Export-Oriented FDI, the Euro, and EU Enlargement

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Abstract

Since 1999, the UK's share of FDI heading into Europe has declined dramatically, while the Euro-Zone's share has increased. I argue that the timing of this divergence is not coincidental. The formation of the Euro-Zone has eliminated nominal exchange rate volatility between member-states, increasing export market access intra-union. For source countries outside of Europe, Euro-Zone countries have become more attractive destinations for export-oriented FDI, as operations within the union are insulated from currency fluctuations. As exchange rate volatility between a non-Euro country and local export markets increases, or as the market size of the euro-zone increases, more and more investment will be diverted towards Euro-Zone countries.

This theory is tested in two stages using detailed data on the operations of foreign affiliates of US multinationals across seventeen European countries from 1983 – 2004. A host country's export market access is first estimated with an augmented gravity model. This export series is then included in a dynamic panel with US to host market exchange rate volatility and a range of FDI determinants to explain inflows of FDI from the US to European countries. Potential endogeneity issues are addressed using the Arellano and Bond (1991) GMM procedure. The ability to export from a particular host country has a positive and significant effect on inflows of FDI. Additionally, unobserved features of Euro-Zone membership (beyond the elimination of currency risk) have a positive effect on inflows. A counterfactual experiment sheds light on how much FDI the UK "lost" by not adopting the euro in 1999. Re-estimating the trade and FDI relations under the assumption that the UK had adopted the euro, I estimate that the UK has lost approximately $33 billion (2% of GDP) worth of FDI from the US. Similarly, the flight of FDI to the new EU accession countries has been slowed by these countries staying out of the Euro-Zone.

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I. Introduction

In December 1997, a surprising announcement was made by Toyota Motor Corporation. The Japanese car manufacturer announced plans to build a new factory in Valenciennes, France rather than in the UK as had been anticipated. At the time, labor costs in France were approximately 10% higher than those in the UK, a differential further exacerbated with the French statutory working week expected to be reduced from 39 to 35 hours in 2000. Coupled with the fact that existing regulations made it more difficult to lay off workers in France than in Britain, why did Toyota choose to build its new factory in France? While it is true that the French government agreed to pay 10% of the initial investment, was this enough to offset the higher production costs? Was it the case (as some analysts have argued) that Toyota predicted recruitment problems in the UK due to low unemployment and skill shortages? Or was it that France is a member of the Euro-Zone while the UK is not? By locating in France, Toyota's sales in France and exports to the other eleven members of the Euro-Zone would be insulated from currency risk. Although the Toyota's official stance at the time was that Britain's "wait and see" attitude on the euro did not influence the decision, managing director Tatsuo Takahashi was quoted as saying that it would consider it "a matter of concern" if the UK stayed out of the Euro-Zone.[1] Highlighting this, Toyota told all its UK suppliers in August of 2000 to settle all bills in euros stating a desire to "minimize currency risk exposure." Was the decision to build a new production facility in France an example of Toyota acting on this concern?

Historically, the UK has been the largest recipient of inward FDI flows to the European Union. Figure 1 suggests the possible impact of the euro on this trend. Between 1990 and 1998, the UK's average share of total inflows to the European Union was approximately 20%. During this same period, the share of total EU inflows going to the Euro-Zone countries as a whole ranged from 60 – 75%. Around 1998, however, the UK began losing FDI to the Euro-Zone countries. In 1998, 25% of all FDI inflows to the EU went to the UK, while the Euro-Zone's aggregate share was 56%. By 2001, the UK's share had fallen to 13%, while the Euro-Zone's share had risen to 73%. By 2003, the UK share had fallen even further to 6%, while the EMU share rose to 84%. What had brought about this divergence? While it is true that overall flows to the EU have fallen in this period (reflecting a sluggish global economy), why has the fall in FDI been so much more pronounced in the UK than in the Euro-Zone countries? Various explanations such as tight labor markets, differential tax incentives, and a greater degree of "hot" money invested in the UK due to looser regulations have been presented. These variables, however, have not drastically changed over this

[1] "Britain loses to France in £400 million fight for car jobs," *The Times of London*, December 11th, 1997

period and are unlikely to have caused the observed divergence. Another potential explanation is that while much of Europe has adopted a single currency, Great Britain has maintained its own currency. This argument is supported by the fact that this pattern of declining FDI shares is also seen in Denmark and Sweden, both countries that have not adopted the euro as their currency[2].

Why should membership in a currency union have an effect on the flow of FDI into a country? To see why this might make a difference, consider a U.S. firm deciding on where to locate its European production facilities. The firm has already decided that because of transportation costs, home biases, trade barriers, and a host of other factors, it would rather serve the European market through a local production facility rather than exporting from a U.S. based production facility. If the fixed costs involved in setting up a new production facility are high enough, the firm will not produce in every European country. Rather, it will take advantage of the free trade and low transport costs between EU countries and only produce in one location. Figure 2 diagrams this situation, showing the market activities of the foreign affiliate located either inside or outside the Euro-Zone. What is the optimal location for the firm? Considerations in determining this choice include production costs, access to skilled labor, local infrastructure, and tax treatments. Holding these factors constant, is there any reason to believe that the firm would prefer to produce in a Euro-Zone country over a non-Euro country? If the firm cares about exposure to exchange rate volatility, then there is. Suppose a firm locates production in the UK and then sells its goods in the UK, France, and Germany. The firm's sales in the UK are insulated from currency risk, but sales in France and Germany are not. Contrast this situation to a firm locating production in Germany. Sales in the UK are exposed to currency risk, but because France and Germany share the same currency, exports to France will be insulated from exchange rate volatility. Assuming that sales are roughly proportional to a country's GDP, locating within the EMU will insulate a greater proportion of sales from currency risk. Thus, if all traditional determinants of FDI are identical across locations, a firm may well have an incentive to locate within a currency zone, as it reduces uncertainty.

As has been shown by Dixit (1989), the firm need not be risk averse for this result to hold, as long as the firm has the option to make the direct investment in more than one period. When firms make irreversible (or only partially reversible) investments, the timing of these investments becomes important. Uncertainty about future market conditions gives an option value to waiting. The higher the degree of uncertainty, the more profitable it is for a firm to hold off on its investments. This result is driven by the fact that once an investment is made, it cannot be completely recovered. Suppose a firm makes an investment in an overseas production facility. The amount spent on the investment will generally be greater then the amount that the firm can recoup

[2] There is also some evidence of declining FDI shares for non-EU countries such as Norway and Switzerland. This may be due to these countries not using the euro or greater trade barriers from not being in the EU.

through divestiture, resulting in FDI hysteresis, similar to the effect of exchange rate shocks on trade patterns as exposited by Baldwin and Krugman (1989). A positive economic shock that would induce a reversible direct investment may not be enough to trigger an irreversible direct investment. A negative shock that would cause a firm to exit a foreign market may not be enough of a stimulus for exit when the full value of direct investment cannot be recovered.

Given the above argument, FDI is a decreasing function of uncertainty. If a multinational wishes to serve all markets in a region (the FDI is export-oriented), investment within a currency union will lead to less uncertainty than investment outside the union. All else being equal, a firm will choose to invest in the location that yields the lowest uncertainty. If the majority of the firm's sales are in the currency union, then locating within the union will yield the lowest uncertainty. Given that FDI often acts as technology transfer vehicle, yielding positive spillover effects and increases in the rate of technological progress (c.f. Barell and Pain, 1997; Borenzenstein et. al., 1998), any increases in inward investment to the euro-zone can be counted as a benefit of monetary union.

Does this situation change with the accession of ten new countries to the European Union? In 2004, a group of nations with significantly lower labor costs joined the EU, but did not adopt the euro.[3] These nations appear to be attractive destinations for export-oriented FDI, given their low production costs and cooperative tax-schemes. However, export market access to the rest of these countries is limited – both by the barrier of different currencies and by their geographical location in Europe. This paper predicts and confirms (though with a limited dataset) that EU expansion will not lead to a flood of investment to the east at the expense of the west.

