euro time period		0.164***		0.132***		0.118***		0.150***
		(4.39)		(3.09)		(3.05)		(2.90)
Domestic long-term real interest rate (%)			-0.031***	-0.019	-0.027**	-0.019	-0.036***	-0.021
			(-2.89)	(-1.47)	(-2.38)	(-1.39)	(-2.83)	(-1.38)
Log of sales (in euro)	-0.103***	-0.105***	-0.103***	-0.104***	-0.100***	-0.102***	-0.100***	-0.101***
	(-6.59)	(-6.84)	(-6.90)	(-6.96)	(-5.73)	(-5.86)	(-4.96)	(-4.93)
EBITDA/ total assets	0.725***	0.725***	0.722***	0.723***	0.921***	0.921***	0.612***	0.613***
	(6.57)	(6.57)	(6.58)	(6.58)	(6.45)	(6.44)	(5.59)	(5.60)
Fixed tangible assets / total assets	-0.088	-0.085***	-0.089	-0.087	-0.043	-0.041	-0.117	-0.116
	(-1.10)	(-1.07)	(-1.12)	(-1.09)	(-0.45)	(-0.43)	(-1.23)	(-1.23)
Non-equity liabilities / total assets	0.401***	0.403***	0.399***	0.401***	0.444***	0.444***	0.374***	0.377***
	(6.31)	(6.36)	(6.29)	(6.35)	(5.97)	(5.96)	(4.95)	(5.02)
Current year real GDP growth (%)	0.034***	0.040***	0.038***	0.041***	0.031***	0.033***	0.044***	0.048***
	(2.92)	(3.40)	(3.18)	(3.39)	(2.76)	(2.85)	(3.22)	(3.50)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.759	0.760	0.760	0.761	0.772	0.773	0.752	0.753
Number of firm-year observations	9,742	9,742	9,742	9,742	4,869	4,869	4,873	4,873

Table 4. The introduction of the euro, exchange rate exposure, and firm value: Fixed firm-effects regression analysis

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. 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 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. A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm. Control variables (log of total assets, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, and real GDP growth) and time dummies are included but not reported. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	All firms				Large firms				Small firms			
Explanatory Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EMU-country x post-euro time period	0.061* (1.84)	0.061* (1.84)			0.077*** (2.65)	0.077*** (2.65)			0.048 (1.17)	0.048 (1.17)		
Strong EMU-country x post-euro time period			0.043 (1.20)	0.044 (1.22)			0.064** (1.98)	0.065** (1.99)			0.027 (0.04)	0.028 (0.63)
Weak EMU-country x post-euro time period			0.127*** (2.91)	0.125*** (2.88)			0.123*** (3.18)	0.122*** (3.17)			0.138** (2.49)	0.133** (2.44)
EMU-country x post-euro time period x significant euro exposure	0.051*** (3.36)		0.048** (3.26)		0.045* (1.93)		0.045* (1.93)		0.055** (1.98)		0.050* (1.92)	
EMU-country x post-euro time period x significant positive euro exposure		0.016 (0.63)		0.020 (1.10)		0.026 (1.03)		0.028 (1.12)		-0.004 (-0.12)		0.003 (-0.52)
EMU-country x post-euro time period x significant negative euro exposure		0.096*** (3.05)		0.086*** (2.82)		0.084* (1.83)		0.079* (1.70)		0.107** (2.45)		0.091** (2.31)
Domestic long-term real interest rate (%)	-0.029*** (-2.63)	-0.018 (-1.35)	-0.029*** (2.65)	-0.018 (-1.39)	-0.022* (-1.94)	-0.014 (-1.04)	-0.022** (-1.97)	-0.014 (-1.06)	-0.036*** (-2.75)	-0.022 (-1.47)	-0.036*** (-2.77)	-0.023 (-1.52)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.768	0.769	0.769	0.769	0.774	0.774	0.774	0.774	0.764	0.764	0.765	0.765
Number of firm-year observations	8,787	8,787	8,787	8,787	4,531	4,531	4,531	4,531	4,256	4,256	4,256	4,256

