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**Inflexibilities and Imbalances:  
Evidence from Europe\***

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Abstract

The emergence of large and persistent trade imbalances is often interpreted as evidence of underlying rigidities or distortions. In this short paper, we analyze the effects of various types of inflexibilities on trade. We study bilateral trade balances for a sample of 18 European countries over the period from 1985 through 2008. We find that higher rigidities are indeed typically associated with greater trade imbalances, even after allowing for permanent asymmetries in trade competitiveness within pairs of countries. Among different types of rigidities, the (in)flexibility of product markets tends to have the largest effect on trade imbalances.

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## **I. Introduction**

Imbalances in bilateral trade relationships have recently become an issue of growing concern. For many countries, the difference between the value of shipments to and from a particular partner has risen sizably in recent years. More notably, large bilateral imbalances appear to increasingly dominate some countries' overall trade balance. For the United States, for example, the trade deficit with China has increased from virtually zero in 1985 to 227 bn. US dollar in 2009, thereby accounting for about 45% of the U.S.'s overall trade deficit of 501 bn. US dollar.<sup>1</sup> Italy's trade deficit with Germany has risen by factor 5 within a decade; it now even exceeds the country's total trade deficit.<sup>2</sup>

While there is no economic reason to assume that a bilateral trade relationship should necessarily be balanced, the emergence of large and persistent trade imbalances is often interpreted as prima facie evidence of underlying rigidities or distortions. For example, protectionist measures can bias trade in favor of a particular country. Similarly, distortionary policies could delay a country's external adjustment to shocks. Also, fixed or managed exchange rates may slow corrections of the real exchange rate.<sup>3</sup>

In this paper, we examine the association between inflexibilities and trade imbalances in more detail. More precisely, we compare the effects on trade of three types of rigidities: 1) a fixed nominal exchange rate, 2) inflexibilities on the labor market, and 3) rigidities on the product market. All these rigidities may have an effect on patterns of trade, both independently and jointly. For instance, the lack of an adjustable nominal exchange rate supposedly poses a particular problem within a currency union that also operates a single and unrestricted market for goods and services, such as the euro area. In this case, the permanently fixed nominal exchange rate forces real exchange rate adjustment through relative price levels alone, which can be difficult in the presence of rigidities in national goods and labor markets.

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<sup>1</sup> The figures are taken from the U.S. Census Bureau, available online at <http://www.census.gov/foreign-trade/balance/>.

<sup>2</sup> See Eurostat's *External and Intra-EU Trade: A Statistical Yearbook*; the publication is available at [http://epp.eurostat.ec.europa.eu/cache/ITY\\_OFFPUB/KS-GI-10-001/EN/KS-GI-10-001-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-GI-10-001/EN/KS-GI-10-001-EN.PDF). Italy's trade deficit with Germany has increased from 2.7 bn. euro in 1999 to 13.7 bn. euro in 2008, when Italy reported an overall deficit of 11.5 bn. euro.

<sup>3</sup> In the United States, the trade deficit with China is widely attributed to the Chinese policy of pegging its currency to the US dollar. Within the European Monetary Union (EMU), it is frequently claimed that, with fixed exchange rates, differences in national economic policies have a direct effect on trade patterns.

Following Berger and Nitsch (2010), we analyze the formation of the European Economic and Monetary Union as an experiment to study the effects of a currency union on trade imbalances. With the adoption of a common currency, eleven European countries irrevocably fixed their bilateral exchange rates on January 1, 1999. In addition, we use measures of employment protection legislation and product market regulation as proxies for inflexibilities on the labor and product markets. Our sample covers trade between a set of 18 European countries, some of which have adopted the euro as their common currency, over the period from 1985 through 2008.

Previewing our main results, we find that trade imbalances—measured as the fraction of deficits and surpluses in total bilateral trade—are indeed considerably larger for country pairs that face various types of rigidities. Moreover, since we also control for pair-wise fixed effects, our analysis indicates that the larger imbalances are not (only) the result of enduring asymmetries in trade competitiveness between a given pair of countries.