Goals of the paper

This paper makes two contributions to the literature on currency risk and FDI. Existing empirical studies have not reached a consensus on the effect of exchange rate volatility on inflows of FDI. This indeterminacy may in part be due to past studies overlooking the importance of export-oriented FDI. Exchange rate volatility affects the risk of a foreign investment directly - currency exposure between the headquarters and host countries - and indirectly - reducing local export market access of a foreign affiliate. Overlooking the latter channel will bias any estimates of the effect of currency risk on FDI. I attempt to reconcile the existing literature's conflicting results by developing a link between foreign affiliate exports, FDI from the headquarters country, and currency risk. The second contribution is to examine what effect, if any, the adoption of the euro in 1999 has had on inflows of FDI to both Euro-Zone members and non-members. Consider these two stylized facts: the Euro-Zone has eliminated nominal exchange rate volatility within the union and the two largest markets in Europe are located within the Euro-Zone. The increased ability to export within a

[3] Of the accession countries, only Slovenia has adopted the euro.

currency union coupled with the two largest markets being in the union may induce a multinational to locate new foreign production within the Euro-zone at the expense of the non-Euro countries. Figure 1 outlines a sharp divergence between the inflows of FDI going to the UK and the Euro-Zone countries. To what extent can our results explain this divergence, yielding estimates of how much FDI the non-Euro-Zone countries have "lost" by not joining? Will this dynamic change following expansion of the EU into a region with significantly lower production costs?

To answer these questions, I use a dataset on US direct investment in thirty European countries over the period 1983 – 2004, examining the interactions between exchange rate volatility, foreign affiliate exports, and FDI inflows in two stages. In the first stage, I estimate export market access from potential host countries within a gravity model. This relation is estimated recursively, yielding forecast exports by the multinational. In the second stage, I examine how the multinational's expected exports from a hypothetical foreign production facility affect flows of direct investment to the host country. Forecasted exports, exchange rate volatility between the US and the host country, and a set of other FDI determinants are used to explain inflows of FDI within a dynamic panel. Applying this methodology yields valuable insights to the interaction between export-oriented FDI and exchange rate volatility. Furthermore, we are able to separate out currency risk between the headquarters and host as well as between the host and local export markets.

II. Literature Review

The consensus view: there is no consensus

This paper builds upon two related strands of literature: the effects of exchange rate volatility on inflows of FDI and the effects of currency risk on trade flows. While these issues have been studied extensively, no definitive conclusions have been reached. For both FDI and trade, some studies have found a positive effect, some have found a negative effect, and others have found that currency risk has no significant impact on either variable. [4]

One possible reason why an increase in currency risk might cause FDI inflows to increase is export substitution. Markusen (1995) argues that firms will engage in FDI to avoid the costs of international trade, which include currency risk. As the exchange rate becomes more volatile, more firms will choose to serve foreign markets through a local (host country) production facility rather than exports from the headquarters country. Goldberg and Kolstad (1995) use a model with a risk averse multinational, allowing for both exchange rate shocks and demand shocks. The optimal amount of productive capacity located abroad is increasing with exchange rate volatility. Numerous empirical studies have supported this view. Cushman (1988) and Stokman and Vlar (1996) find a significantly positive relationship between exchange rate volatility and FDI flows into and out of the

[4] Throughout the remainder of the paper, the terms "exchange rate volatility" and "currency risk" will be used interchangeably. Although not technically the same, we will consider them as such.

US and the Netherlands. De Ménil (1999) examines this issue across the EU and finds that a sustained 10% increase in exchange rate volatility (as measured by the standard deviation of the real exchange rate) will eventually increase the level of FDI by 15% a result supported by Pain and Van Welsum (2003) and Sung and Lapan (2000), who find a positive effect of exchange rate fluctuations on inflows of FDI into the UK, Germany, Canada, and the US.

One possible explanation for a negative impact of currency risk on FDI is that a direct investment is at least partially irreversible. When a multinational engages in FDI, it cannot completely recover the value of the investment. When future revenues are uncertain, it may pay for the firm to wait and acquire additional information. Dixit (1989) considers this in the context of option values. A firm has an option to make an investment at any given point in time, and as the underlying volatility of the investment increases, so too does the firm's option to hold off on the investment. More volatile investment projects will require a higher level of expected profits to trigger investment. As a result, we can expect countries with a high degree of exchange rate risk to lose FDI to countries with more stable currencies.

Supporting this idea are several studies finding a negative relationship between currency risk and FDI. Campa (1993) examines the effect of exchange rate volatility on direct investment to sixty-one US industries, and finds that increases in uncertainty were associated with decreases in direct investment, with the largest decreases associated with industries with high sunk costs. Bell and Campa (1997) examine this issue in the context of the Chemical Processing industry. They find that input price and product demand shocks have little to no effect on FDI, but that exchange rate shocks have a large effect, especially in the European Union. Darby et al (1999) use a threshold model and find a negative long run relationship between exchange rate volatility and investment in France, Germany, and the US; and a negative short run relationship with investment in the UK and Italy. Byrne and Davis (2003) find that a sustained 10% increase in the monthly volatility of the real effective exchange rate lowers the total volume of investment by 1.5%. Both Benassy-Quere et al (2001) and Hubert and Pain (1999) find a negative impact of exchange rate volatility on flows of FDI to developing countries. It may be the case that in these studies, a volatile exchange rate is just a symptom of deeper institutional and structural problems in developing countries. However, other studies have noted this negative relationship for developed countries. Another possible reason for the lack of consensus is the specification of exchange rate volatility. Measuring exchange rate risk with unconditional variance may underestimate its true impact, as it does not allow for all available information (specifically any autocorrelation in exchange rates) to be taken into account when forming expectations about future volatility. Amuedo-Dorantes and Pozo (2001) model exchange rates with a GARCH process and find a significantly negative effect for currency risk, although this effect is stronger in the long run.

A third channel for currency risk?

These studies have principally focused on the volatility of the headquarters to host country exchange rate. What they may overlook, however, is exchange rate volatility between the host country and local markets that are served by the foreign affiliate. For example, when considering flows of FDI between the United States and Germany, we need to consider not only the exchange rate between the dollar and the deutschemark (or the euro after 1999), but also the exchange rate between the mark and the currencies of any foreign market serviced by the German affiliate. As long as foreign affiliates have a not insignificant portion of their sales outside the host country, then overlooking exchange rate volatility between the host and local export markets may bias any estimates of the effect of exchange rate uncertainty on FDI.

A study by Ricci (1998) finds that the effects of currency risk on FDI vary across country size, with nominal exchange rate volatility having a significant positive long run relationship for a subset of large countries, but a significantly negative long run relationship for small countries. Increases in exchange rate volatility may induce a multinational to locate in the largest market, a manifestation of Krugman's home market effect. Given the tendency for FDI to go to the largest market, we must pay attention to variables that define a market's borders. As one of these is the currency in usage, any study that overlooks currency fluctuations between local markets may be flawed.

Just how important are exports to the activities of foreign affiliates of US multinationals? Kneller and Pisu (2004) examine the behavior of foreign affiliates located within the UK relative to indigenous firms and find that the affiliates tend to export more than native firms. Barry and Bradley (1997) find that nearly 80% of all output produced by foreign affiliates located in Ireland is exported. Furthermore, the majority of FDI is in industries characterized by increasing returns, suggesting that a multinational would rather serve a region through exports from one foreign affiliate than with an affiliate in each country.[5]

Table 1 lists total sales, export shares, and the total number of affiliates across seventeen European countries in 1985 and 2004. While the larger countries in the sample tend to be those with the greatest sales and most affiliates, an interesting pattern emerges when examining export behavior. The export share is defined as the percentage of the total sales of foreign affiliates sold outside the affiliate's host country (excluding re-exports to the US). Focusing on 1985, there is considerable variation in this share across countries, ranging from 1.7% in Finland to 84.3% in Luxembourg. The export share of sales tends to be higher in smaller countries and in countries that are physically closer to the major European markets; supporting the notion that a firm making a direct investment

[5] Across OECD countries, over 63% of foreign-industry employment is characterized by increasing returns, compared to 23% for indigenous manufacturing employment (O'Malley, 1992).

considers both host market conditions and those in other local markets.[6] Furthermore, this pattern remains stable across the sample period, with exports remaining a fairly significant portion of total sales across the 1980's and 90's. While data is only available for recent years of FDI activity in Central and Eastern Europe (CEE), a similar pattern holds.