Table 5. 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. 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 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. A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years 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)
EMU-country x post-euro time period	0.111**		0.073**		0.023		0.058*	
	(2.48)		(2.06)		(0.68)		(1.92)	
Strong EMU-country x post-euro time period		0.072		0.074*		0.006		0.044
		(1.48)		(1.88)		(0.17)		(1.33)
Weak EMU-country x post euro time period		0.266***		0.068		0.081*		0.101**
		(4.67)		(1.32)		(1.81)		(2.45)
Domestic long-term real interest rate (%)	-0.051***	-0.028*	-0.027*	-0.028	-0.015	-0.005	-0.018**	-0.011
	(-3.46)	(-1.73)	(-1.91)	(-1.61)	(-1.23)	(-0.30)	(-2.18)	(-0.98)
Log of sales (in euro)	-0.093***	-0.094***	-0.131***	-0.131***	-0.111***	-0.112***	-0.069***	-0.070**
	(-4.54)	(-4.55)	(-4.12)	(-4.14)	(-3.29)	(-3.31)	(-5.02)	(-5.09)
EBITDA/ total assets	1.222***	1.222***	0.833***	0.833***	0.572***	0.577***	0.456***	0.456***
	(7.60)	(7.62)	(5.72)	(5.72)	(4.72)	(4.79)	(3.32)	(3.32)
Fixed tangible assets / total assets	-0.242	-0.240	-0.066	-0.067	0.025	0.026	-0.076	-0.078
	(-1.63)	(-1.62)	(-0.60)	(-0.61)	(0.22)	(0.23)	(-0.71)	(-0.73)
Non-equity liabilities/ Total assets	0.658***	0.661***	0.403***	0.403***	0.500***	0.503***	0.255**	0.255***
	(5.59)	(5.67)	(3.95)	(3.95)	(6.60)	(6.63)	(2.03)	(2.03)
Current year real GDP growth	4.799***	5.358***	4.106***	4.083***	3.389***	3.617***	2.484**	2.658***
	(2.91)	(3.34)	(2.73)	(2.65)	(2.77)	(2.96)	(2.28)	(2.38)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.781	0.783	0.779	0.779	0.732	0.732	0.708	0.708
Number of firm-year observations	2,391	2,391	2,229	2,229	2,203	2,203	2,242	2,242

Table 6. The introduction of the euro, convergence criteria, corporate taxes, and firm value: Fixed firm-effects regression analysis

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. 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 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 total assets, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, real GDP growth, and domestic long-term real interest rate) and time dummies are included but not reported. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	Adjusted convergence variables		Unadjusted (raw) convergence variables	
Explanatory Variable:	(1)	(2)	(3)	(4)
EMU-country x post-euro time period	0.065**		0.053	
	(2.03)		(1.56)	
Strong EMU-country x post-euro time period		0.040		0.030
		(1.11)		(0.79)
Weak EMU-country x post-euro time period		0.139***		0.118***
		(4.03)		(3.22)
Convergence variables:				
Government deficit (%)	-0.008	-0.007	-0.007	-0.007
	(-0.45)	(-0.42)	(-1.04)	(-1.12)
Government debt / GDP (%)	-0.001	0.000	-0.001	-0.000
	(-0.25)	(0.04)	(-0.26)	(0.13)
Inflation (%)	-0.030	-0.026	0.014	0.005
	(-0.71)	(-0.66)	(1.08)	(0.38)
Long-tern nominal interest rate (%)	-0.049	-0.042	-0.040***	-0.031**
	(-1.29)	(-1.28)	(-3.21)	(-2.28)
Corporate tax rate (%)	0.005	0.004	0.001	0.001
	(1.02)	(0.78)	(0.14)	(0.18)
Control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Adjusted R^2	0.760	0,761	0.761	0.761
Number of firm-year observations	9,742	9,742	9,742	9,742

Table 7. 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 8. The introduction of the euro, cross-border takeover activity, and firm value: Fixed firm-effects regression analysis

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. 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 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 A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm. Control variables (log of total assets, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, and real GDP growth) and time dummies are included but not reported. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	All firms		Large firms		Small firms	
Explanatory Variable:	(1)	(2)	(3)	(4)	(5)	(6)
EMU-country x post-euro time period	0.067**		0.074**		0.063	
	(1.98)		(2.41)		(1.58)	
Strong EMU-country x post-euro time period		0.049		0.061*		0.041
		(1.37)		(1.89)		(0.96)
Weak EMU-country x post-euro time period		0.142***		0.125***		0.161***
		(2.89)		(2.98)		(2.69)
Cross-border takeover activity	0.043	0.170	0.051	0.137	0.031	0.200
(=Domestic targets/ Number of firms in domestic market)	(0.19)	(0.68)	(0.24)	(0.60)	(0.10)	(0.62)
Domestic long-term real interest rate (%)	-0.030***	-0.017	-0.026**	-0.017	-0.035***	-0.019
	(-2.83)	(-1.25)	(-2.34)	(-1.21)	(-2.72)	(-1.15)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.760	0.761	0.772	0.773	0.752	0.753
Number of firm-year observations	9,742	9,742	4,869	4,869	4,873	4,873

Table 9. The introduction of the euro and firm value: Changes in USD exchange rate