The remainder of the paper is organized as follows. Section 2 describes the empirical methodology and the data. Section 3 presents the results. Finally, we summarize our findings in a brief concluding section which also provides some policy conclusions.

## **II. Methodology and Data**

Our variable of interest is the bilateral trade balance between a reporter country  $r$  and a partner country  $p$ , defined as the difference between  $r$ 's exports to  $p$  and  $r$ 's imports from  $p$  in a given year  $t$ . To account for differences in the importance of a trade relationship both across partners and over time, we normalize the trade surplus or deficit by the total value of bilateral trade:<sup>4</sup>

$$(1) \quad \text{TradeBalance}_{rpt} = (\text{Exports}_{rpt} - \text{Imports}_{rpt}) / (\text{Exports}_{rpt} + \text{Imports}_{rpt}) .$$

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<sup>4</sup> Given our interest in the symmetry of trade relations, normalizing by total trade is the natural choice (rather than, for instance, normalizing by country size). Larger magnitudes of the variable of interest indicate greater imbalances in bilateral trade.

Since we proxy for exchange rate stability by using dummy variables for presence of a fixed exchange rate (e.g., euro area membership), we focus on the magnitude (not the sign) of the trade imbalance.<sup>5</sup> That is, we estimate variants of the regression:

$$(2) \quad |\text{TradeBalance}_{rpt}| = \alpha + \beta_1 \text{FEXR}_{rpt} + \beta_2 \text{EPL}_{rpt} + \beta_3 \text{PMR}_{rpt} \\ \{ + \sum_t \phi_t T_t \} \{ + \sum_{rp} \phi_{rp} \text{RP}_{rp} \} + \varepsilon_{rpt} ,$$

where the regressand is the absolute value of the normalized trade balance, FEXR is a dummy variable that takes the value of one if there was no change in the nominal exchange rate (e.g., because both trade partners are members of the euro area) and zero otherwise, EPL is the average level of employment protection in both countries, PMR is the average level of product market regulation, and  $\varepsilon$  is the disturbance term. We also include various combinations of fixed effects. In our baseline specification, we use common time fixed effects  $\{T\}$  to control for joint variations in trade imbalances over time. We also allow pair-wise imbalances to consistently deviate from the sample average by adding pair-specific fixed effects  $\{RP\}$ . Finally, we replace the common time effects by country time fixed effects for both reporter  $\{R\}$  and partner  $\{P\}$  countries to capture any dynamic country-specific features that could affect the countries' overall trade position, such as general trends in country-specific competitiveness. Given the comprehensiveness of the set of fixed effects, this constitutes a fairly strong test of the hypothesis that inflexibilities will influence the level of trade imbalances.

In line with previous work on the effects of EMU on trade (Berger and Nitsch, 2008), our analysis focuses on a homogeneous set of 18 European countries. The approach has the advantage of including countries which either share the European Union's (EU) institutional framework or are closely associated with it. The sample comprises the 15 countries which were member of the EU at the time of the introduction of the euro (eleven of which adopted the currency from the beginning, followed by Greece in 2001) plus Iceland, Norway and Switzerland. We analyze the period from 1985 to 2008.

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<sup>5</sup> In principle, we could also use a measure of bilateral exchange rate variability (such as the standard deviation of monthly exchange rate changes). It is unclear, however, whether the effect of flexible exchange rate flexibility on trade is linear. While moderate adjustments may help lowering imbalances, large exchange rate fluctuations may be associated with greater imbalances.

Our key source of data is the International Monetary Fund's Direction of Trade Statistics from which we obtained nominal values of bilateral exports and imports on an annual basis. Since country  $r$ 's trade balance with  $p$  is typically not identical to  $p$ 's inversely-signed trade balance with  $r$  (e.g., because of different statistical valuation methods for exports and imports), we analyze the full sample of bilateral imbalances.<sup>6</sup> Our trade data set is augmented with a set of institutional variables. The data are taken from the OECD which aggregates detailed indicators that proxy the intensity of various aspects of product and labor market regulation into summary indicators of strictness of regulations, with larger values implying less flexibility; the indicators are consistent across time and countries.<sup>7</sup> Variables and sources are described in detail in an appendix.