The evidence suggests that a significant portion of FDI is export-oriented. FDI from the US to Europe is overwhelmingly horizontal as well. Table 2 breaks down the sales of US foreign affiliates by destination. While sales to the host country generally make up the largest portion, exports to local markets dwarf re-exports to the US, a pattern that even holds for the CEE countries. This indicates that US firms are engaging in FDI to serve the European market, rather than take advantage of cost advantages offered by European production facilities.[7] Given that FDI to Europe appears to be both horizontal and export-oriented, we need to consider both the interaction between the headquarters and host countries and that between the host country and local export markets. Taking local export markets into account is especially relevant when looking at FDI in a free-trade zone such as the EU. The next section develops a theoretical model that captures this dynamic.

III. Empirical Methodology

How does currency risk affect FDI? What is the relation between membership in a trade or monetary union and foreign investment? How has enlargement of the EU affected the pattern of FDI to Europe? Some light may be shed on these questions by turning to the operations of US multinationals in Europe. Given the limited data available on CEE nations, the first two questions listed above (the impacts of currency risk and monetary union membership on FDI) will be addressed using a baseline model. The model will then be adjusted to incorporate all available data on CEE countries. In both cases, the methodology will be the same – to first estimate the ability of a country to export to adjacent markets then to see how that export ability affects the FDI it receives.

The Data

Data on the activities of US multinationals is supplied by the US Bureau of Economic Analysis, *Financial and Operating Data of US Multinationals Abroad*. This dataset has been published annually since 1982 and include information on the total sales, exports, labor costs, taxes paid, and depreciation of foreign affiliates of US multinationals across a wide range of countries. Due to data availability limitations, this paper examines a sample covering the period 1983 – 2004 for thirty

[6] The majority of exports are going to local European markets. Between 1994 and 1999, approximately 89% of total exports from foreign affiliates of US multinationals located within Europe went to other European nations (Bureau of Economic Analysis, 1994 and 1999).

[7] The only two countries with re-exports constituting more than 10% of sales are Ireland and Sweden. In both of these cases, however, local export sales constitute a significantly larger portion of total sales than re-exports.

European countries. The countries included in the sample are Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, and the UK.[8] This gives us a nice mix of small and large countries as well as countries that have adopted the euro and those maintaining their own currencies and monetary policy.

Export market potential is proxied by the export share of total affiliate sales. Unfortunately, the export data published by the BEA does not give destinations, only the total value of exports. We may, however, be able to infer bilateral export data by assuming that on average, export patterns by foreign affiliates matches that of domestic firms in the host country. To infer bilateral exports, we calculate the share of total exports from the host country to local export markets using trade statistics collected from the World Bank's *World Trade Analyzer*. For example, if Germany's total exports equal $100 and German exports to France equal $30, then France's share of German exports is 30%. Once these shares are tabulated, bilateral foreign affiliate exports are computed by multiplying total exports from the foreign affiliate by each country's share of the host market's exports. Admittedly, foreign affiliate export behavior matching that of domestic firms is a strong assumption. We do, however, have some empirical support for this. Every five years, the BEA conducts a benchmark survey of US multinationals in which exports are broken down by their destination (to the UK, the EU less the UK, Canada, and Japan). Our implied measure of bilateral exports closely matches the actual figures for the benchmark survey years (generally within 10% of the actual export figure.)

The BEA publishes data on both inward position of FDI – the stock of existing capital in the host country – and inflows of FDI – new investment in the host country. To control for size effects across countries, we express inflows as a percentage of GDP. Doing so allows us to compare inflows to a relatively small country like Belgium with inflows to a larger country such as France.

Monthly exchange rate data is taken from the IMF's *International Financial Statistics* for the period 1982 – 2004. Currency risk is proxied for by exchange rate volatility, estimated by fitting monthly exchange rates to a GARCH(p,q) process with lags chosen from information criteria. We assume that firms will change their behavior given new information, so we want to use a measure of exchange rate volatility that is conditional on information up to time t. In nearly all cases, the results support a GARCH(1,1) process and our estimate of exchange rate volatility is the conditional variance from this process.[9]

[8] Due to data limitations, the dataset is significantly more complete for the Western European nations. FDI data for Belgium and Luxembourg are aggregated

[9] For robustness, we also estimated the relations with an unconditional measure of exchange rate volatility. The results do not qualitatively change (no change in sign or significance), but the magnitudes of the exchange rate effects are larger for the GARCH specification.

FDI, foreign affiliate exports, and exchange rate volatility

I estimate the impact of export market potential and exchange rate volatility on FDI using a two-stage process. I first forecast export potential as share of total affiliate sales, then include this estimate in a regression of FDI on export behavior , exchange rate volatility between the headquarters (U.S.) and host country, lagged FDI, and a set of variables that have been found to be significant determinants of FDI. Two estimation issues need to be accounted for with this procedure. First, the use of generated regressors (predicted export potential) will cause the asymptotic t-statistics in the FDI regression to overstate their true values. Second, the inclusion of a lagged dependent variable in the cross-sectional time series FDI regression may cause an endogeneity bias. Both these issues will be addressed in greater detail below. The empirical setup is summarized as:

$$X_{H,E,t} = X^{*}_{H,E,t} + u_{H,t} = \beta_1 y_{H,t} + \beta_2 y_{E,t} + \beta_3 \pi_{H,t} + \beta_4 \pi_{E,t} + \beta_5 \log(dist_{H,E}) + \beta_6 EU_t + \beta_7 Border + \beta_8 Lang + u_{H,E,t} \quad (1)$$

$$X^{*}_{H,t} = \sum_{E=1}^{N} X^{*}_{H,E,t} \quad (2)$$

$$\Delta FDI_{H,t} = \psi \Delta FDI_{H,t-1} + \beta_1 X^{*}_{H,t\,H,t} + \beta_2 Euro_{H,t} + \gamma_1 V_{H,t} + \gamma_2 Y_{H,t} + \gamma_3 Wage_{H,t} + \gamma_4 Tax_{H,t} + \gamma_5 Depr_{H,t} + \delta_H + \eta_t + u_{H,t} \quad (3)$$

FDI in year *t* is a function of past FDI, forecasted exports (export market potential), a dummy variable for euro-zone membership, exchange rate volatility between the headquarters (the U.S. in this paper) and host countries, GDP in the host country, labor costs, taxes, and depreciation. Forecast exports are defined in equations 1 and 2. From 2, we see that a multinational's forecast of exports from host country H is equal to the sum of exports from the host country to export markets E = 1,…,N. We assume that forecasted exports are observed with measurement error. Forecasted exports are then estimated with a gravity model, relating the export share of sales between a host country and local export markets to log GDP and inflation in both countries, log distance between the countries, a dummy variable equal to one if both countries are members of the EU in year t, a border dummy and a language dummy.[10] We use export share of total sales instead of total exports as this adjusts for differences in market size across the host countries. This provides a more reliable estimate of export behavior than total exports as a large market may have larger export sales due to a larger volume of FDI than a smaller country that exports a greater proportion of total output.

[10] Countries are said to share a border if they are contiguous or have a high degree of cross-border traffic (thus, while France and the UK are not technically contiguous, they are treated as such). The common language variable is equal to 1 if at least 10% of the population in both countries speaks the same language.