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. 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 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. A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm. Control variables (log of total assets, EBITDA/ total assets, fixed tangible assets / total assets, non-equity liabilities / total assets, and real GDP growth) and time dummies are included but not reported. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	All firms		Large firms		Small firms	
Explanatory Variable:	(1)	(2)	(3)	(4)	(5)	(6)
EMU-country x post-euro time period	0.067**		0.075**		0.063*	
	(2.03)		(2.37)		(1.66)	
Strong EMU-country x post-euro time period		0.049		0.062*		0.039
		(1.33)		(1.76)		(0.18)
Weak EMU-country x post-euro time period		0.136***		0.122**		0.151***
		(3.24)		(3.15)		(3.03)
Current year relative change in the Domestic currency/USD- exchange rate	0.044	0.059	0.082	0.092	0.008	0.027
	(0.28)	(0.36)	(0.56)	(0.61)	(0.05)	(0.15)
Domestic long-term real interest rate (%)	-0.030***	-0.018	-0.025**	-0.017	-0.036***	-0.021
	(-2.89)	(-1.49)	(-2.32)	(-1.36)	(-2.84)	(-1.41)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.760	0.761	0.773	0.773	0.752	0.752
Number of firm-year observations	9,742	9,742	4,869	4,869	4,873	4,873

Table 10. 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. 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 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. A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	All firms				Large firms		Small firms	
Explanatory Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EMU-country x post-euro time period	0.052*		0.050		0.049		0.053	
	(1.72)		(1.61)		(1.53)		(1.57)	
Strong EMU-country x post-euro time period		0.011		0.010		0.021		0.000
		(0.33)		(0.29)		(0.59)		(-0.01)
Weak EMU-country x post-euro time period		0.110***		0.131***		0.104***		0.163***
		(3.50)		(4.02)		(3.01)		(4.32)
Domestic long-term real interest rate (%)			-0.004	0.013	0.004	0.016	-0.014	0.009
			(-0.49)	(1.47)	(0.45)	(1.60)	(-1.54)	(0.94)
Log of sales (in euro)	-0.033*	-0.033*	-0.033*	-0.031	-0.092***	-0.093***	-0.005	0.000
	(-1.68)	(-1.69)	(-1.70)	(-1.60)	(-3.62)	(-3.60)	(-0.23)	(0.01)
EBITDA/ total assets	1.019***	1.023***	1.020***	1.021***	1.368***	1.363***	0.835***	0.839***
	(5.88)	(5.98)	(5.89)	(5.94)	(6.12)	(6.13)	(3.94)	(4.02)
Fixed tangible assets / total assets	-0.109	-0.108	-0.109	-0.107	-0.077	-0.065	-0.104	-0.115
	(-0.88)	(-0.88)	(-0.88)	(-0.88)	(-0.74)	(-0.64)	(-0.61)	(-0.69)
Non-equity liabilities / total assets	0.247***	0.249***	0.246***	0.252***	0.383***	0.385***	0.179	0.193
	(2.62)	(2.64)	(2.62)	(2.67)	(3.49)	(3.45)	(1.26)	(1.36)
Current year real GDP growth (%)	0.037***	0.043***	0.037***	0.043***	0.027***	0.031***	0.045***	0.052***
	(4.14)	(4.65)	(4.13)	(4.72)	(2.98)	(3.19)	(4.09)	(4.94)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.798	0.800	0.798	0.800	0.810	0.811	0.792	0.796
Number of firm-year observations	3,774	3,774	3,774	3,774	1,874	1,874	1,900	1,900

Table 11: The introduction of the euro and firm value: 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. 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 EMU-countries classified as weak (i.e., countries with a recent currency crisis) are: Finland, Italy, Ireland, Portugal and Spain. A firm is classified as large if its total sales in 1995 are above the median value of total sales among sample firms from the same country and year; otherwise it is classified as a small firm Control variables (log of total assets, EBITDA/ total assets, fixed tangible assets/ total assets, non-equity liabilities/ total assets, and real GDP growth) and time dummies are included but not reported. T-statistics based on heteroskedasticity-robust standard errors adjusted for firm dependence within country-years are reported within parentheses. *, **, and ***, denotes significance at the 10%, 5%, and 1%-levels, respectively.

	Yearly effects	
Explanatory Variable:	(1)	(2)
Strong EMU-country x 1996	-0.007	-0.013
	(-0.16)	(-0.30)
Strong EMU-country x 1997	0.054	0.044
	(1.11)	(0.87)
Strong EMU-country x 1998	0.122	0.119***
	(2.69)	(2.67)
Strong EMU-country x 1999	0.018	0.021
	(0.39)	(0.46)
Strong EMU-country x 2000	0.012	0.002
	(0.23)	(0.04)
Weak EMU-country x 1996	0.023	0.008
	(0.52)	(0.15)
Weak EMU-country x 1997	0.140***	0.114**
	(3.16)	(2.00)
Weak EMU-country x 1998	0.282***	0.250***
	(6.01)	(3.81)
Weak EMU-country x 1999	0.174***	0.146**
	(3.61)	(2.37)
Weak EMU-country x 2000	0.182***	0.142*
	(3.32)	(1.80)
Domestic long-term real interest rate (%)		-0.012
		(-0.77)
Control variables	Yes	Yes
Year dummies	Yes	Yes
Adjusted R^2	0.763	0.763
Number of firm-year observations	9,742	9,742