Figure 1 graphs the evolution of absolute trade imbalances in our sample over time. Two observations stand out. First, the sample average trade imbalance consistently exceeds the median imbalance, indicating that the distribution could be dominated by a few disproportionately large imbalances between country pairs. Indeed, some bilateral trade relationships are characterized by one-directional trade flows and, thus, high imbalances, especially for small countries (such as Iceland, Ireland, and Greece).<sup>8</sup> Second, median and mean imbalances display an increase in imbalances since the mid-1990s. Taken at face value, this pattern is consistent with the hypothesis that a fixed exchange rate regime is associated with larger trade imbalances.

To analyze this issue in more detail, Figure 2 shows the trade balances of various groups of countries over the same period. Specifically, we distinguish between trade relationships for which exchange rates were fixed with the introduction of the euro (intra-EMU trade) and trade pairs for which nominal exchange rates remained flexible (i.e., trade between EMU countries and non-members as well as trade between non-members).

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<sup>6</sup> Restricting the sample to only one observation per country pair requires a decision on which observation to analyze and which to ignore. In our sensitivity analysis, we experimented with a number of approaches and found most results to be reasonably robust. For example, including only one observation per country pair while dropping any observations where pairwise balances differ by more than 10 percentage points between the two reporting countries delivers results quite similar to those tabulated below.

<sup>7</sup> The indices range from 0 (least restrictions) to 6 (most restrictions). The data are described in detail at

[http://www.oecd.org/document/36/0,3343,en\\_2649\\_34323\\_35790244\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/36/0,3343,en_2649_34323_35790244_1_1_1_1,00.html).

<sup>8</sup> The introduction of fixed country-pair effects will limit the possible effect of outliers on our econometric results below.

Interestingly, the finding of growing imbalances applies most strongly to trade between EMU member countries, while trade between non-members displays no clear tendency over time. Trade imbalances between EMU member countries and non-members show a similar but less pronounced increase. A possible explanation is that the external value of the euro, while flexible for the euro area as a whole, cannot adjust to individual (and possibly opposing) member country needs. Figure 3 contains corroborating graphical evidence for this hypothesis. The figure plots, separately for each EMU member country, the difference between the largest bilateral trade surplus and deficit with a non-member in our sample. For most countries, the spread between the most positive and the most negative trade imbalance has indeed been increasing over the last few years, possibly reflecting a growing divergence in trade competitiveness.

Finally, we examine the relationship between market flexibility and the trade balance—a link emphasized by Blanchard (2007) and others. Figure 4 is a set of scatter plots of the trade balance against both cross-country differences in employment protection and product market regulation for individual years, covering the period of available data. The graphs clearly illustrate that higher relative levels of labor or product market flexibility are associated with higher bilateral trade surpluses (or lower deficits). Also, the association has apparently become stronger over time, especially for country pairs in which both partner countries adopted the euro (marked with a filled circle).

### **III. Empirical Results**

The graphical analysis of the preceding section provides an interesting and illustrative picture of the dynamics in bilateral trade imbalances after currency union formation. We now test for the effect of inflexibilities on trade imbalances more formally. We begin with a specification in which the indicators for the presence of a certain type of inflexibility enter the regression separately as explanatory variable.

Table 1 presents results. The first four columns on the left of the table tabulate estimation results for the most parsimonious specification of equation (2), a regression of the absolute value of bilateral trade imbalances on the restrictiveness measure of interest and a comprehensive set of year fixed effects. As shown, the results strongly confirm the association between EMU membership and trade imbalances. The estimated  $\beta$  coefficient on the EMU variable is positive and, with a t-statistic of 2.1, significantly different from zero at