One way to proceed would be to estimate the relation in 1 using the full sample, aggregating the predicted values from this estimation and then replacing $X^*_{H,t}$ in 3 with the predicted value $\hat{X}_{H,t}$. While intuitively appealing, this procedure would lead to invalid inferences about the coefficients in 3 due to the fact that $\hat{X}_{H,t}$ is a generated regressor potentially correlated with $u_{H,t}$. Pagan (1984) shows that in a system such as that presented in 1-3, the OLS estimator of the variance of the estimated coefficients in 3 will be inconsistent and the asymptotic t-statistics will generally overstate their true values. To account for this, I estimate the parameters in the export equation recursively, forecasting year t exports using only information up to year t-1. Using this method yields a forecast time series that will be uncorrelated with the error term in 3. Forecasts are based on information available up to year t-1, and will thus be uncorrelated with the year t error term. A drawback to this procedure is that we are forced to truncate the dataset, with forecast exports starting in 1984. Given that we are more interested in the behavior of FDI in the latter years of the sample, the tradeoff between bias and efficiency is justified. We are looking at inflows of FDI, which are defined as the change in FDI position from year t-1 to year 1. In other words, inflows are the same as differenced inward position. Arellano and Bond (1991) have argued that the presence of a lagged dependent variable in a panel may cause an endogeneity bias. The intuition behind this result is that the within-group lagged error term is correlated with the within group error term. While this problem disappears as T goes to infinity, it may seriously bias any small sample results. They propose a GMM approach to instrument the lagged dependent variable in the panel regression. Consider a simplified relation for inward FDI *position*:

$$FDI_{h,t} = \psi FDI_{h,t-1} + \beta X_{h,t} + \alpha_h + \nu_{h,t} \quad (4)$$

To get inflows, we take first differences:

$$FDI_{h,t} - FDI_{h,t-1} = \psi(FDI_{h,t-1} - FDI_{h,t-2}) + \beta(X_{h,t} - X_{h,t-1}) + (\nu_{h,t} - \nu_{h,t-1}) \quad (5)$$

As can be seen with a comparison of (4) and (5), taking the first difference eliminates the fixed effects estimator (a_h). As such, the unobserved heterogeneity across groups may bias any estimate of ψ through an omitted variable bias. One possible solution to this problem is to instrument lagged FDI through a generalized method of moments approach. The GMM estimators use all available lags at each period as instruments for the equation in first differences. We define $Z_{h,t}$ as a vector of predetermined variables such that $Cov(Z_{h,t},\nu_{h,s})=0$ for all $s<t$ and $Cov(Z_{h,t},\alpha_h)\neq 0$ for all $t = 1,\ldots,T$. Thus, all lags of Z_h up to $Z_{h,t-1}$ are valid instruments for lagged FDI. Valid instruments therefore include both the second lag and beyond of the dependant variable, but also all lags of the pre-determined variables. The optimal weighting matrix for the instruments is obtained from the residuals of a first step consistent estimate of the FDI relation (OLS in this case) with equal weights on all instruments. Following this procedure will yield consistent estimates for the coefficients in 3.

There are several ways in which membership in the Euro-Zone can affect FDI through this estimation procedure. In the first step, the elimination of exchange rate volatility between host countries and export markets may raise trade. This then feeds through to FDI via the impact of export market potential on inflows of foreign investment. Euro-zone membership may also affect FDI directly through the Euro dummy variable. This variable represents the impact of monetary union membership beyond increased trade. Given the long run nature of most FDI flows, I choose 1998 as the starting date for the Euro-Zone. Why choose 1998 as the start date for the EMU when the euro was not officially adopted until January 1st, 1999? Firms looking to make a direct investment will invariably consider market conditions several years into the future when making this decision. By 1998, most analysts agreed that the adoption of the euro would proceed for all eleven (Greece joined late) member states. This optimism about the euro was not nearly as strong in 1997. Thus, from the context of a long term investment, we can consider the "true" beginning of the EMU to be 1998.[11]

V. Empirical Results

Exchange rate volatility and affiliate trade

Table 3 presents pooled estimates from the export forecast equation in 1, pooled across a core sample of countries for which there is detailed data available and an expanded sample including CEE countries with limited data coverage. The results presented here are consistent with most gravity equations. GDP in both the host country and the export market have a positive effect on exports, while inflation in both countries tends to dampen exports. More useful for this analysis, we see that membership in the EU increases exports while exchange rate volatility (the proxy for currency risk) reduces exports. Interpreting these results, a country that is both a member of the EU and uses the euro will have greater access to export markets than a similarly sized country outside of the EU. Since more countries use the euro than not, there is increasing export market access with Euro-zone membership, as there will be more trading partners for which exchange rate volatility is equal to zero. Interestingly, the effect of currency risk relative to EU membership falls considerably when including CEE countries in the sample. This may reflect the fact that while currency risk can be a barrier to export markets, it pales in comparison to the more explicit barriers removed by a free trade zone. The other variables in the model have the expected sign, with export market access falling with increased distance, increasing for neighboring countries, and larger for nations speaking the same language (though this result is only significantly different from zero in the expanded sample). These results suggest that the ideal country from which to base export oriented FDI would

[11] Admittedly, this is a subjective start date. One could make an argument for an earlier or later start date for the EMU dummy variable. However, the results do not change qualitatively if the start date is pushed back to 1997 or moved ahead to 1999.

be one located centrally within Europe and that is both a member of the EU and the Euro-zone. In other words, there should be greater export market access from Germany than the UK (not central, doesn't use the euro) and certainly more access than from Poland (on the periphery, doesn't use the euro, not in the EU until 2004). While other variables influence the location decision of a multinational, the ability to serve local export markets may indeed play a critical role.

Affiliate trade, exchange rate volatility, and FDI

Having obtained an estimate of forecast exports, we can now examine the relationship between inflows of direct investment, the ability of a foreign affiliate to export, and currency risk between the host and US markets. To do this, we will be interested in the variation of FDI across both time and countries, implying a dynamic panel model as explained in 3.

Inflows of FDI may exhibit persistent behavior, so I perform panel unit root tests on inflows, using a procedure suggested by Papell and Theodoridis (2001) that controls for cross-sectional correlation. Specifically, I augment the inflow equation in 3 with k_j lags (j=1,…,16) of first differenced inflows, where k_j is chosen using the general to specific lag selection of Ng and Perron (2001). This new specification is then estimated across countries using Seemingly Unrelated Regressions (SUR). Using this methodology, the estimated coefficient on lagged inflows is the test statistic. As can be expected from the persistent behavior of FDI inward *position*, we are able to strongly reject the null of a unit root in inflows. For robustness, a unit root is also rejected using the Im-Pesaran-Shin (IPS) panel unit root test.

Table 4 gives the estimated coefficients across four variations of the FDI relation in 3 for the core sample. The four variations are:

i. Equation 3 without the export share variable
ii. Equation 3 without the export share variable, but with the Euro dummy
iii. Equation 3 with the export share variable
iv. Equation 3 with the export share variable and the Euro dummy.

The first variation can be thought of as a benchmark specification. Inflows of FDI are regressed on lagged values, exchange rate volatility, GDP growth, inflation, average taxes, a measure of labor cost, and depreciation. The second variation allows membership in the Euro-Zone to have a positive or negative shift on inflows. The third variation examines the impact of a multinational's ability to export from a given host country on inflows to that host country. The fourth examines the same issue, but allows for some unobserved features of Euro-Zone membership to have an impact.

Looking at the first column of Table 4, we see that though lagged inflows have a significant effect on current inflows, persistence is weak. Exchange rate volatility has a negative, but insignificant effect, perhaps confirming earlier studies finding indeterminate effects of currency risk

on FDI. GDP growth has a strongly positive effect, indicating that multinationals choose to locate in large markets. Inflation has a significantly positive effect. This is a somewhat surprising result, given that empirical studies have found that investment is often depressed in high inflation countries. However, consider two channels through which inflation may affect FDI. The first channel is to make goods produced in the host country more expensive in local export markets. As this will tend to reduce export behavior, which in turn is positively related to inflows, we would expect to see inflation have a negative impact on FDI. The second channel through which host country inflation may affect FDI is by giving the foreign affiliate a competitive advantage over domestic host country firms. Since the foreign affiliate has access to resources in the headquarters country, they are more insulated from host country inflation. Thus, host country inflation may actually induce greater inflows of FDI. It would appear that the latter effect dominates here. Tax treatment has an expected negative effect, confirming the results in studies on tax competition amongst countries for FDI. Finally, both labor costs and depreciation have insignificant effects.

The results in the second column of Table 4 indicate that Euro-Zone membership is a key determinant of FDI. Membership in the Euro-Zone has a strong and positive effect on inflows of FDI, with membership raising inflows by 0.18% of GDP. Given the significance of the Euro variable, any change in the estimated parameters can partially be explained by their correlation with Euro membership. The only two variables for which we observe any meaningful coefficient change are exchange rate volatility and inflation. In both cases, the parameter estimate switches from negative to positive with the inclusion of the Euro dummy, although both remain statistically insignificant.

Several key insights can be gained from the third column in Table 4. First, a multinational's forecast of the export share of sales has a strong and positive effect on inflows of FDI. The export share coefficient is 6.82, implying that for every 10% increase in the export share of sales, inflows of FDI will increase by 0.68% of GDP. For example, if forecast exports from the UK in 2002 rose from 19% to 29%, we would predict that inflows of FDI would increase by $8.7 billion.

Exchange rate volatility becomes significantly negative (at the 9% level) when we include the export share variable. This implies that by omitting a multinational's ability to export from a host country, the effect of currency risk on FDI has been biased upward. Once we account for export behavior, increases in exchange rate volatility may deter new investment in a host country or divert investment to other, more stable, host countries.

Another coefficient affected by inclusion of the export variable is that on taxes, which becomes insignificant. This is somewhat surprising, as we do have fairly significant variation in taxation and this is a variable that has often been argued to have a strong influence on FDI. For example, total tax payments as a percentage of sales, averaged over the entire sample, range from 2.8% in Switzerland to 7.1% in Ireland to 14.4% in Italy and 23.9% in Norway. However, an

intuitive explanation may be that different types of FDI are affected to differing degrees by taxation. Taxes are likely to have the largest impact on the location decisions of multinationals looking for the lowest cost production site. These investments are also likely to be the most export-oriented. Once we have controlled for export-oriented FDI, we are left with multinationals who locate in a particular host country primarily to serve that host country. As these investments are targeted at a particular country – Ford specifically seeking to establish a presence in the German market, for example – they are less likely to be affected by variations in taxes across time and countries.

The last column of Table 4 gives the estimated coefficients from equation 24 including both export forecasts and the Euro dummy variable. Lagged inflows remain significant with a small autoregressive parameter. The export share variable becomes slightly larger and remains significant, indicating that the ability to export is an important determinant of FDI for both Euro and non-Euro countries. Exchange rate volatility becomes insignificant when we include the Euro dummy, indicating that currency risk was picking up some of the effects of Euro membership. As was the case in the second column, Euro membership has a strongly positive effect on inflows, with Euro membership associated with an increase in inflows of 0.18% of GDP. Given that we directly control for the decrease in currency risk intra-union and indirectly control for increased trade as a result of Euro membership, this implies that some unobserved characteristics of Euro membership have a powerful attractive force for FDI.[12] GDP growth rates continue to have a strong positive effect on FDI inflows, reflecting the fact that multinationals choose to locate in growing markets. One way to interpret this result in the context of this study is that once we have controlled for export market access, currency risk, and operating costs, a multinational will choose to increase its investments in the fastest growing host countries. However, the significance of export market access and currency risk implies that this is not the only consideration. Finally, depreciation has a significant positive effect on inflows of FDI, indicating that one motivation for inflows of direct investment is to replace depreciated capital.

Robustness checks

The results presented in Table 4 may be dependent on the empirical methodology employed. For robustness, Table 5 presents estimation results from three alternative empirical methods of estimating equation 3. The first column lists the estimated coefficients from a least squares dummy variable (OLS) method, ignoring any potential endogeneity. The estimates in the second column employ Anderson and Hsiao's (1981) procedure for dynamic panel data. The third method attempts

[12] Alternatively, this could be due to our expression of exchange rate volatility suffering from measurement or specification error. Furthermore, the currency risk that affects a multinational's decision may be a long run risk estimate, which could exceed the observed short run volatility between the pound and the euro for example.

to bypass the issue of by eliminating the dynamic component of the panel. If we knew the true value of the coefficient on lagged FDI, equation 3 simplifies to a standard panel data model which can be estimated with OLS (equivalent to maximum likelihood in this case). Given this fact, we perform a grid search over plausible values of the autoregressive coefficient, choosing the value that maximizes the resulting likelihood function.

A comparison of Tables 4 and 5 indicate that the key results are robust to the estimation method employed. Under all specifications, the ability to export and Euro membership have a strong and positive effect on inflows of FDI. However, in both the Arellano and Bond and Anderson and Hsiao methods, the coefficient on export share has a larger magnitude, implying that the unobserved heterogeneity across countries places a downward bias on the export share variable in OLS estimation.

Have the non-EMU countries "lost" FDI by not adopting the Euro?

The results discussed above have several implications for the effects of Euro-Zone membership on inflows of FDI. First, the adoption of the euro has eliminated nominal exchange rate volatility intra-union and the Stability and Growth pact has greatly reduced price variability within the union. Past work indicates a strong positive trade effect of currency unions. Taken together with the fact that the aggregate market size within the Euro-Zone is larger than the aggregate EU market size outside the union, we should see foreign affiliates located in Euro countries to increase their export activities. Export activity has a positive effect on FDI inflows, so this in turn should cause an increase in FDI inflows to Euro countries, all else being equal. Second, unobservable features of Euro-Zone membership appear to have a strong positive effect on inflows of FDI. Given these two results, it would appear that membership in the EMU is associated with increased inflows of FDI from the US. This is really no surprise, as Figure 1 shows this result quite clearly.

We can get a rough estimate of the how much the non-euro countries have lost by running a counterfactual experiment. Suppose, for example, that the UK had in fact adopted the euro. What does our estimated model say about inflows of FDI in a world in which the euro has replaced the pound? One way to quantify the effect of UK adoption of the euro on FDI inflows would be to simply adjust the variables accordingly and assume the estimated parameters of the model do not change. For example, we would change the Euro dummy variable to 1 for the UK after 1998, adjust exchange rate volatility with the US from pound to euro volatility, and recalculate export shares based on the coefficients reported in Table 3. Using these new variables, we could project the estimated effect of UK membership in the EMU with the estimated coefficients in Table 4. This would yield a time series of FDI inflows that would be identical to the actual series (where the UK

has not adopted the euro) until 1998, then diverging. We could then look at the difference between projected inflows for the UK both in and out of the EMU and use this to tabulate lost FDI.

However, this procedure is subject to the Lucas critique. If the UK had adopted the euro, our parameter estimates will change. This is especially true for a large country such as the UK. Acknowledging this, we must re-estimate equations 1 – 3 under the assumption that the UK adopts the euro in 1999.[13] We first adjust the bilateral exchange rate volatilities used in estimating 1 to take into account that the pound is replaced by the euro in 1999. Export share of sales are recursively forecasted on an annual basis and aggregated across export markets to yield a new, predicted aggregate export share series. We then adjust the EMU dummy variable and the UK to US exchange rate volatility to reflect the fact that in this hypothetical example, the UK has adopted the euro. Using these three new variables, we re-estimate 3, including the Euro indicator variable. Figure 3 displays predicted measures inflows under two regimes. The line noted UK-Out indicates estimated inflows of FDI to the UK when the UK does not adopt the euro; while the UK-In line shows predicted inflows when the UK does in fact adopt the euro. Prior to 1998, we see that these two series move concurrently, although estimated inflows are slightly higher in the non-Euro world. Beginning in 1998, however, these two series diverge. In the world in which the UK had adopted the euro, inflows of FDI would have been much higher than they actually are. Quantitatively, the vertical distance between estimated UK-euro inflows and UK-pound inflows represents "lost" inflows from not adopting the euro. Between 1998 and 2002, cumulative losses are approximately $32.9 billion. To put this in perspective of the total inward position for the UK, these losses are equal to approximately 13.7% of total US FDI in the UK. Put into a broader context, UK's GDP in 2004 was approximately $1.7 trillion. The estimated lost FDI from the US due to the UK not adopting the euro is about 2% of GDP. Furthermore, this lost FDI is only calculated for one source and over a period of five years. If we increase the number of source countries and look over a longer period of time, the loss may be even more significant. In 2002, the total stock of FDI located in the UK was $568.3 billion, with $239.2 billion (42.1%) coming from the US and an additional $102.7 billion (18.1%) coming from outside the Euro-Zone. If we make the strong assumption that the pattern of FDI from non-Euro, non-US sources follows the same pattern as US FDI, then a back of the envelope calculation of the lost FDI from these sources is $14.1 billion. While losses from the US will be the most significant, the impact on FDI from other non-Euro countries would also be noticeable.

[13] Note that this is still a rough estimate, as we are assuming that the volatility of the euro, GDP in the UK and elsewhere, inflation rates, and a host of other variables would not have changed if the UK had in fact joined the EMU.