the 5 percent level; the point estimate of about 0.018 implies that trade imbalances between euro area member countries are on average about 2 percentage points larger than for the rest of the sample. In contrast, when we include a dummy variable for the presence of a fixed (or unchanged) exchange rate other than euro area membership, the estimated coefficient is negative and significant. This finding appears to provide support for the hypothesis that a currency union is fundamentally different from just stabilizing the exchange rate; that is, a currency union is a much more restrictive exchange rate regime.<sup>9</sup> Also, the coefficient possibly reflects the pattern of trade between some pairs of highly integrated economies with small imbalances and stable exchange rates (e.g., the former DM bloc); analyzing a much longer sample period, Berger and Nitsch (2010) find a positive effect of exchange rate stability on trade imbalances. The next two columns report the estimation results for inflexibilities on the national labor and product markets. In each case, the coefficient is significantly positive, indicating that country pairs with more rigid markets experience larger trade imbalances. Given our very crude measure for the presence of inflexibilities (by simply averaging the restrictiveness measures for the reporter and the partner country in a given year), we consider these results as particularly encouraging.

The final four columns of Table 1 seek to further generalize these results. The columns present analogous estimates for specifications in which we add a comprehensive set of pair-wise fixed effects. With this extension, we control for any pair-wise specific differences in trade imbalances over the sample period so that the coefficient on the restrictiveness measure now captures only the time variation in imbalances. For EMU membership, the estimated coefficient not only remains positive and significant, but increases considerably in magnitude to 0.027. This suggests that euro area member countries have experienced an increase in their bilateral trade imbalances with other euro area members by an average of about 3 percentage points since the adoption of the common currency, which appears large compared to a sample mean of about 0.3. For other measures of inflexibilities, the results become considerably weaker with this extension. The  $\beta$  coefficients for the measures of exchange rate stability and employment protection legislation both lose significance completely and even change signs. As a result, the baseline estimates for these indicators were apparently driven by persistent differences in the variable of interest and the trade imbalance across country pairs. The estimated coefficient on product market regulation falls in magnitude, but remains different from zero at any conventional measure of statistical significance.

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<sup>9</sup> See, for instance, Rose (2000).

We now compare the effect of various types of inflexibilities by sequentially adding the restrictiveness measures to our regression. Table 2 presents the results. Again, we tabulate results for two different estimators. The upper panel contains estimates using simple ordinary least squares (OLS); the lower panel applies a panel fixed effects estimator.

Column 1 of Table 2 (a) basically confirms our previous findings. The effect of EMU membership on trade imbalances is significantly positive, while the analogue for other situations of an unchanged exchange rate is significantly negative. For both coefficients, the estimates are almost similar in magnitude and significance to their independent effect reported in Table 1. In column 2, we add our measure of employment protection. Again confirming previous findings, the estimated coefficient on this indicator takes a significantly positive sign, suggesting that countries with more rigid labor markets face larger trade imbalances. With this extension, however, the effect of EMU membership becomes economically and statistically small. Finally, we add our measure of product market regulation. This effect clearly appears to dominate all other effects of inflexibilities. The coefficient is not only significantly positive and economically large; also, all other coefficients lose significance. Part of the explanation may be different sample sizes. Since the product market measure is only available for three years (1998, 2003, 2008), the number of observations for regressions where this measure is included is considerably smaller. The remainder of the table shows, however, that our previous estimation results remain essentially unchanged when the smaller subsample is analyzed. In sum, product market regulation wins the horse race of the effect inflexibilities on trade imbalances.

Table 2 (b) shows that this finding is robust to a perturbation that applies a pair-wise fixed effects estimator. As before, the effect of employment protection legislation on trade imbalances is insignificant as soon as we control for average differences in trade imbalances over the sample period. Similarly, the estimated EMU effect turns out to be generally stronger for this specification, except for the sub-sample for which data on product market regulation is available. Most notably, however, product market regulation keeps its strong and statistically significant effect on trade imbalances. There is a consistent finding that countries with rigid product markets display on average larger trade imbalances.

#### **IV. Conclusion**



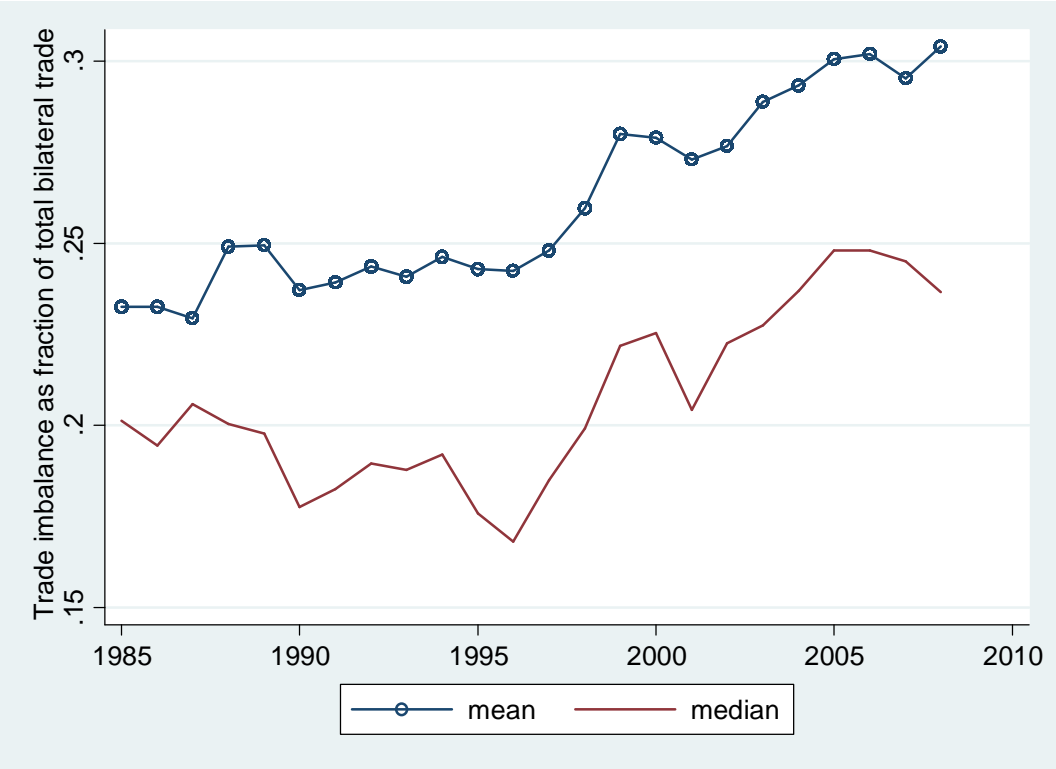
Although bilateral trade relationships need not necessarily be balanced, the emergence of large and persistent trade imbalances between a pair of countries may reflect underlying policy tensions or rigidities. In this paper, we add to evidence that shows that imbalances in trade among euro area member countries have indeed widened markedly after the introduction of the common currency (Berger and Nitsch, 2010). In addition to possible distortions introduced by a fixed exchange rate, we examine the effects of other inflexibilities on trade imbalances, both independently and jointly. Applying very crude pair-wise measures to capture regulation of adjustment, we find that policy and market institutions affect external balances. Countries with relatively less flexible labor and product markets tend to display larger trade imbalances. Moreover, the effect of product market regulation on trade imbalances dominates that of other rigidities, including the effect of euro area membership on trade imbalances.

Our findings imply both bad and good news for policymakers. The bad news is that irrevocably fixed nominal exchange rates do come at the cost of larger and more permanent trade imbalances. The good news is that these imbalances are not completely unavoidable. With a fixed exchange rate, trade imbalances are all the smaller and their adjustment to shocks all the faster, the more flexible the national labor and product markets are.