The Impact of EU Enlargement

The results presented in the preceding section are based on a core sample of countries for which there is detailed data. The sample covers Western Europe and is useful in examining the impact of a monetary union on FDI in a region of relatively similar countries. There are not drastic wage and tax differences across the countries in the core sample. When countries are similar, a multinational may indeed turn to the currency regime used by that nation in making its location decision. Does the same result hold if we expand the sample to include nations that have significant cost and tax differences from the core countries? A US firm may be induced to locate operations in a CEE country because of low production costs and favorable taxes. However, one of the advantages of sending FDI to Europe is the ability to serve multiple countries from one host market. This ability is hindered by reduced export market access in CEE nations. With enlargement of the EU into these nations, access has improved, but nearly all of the accession countries have yet to adopt the euro (Slovenia being a recent exception). The results in the preceding section suggest that EU membership alone is not enough to attract FDI. The UK has apparently lost out on FDI by not adopting the euro, even though they are an EU member. Will the same pattern hold for the new EU members?

To answer this question, I follow the same procedure outlined by equations 1-3. Unfortunately, detailed sales data for the operations of US multinationals in the CEE countries is not available. Rather, the export share of sales variable is proxied for by a country's total exports divided by GDP. Doing so assumes that multinational's operating in a country behave like domestic firms. If anything, this assumption leads to an underestimate of true export activity. Within the FDI inflow equation (3), I am forced to drop the depreciation variable due to a lack of reliable data and replace the taxation variable with the public sector's share of GDP for each country, obtained from the Penn World Tables. Clearly depreciation is an important determinant of new inflows of FDI, but as long as the composition of FDI (in terms of industries) does not differ greatly across countries, then the effect of depreciation should be adequately accounted for by lagged inflows. The loss of specific tax information is more problematic. In the core sample, we had information on how much firms actually paid in taxes, accounting for any preferential tax treatment offered by governments. The government share of GDP clearly does not contain the same information. However, there should be a positive correlation as countries with large public sectors are more likely to have higher tax rates.

Table 6 presents Arellano-Bond estimates for the expanded sample across the four specifications presented in Table 4. Strikingly, the exchange rate volatility between a host country currency and the U.S. dollar has no discernable impact on FDI. This does not mean that currency risk is not important however. In fact, turning back to Table 3, we see that exchange rate volatility can affect a host country's ability to export. As is seen clearly in columns 3 and 4 of Table 6, the ability to export has a strong and positive effect on FDI inflows from the United States. Greater

export market access induces greater foreign investment. This is particularly pertinent given the seemingly insignificant role of GDP growth in the host market in attracting FDI. Taxes (proxied for by the Government share of GDP) deter FDI as before, supporting the results of past studies on tax competition on FDI. Interestingly, countries with higher labor costs tend to attract more FDI when we omit the export share variable. This effect disappears with the inclusion of export market potential, implying that a positive correlation between export-oriented FDI and labor costs (thus leading to an upward bias in the wage coefficient). This may be due to high skill demands required by export-oriented projects. Finally, the Euro-Zone membership variable is both positive and significant.

Expansion of the EU into Central and Eastern Europe has increased export market access from the accession countries to the "old" EU. The results in this study suggest that greater export market access should lead to increased FDI in the accession countries. Between 1995 and 2001, FDI to the ten EU accession countries increased by a factor of 3.5. In all developing countries during this period, the increase was only by a factor of 2.6 (Brzozowski, 2006). Clearly, better access to the lucrative export markets (in anticipation of EU accession) has contributed to some of this increase. However, the fact that these nations have not yet adopted the euro and ceded control of monetary policy to the European Central Bank has limited the amount of FDI that they could have received. From the perspective of increased foreign investment, the full benefits of accession will not be realized until these nations take the next step and join the monetary union as well.

VI. Conclusion

This paper began with the observation that the pattern of FDI into the European Union has changed since the inception of the Euro-Zone. Countries such as Great Britain, Sweden, and Denmark had seen their share of total FDI into the EU decline, while countries such as France, Germany, and Italy had seen their FDI shares increase. Why should an exchange rate regime affect FDI? This is a perplexing question as the existing literature has found a tenuous link at best between FDI and exchange rate volatility. However, the elimination of currency risk and coordination of monetary policy can have an effect on trade. If trade and FDI are complementary, as in the case of export-oriented FDI, then the divergence outlined in Figure 1 may very well be justified.

Past studies on the impact of currency risk on FDI have largely ignored the export channel through which risk may enter, which I argue is in error. The ability to export from a foreign affiliate is estimated to have a strong and positive effect on inflows of FDI. In other words, export market access (proxied for by the share of sales that are exported) from a particular host country induces a multinational to increase its investment in that country. This result is intuitively appealing as well, since all else being equal, a multinational would prefer to locate in its largest market, and export access simply represents an increase in market size. .

We then ask, "How much FDI have countries lost by not adopting the euro?" While admittedly a very rough estimate, we find that the non-Euro member countries have indeed "lost" out on a fairly significant amount of FDI. While this result by itself is not enough to justify Euro membership, it can prove to be an important factor that must be considered in the adoption debate. Finally, how does the enlargement of the EU affect this dynamic? Multinationals weigh several different variables when deciding on where to base their foreign production facilities. A host market with low labor costs and taxes may not be preferable to one with higher costs and taxes if there are stark differences in export market access. A firm may prefer to locate in Germany over Poland despite the relatively higher labor costs to take advantage of the central location and single currency regime. If the EU accession countries want to attract their full potential of FDI, they need to take the next step and adopt the euro. Of course, the costs of doing so may well outweigh any benefits gained in terms of increased FDI.

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Table 1: Summary Data on the Operations of US Multinationals in Europe

	1985			2004		
Country	*Total Sales ($millions)*	*Exports (% of Sales)*	*Affiliates*	*Total Sales ($millions)*	*Exports (% of Sales)*	*Affiliates*
Austria	3,729	23.4	131	15,465	27.7	199
Belgium	18,062	52.5	450	72,129	50.8	552
Czech Republic	N.A.	N.A.	N.A.	9,609	36.5	139
Denmark	3773	13.5	117	12,317	24.0	230
Finland	1564	1.7	47	10,116	38.9	127
France	40760	24.8	852	163,038	21.0	1214
Germany	66187	29.0	1006	252,097	31.4	1424
Greece	1288	12.7	64	6,239	6.0	89
Hungary	N.A.	N.A.	N.A.	10,111	42.8	133
Ireland	5549	64.5	219	121,189	60.8	490
Italy	25342	15.1	517	99,146	17.4	679
Luxembourg	760	84.3	40	10,710	73.7	206
Netherlands	26302	51.9	650	140,028	49.9	1293
Norway	8433	41.0	118	27,361	31.3	170
Poland	N.A.	N.A.	N.A.	16,671	40.1	182
Portugal	1355	21.3	73	9,247	22.1	145
Spain	9846	29.0	332	68,799	28.1	566
Sweden	5109	18.5	191	54,011	32.0	336
Switzerland	32824	73.7	485	135,159	76.8	512
Turkey	909	2.0	28	10,359	14.1	78
UK	106425	23.7	1797	436,246	21.0	2678

* Summary data on the operations of US multinationals taken from the Bureau of Economic Analysis, Financial and Operating Data of US Multinationals 1983 – 2004. Total Sales are annual sales aggregated over all foreign affiliates in a particular country. The Exports variable is the share of affiliate sales that are exported to the European Union. "Affiliates" gives the total number of foreign affiliates of US companies located in a particular country.