**References:**

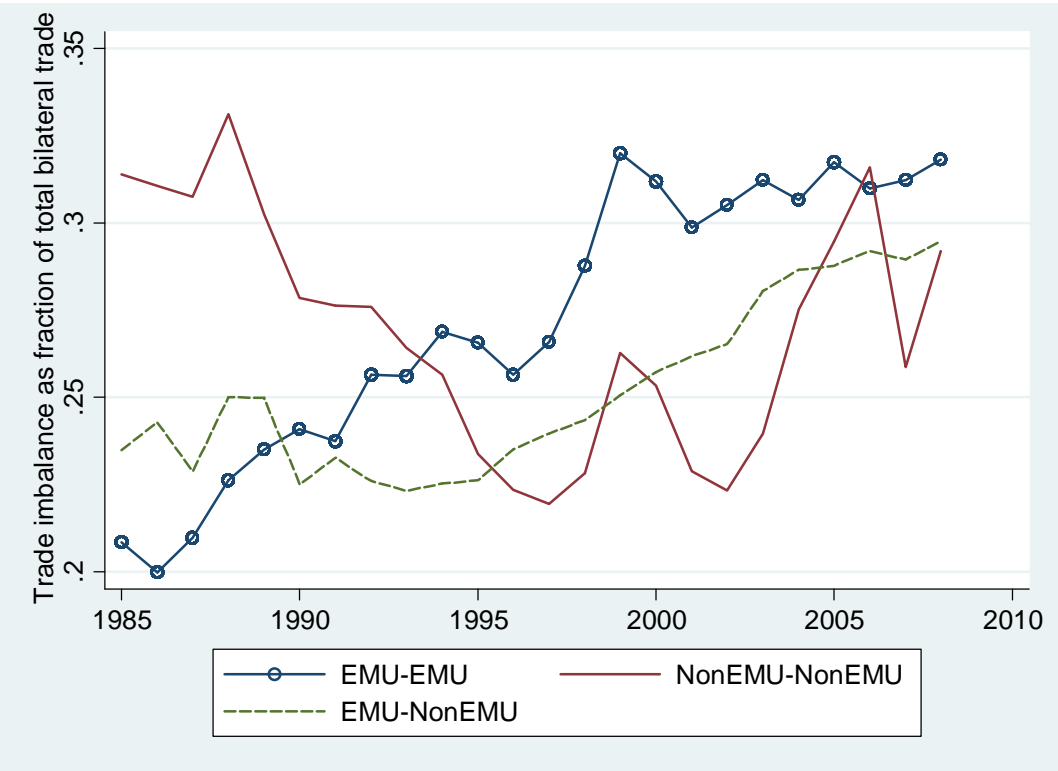
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**Figure 1: Bilateral Trade Imbalances over Time**



Notes: The figure graphs the absolute difference between a country’s exports and imports with a partner as a fraction of total bilateral trade (exports plus imports) for a sample of 18 European countries. Data are taken from the IMF’s Direction of Trade Statistics.

**Figure 2: Bilateral Trade Imbalances by Group of Country Pairs**



Notes: The figure graphs the average absolute difference between a country’s exports and imports with a partner as a fraction of total bilateral trade (exports plus imports) for various groups of country pairs. Data are taken from the IMF’s Direction of Trade Statistics.