Table 2: Horizontal or Vertical FDI? Affiliate Sales by Location, 2004

Region	*Country*	*Total Sales ($millions)*	*Local (% of Sales)*	*US (% of Sales)*	*Export (% of Sales)*
Euro Area	Austria	15,465	70.2%	2.1%	27.7%
	Belgium	72,129	45.5%	3.8%	50.8%
	Finland	10,116	58.2%	2.9%	38.9%
	France	163,038	74.8%	4.1%	21.0%
	Germany	252,097	65.0%	3.6%	31.4%
	Greece	6,239	93.2%	0.8%	6.0%
	Ireland	121,189	23.8%	15.4%	60.8%
	Italy	99,146	79.8%	2.8%	17.4%
	Luxembourg	10,710	21.1%	5.2%	73.7%
	Netherlands	140,028	43.8%	6.3%	49.9%
	Portugal	9,247	76.2%	1.6%	22.1%
	Spain	68,799	70.3%	1.6%	28.1%
	Total	968,203	58.7%	5.3%	36.0%
W. Europe	Denmark	12,317	66.5%	9.5%	24.0%
	Norway	27,361	63.1%	5.6%	31.3%
	Sweden	54,011	57.8%	10.1%	32.0%
	Switzerland	135,159	18.4%	4.8%	76.8%
	United Kingdom	436,246	71.1%	7.8%	21.0%
	Total	665,094	58.9%	7.3%	33.8%
CEE	Czech Republic	9,609	59.3%	4.2%	36.5%
	Hungary	10,111	47.8%	9.3%	42.8%
	Poland	16,671	57.9%	1.9%	40.1%
	Russia	10,514	89.9%	1.0%	9.1%
	Turkey	10,359	85.5%	0.5%	14.1%
	Total	57,264	67.2%	3.2%	29.6%

* Data on the destination of affiliate sales taken from the BEA, *Financial and Operating Data of US Multinationals Abroad*. Local % refers to the percentage of affiliate sales that take place in the host country. US % are the percentage of affiliate sales that are re-exported to the US. Export % refers to the percentage of affiliate sales that are sent to local (non-US) export markets. Total sales are in millions of US dollars.

Table 3: Export Market Potential

	Core Sample	Expanded Sample
$\ln(GDP_{Host})$	0.699	0.997
	[0.000]	[0.000]
$\ln(GDP_{Export})$	0.492	0.506
	[0.000]	[0.000]
$Inflation_{Host}$	-0.048	-0.003
	[0.000]	[0.000]
$Inflation_{Export}$	0.000	-0.001
	[0.965]	[0.000]
EU Membership	0.075	0.399
	[0.000]	[0.000]
Exchange Rate Volatility	-5.076	-0.015
	[0.006]	[0.070]
ln(Distance)	-1.249	-1.386
	[0.000]	[0.000]
Border	0.112	0.048
	[0.000]	[0.217]
Language	0.034	0.241
	[0.316]	[0.000]

* Estimation results from equation 1 in the text. The reported coefficients are pooled across all trade partners for each exporter and year. Average p-values are reported in brackets. The core sample includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK. The expanded sample adds Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Iceland, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey. The dependant variable in the core sample is the export share of affiliate sales. In the expanded sample, the dependant variable is the host country's export share of GDP.

Table 4: The Determinants of Foreign Direct Investment

	(1)	(2)	(3)	(4)
Lagged Inflows	0.30 [0.00]	0.27 [0.00]	0.21 [0.00]	0.15 [0.01]
Export Share	-	-	6.82 [0.02]	7.16 [0.00]
Exchange Rate Volatility	-0.48 [0.29]	-0.34 [0.44]	-0.86 [0.09]	-0.43 [0.33]
EMU Membership	-	1.81 [0.00]	-	1.84 [0.00]
GDP Growth	10.16 [0.03]	9.73 [0.03]	11.30 [0.02]	10.88 [0.02]
Inflation	12.61 [0.03]	11.20 [0.04]	15.19 [0.01]	13.90 [0.01]
Taxes	-2.96 [0.10]	-3.67 [0.04]	-1.21 [0.40]	-0.97 [0.81]
Labor Cost	-1.22 [0.58]	1.41 [0.52]	-1.26 [0.56]	1.41 [0.16]
Depreciation	1.31 [0.03]	1.67 [0.00]	1.44 [0.02]	1.81 [0.00]

* GMM panel data estimation of the determinants of FDI inflows. Specification (1) estimates equation 3 without export forecasts or an indicator variable for Euro membership. Specification (2) includes the Euro dummy. Specification (3) estimates equation 3, including export forecasts as a regressor. Specification (4) augments (3) with the Euro dummy. FDI inflows, labor cost, and depreciation are measured as a percentage of host country GDP. Taxes are defined as reported affiliate tax payments as a share of affiliate sales. P-values are given in brackets and based on heteroskedasticity consistent standard errors. For clarity, the coefficients on export share, EMU, GDP growth rate, inflation, labor cost, taxes, and depreciation have been multiplied by 100.

Table 5: Alternative Estimation Methods

	LSDV	Anderson & Hsiao	Grid Search OLS
Lagged Inflows	0.09 [0.12]	0.15 [0.01]	0.14
Export Share	2.17 [0.00]	6.84 [0.00]	3.08 [0.02]
Exchange Rate Volatility	-0.03 [0.93]	0.08 [0.85]	-0.16 [0.62]
EMU Membership	1.00 [0.00]	1.24 [0.00]	1.00 [0.00]
GDP Growth	8.16 [0.03]	10.36 [0.01]	10.41 [0.00]
Inflation	4.96 [0.05]	6.68 [0.16]	5.57 [0.03]
Taxes	-1.03 [0.37]	-2.51 [0.10]	-0.33 [0.78]
Labor Cost	2.46 [0.31]	3.24 [0.07]	2.55 [0.29]
Depreciation	1.35 [0.00]	1.13 [0.04]	1.28 [0.00]

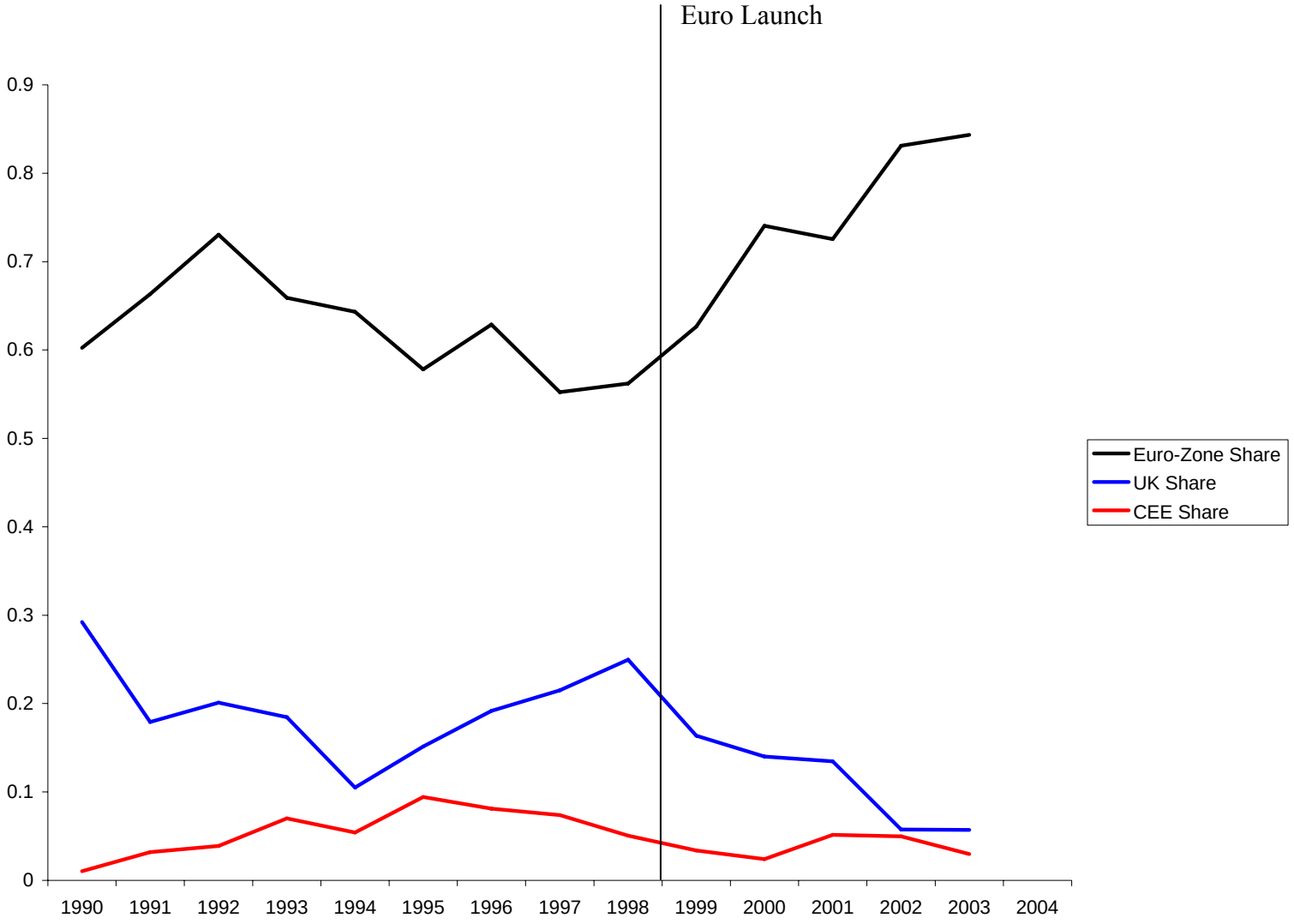
***** Estimation of equation 3 with three alternative measures. LSDV applies OLS to the panel, ignoring the issue of potential endogeneity. The second column applies Anderson and Hsiao's (1998) method of instrumental variables on the differenced model using two lags of FDI inflows and differenced predetermined variables as instruments. Grid search OLS refers to the method in which the autoregressive coefficient is first determined with a grid search, finding the coefficient ψ_g. OLS is then performed on the model where the dependent variable is $FDI_{h,t} - \psi_g FDI_{h,t-1}$. See Table 4 for a description of the covariates.

Table 6: FDI and EU Enlargement

	(1)	(2)	(3)	(4)
Lagged Inflows	0.24 [0.00]	0.23 [0.00]	0.19 [0.00]	0.20 [0.01]
Export Share	-	-	51.64 [0.00]	43.90 [0.00]
Exchange Rate Volatility	-9.81 [0.77]	-6.63 [0.84]	-5.23 [0.88]	-3.86 [0.91]
EMU Membership	-	5.86 [0.00]	-	3.37 [0.04]
GDP Growth	6.99 [0.65]	8.91 [0.56]	5.17 [0.74]	6.63 [0.67]
Inflation	-0.81 [0.84]	-1.28 [0.75]	-0.71 [0.86]	-0.94 [0.81]
Government Share of GDP	-0.35 [0.09]	-0.33 [0.09]	-0.37 [0.04]	-0.35 [0.05]
Labor Cost	0.18 [0.00]	0.13 [0.01]	0.03 [0.52]	0.03 [0.60]

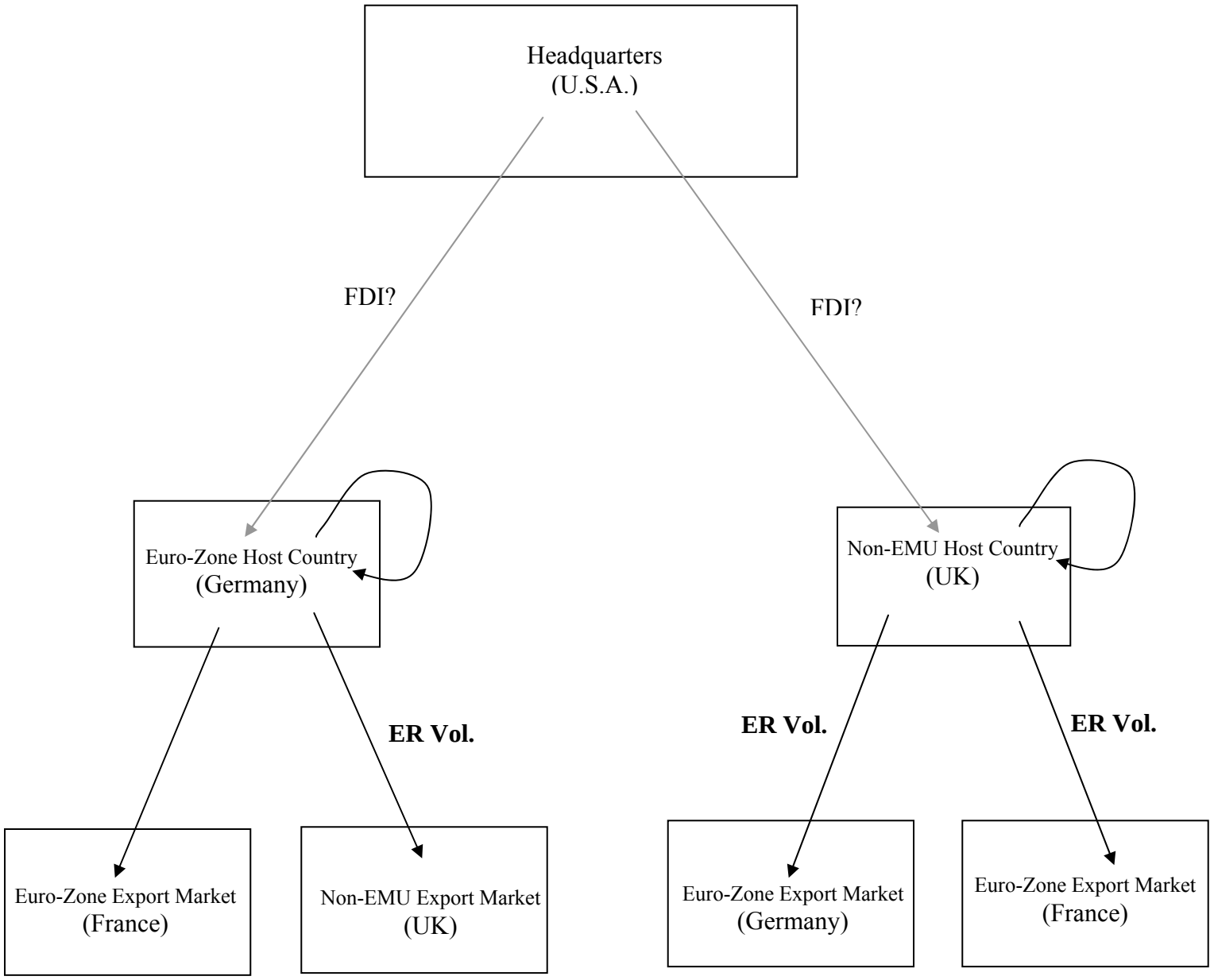
* GMM panel data estimation of the determinants of FDI inflows across the expanded sample including CEE countries. Specification (1) estimates equation 3 without export forecasts or an indicator variable for Euro membership. Specification (2) includes the Euro dummy. Specification (3) estimates equation 3, including export forecasts as a regressor. Specification (4) augments (3) with the Euro dummy. FDI inflows, labor cost, and depreciation are measured as a percentage of host country GDP. Taxes are defined as reported affiliate tax payments as a share of affiliate sales. P-values are given in brackets and based on heteroskedasticity consistent standard errors. For clarity, the coefficients on export share, EMU, GDP growth rate, inflation, labor cost, taxes, and depreciation have been multiplied by 1000 while the exchange rate volatility variable has been multiplied by 10^8.

Figure 1: Share of Total Inflows from the World to the EU-15



* Source – OECD, *International Direct Investment by Country*. The vertical axis plots the percentage of total EU-15 inflows from the world going to a particular region. The Euro-Zone Share represents the share of inward FDI flows going to the 11 original members of the Euro-Zone. The CEE share represents the share of European FDI going to the Central and Eastern European countries in my sample: Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey.

Figure 2: Setting up Export-Oriented FDI in the EU



***** The gray lines indicate flows of FDI from the headquarters country to the host country. If the multinational sets up a foreign affiliate in a euro-zone host country (Germany in this example), the affiliate will sell domestically in the host country and export to both EMU and non-EMU countries. Under this scenario, only exports to non-EMU markets are exposed to currency risk. If the foreign affiliate is located in a non-EMU host country, the affiliate operates in the host market and exports to countries both inside and out of the euro-zone. Under this scenario, all exports will be subjected to currency risk. In the diagram above, the black lines represent sales and currency risk is given by σ.

Figure 3: Estimated Inflows of FDI to the UK under two regimes: Out of the EMU and in the EMU

* Predicted inflows of FDI from the US to the UK under two regimes. UK-Out refers to the existing regime in which the UK did not adopt the euro in 1999. UK-In is a counterfactual regime that assumes the UK adopted the euro in 1999. We first adjust the exchange rate volatility variable and EMU dummy for the UK. The export share of sales is then forecasted recursively as in equation 1. These forecasts are included in equation 3 with a dummy for EMU membership (now equal to 1 for the UK from 1998-2002). Inflows of FDI are given as a percentage of UK GDP. The area between the two curves from 1998-2002 represents what the UK has "lost" by not adopting the euro.