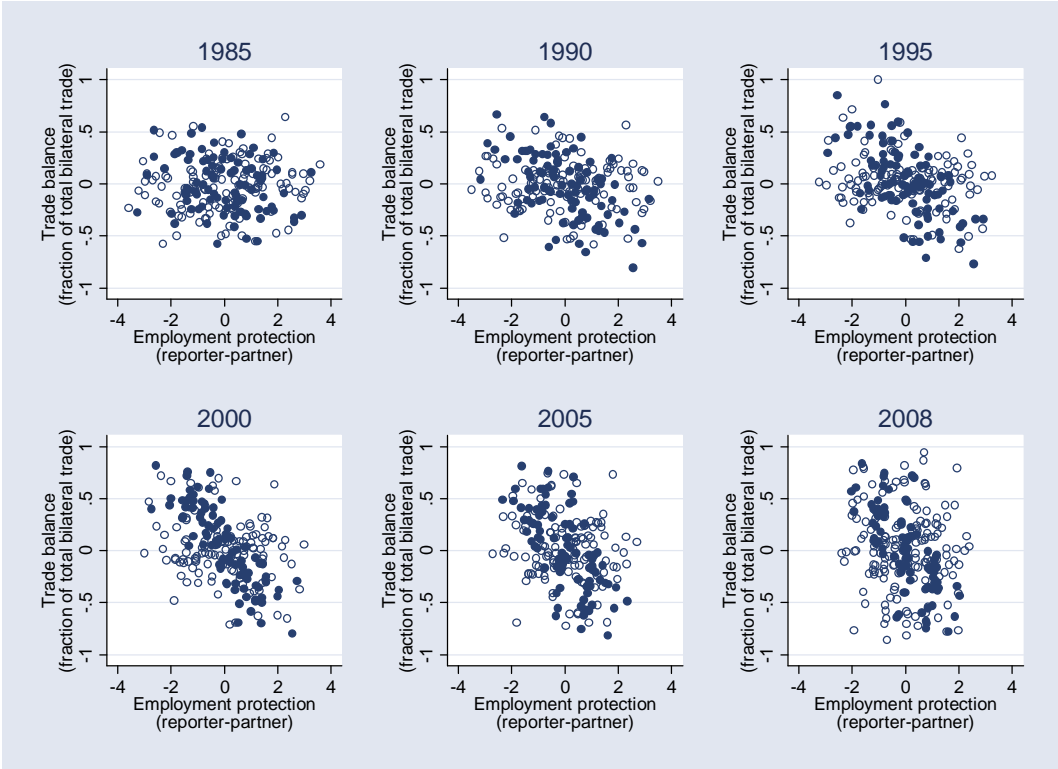
**Figure 3: Spread of Trade Imbalances (Surplus/Deficit) of EMU Member Countries with Non-EMU Countries**



Notes: The figure graphs the difference between the maximum and the minimum trade imbalance (defined as a country's exports and imports with a partner as a fraction of total bilateral trade) of the EMU member country with one of the six non-EMU members in the sample (Denmark, Iceland, Norway, Sweden, Switzerland, the United Kingdom). Data are taken from the IMF's Direction of Trade Statistics.

**Figure 4: Trade Imbalances and Regulation**

Employment protection



Product market regulation



Notes: Filled circles mark country pairs where both partners are/become EMU members.

**Table 1: Inflexibilities and Trade Imbalances**

Specification	Plain OLS				Pair-wise fixed effects			
	1985-2008	1985-2008	1985-2008	1998, 2003, 2008	1985-2008	1985-2008	1985-2008	1998, 2003, 2008
EMU	0.018 (0.009)				0.027 (0.005)			
Other fixed exchange rate		-0.057 (0.018)				0.008 (0.009)		
Employment protection			0.035 (0.004)				-0.001 (0.007)	
Product market regulation				0.222 (0.026)				0.093 (0.031)
Common time fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pair-wise fixed effects?	No	No	No	No	Yes	Yes	Yes	Yes
Number of observations	6,518	6,256	6,472	816	6,518	6,256	6,472	816
Adj. R <sup>2</sup>	0.01	0.01	0.02	0.09	0.74	0.73	0.74	0.83

Notes: OLS regression. Dependent variable is the absolute trade imbalance as a fraction of total bilateral trade. Robust standard errors are reported in parentheses.

**Table 2: Inflexibilities and Trade Imbalances**

a) Plain OLS

<b>Period</b>	<b>1985-2008</b>	<b>1985-2008</b>	<b>1998, 2003, 2008</b>	<b>1998, 2003, 2008</b>	<b>1998, 2003, 2008</b>	<b>1998, 2003, 2008</b>
<b>EMU</b>	0.020 (0.009)	0.005 (0.009)	-0.011 (0.020)	0.010 (0.021)	0.032 (0.020)	0.032 (0.020)
<b>Other fixed exchange rate</b>	-0.056 (0.018)	-0.064 (0.017)	-0.015 (0.044)	-0.054 (0.041)	-0.041 (0.036)	
<b>Employment protection</b>		0.033 (0.004)	-0.016 (0.018)	0.047 (0.015)		
<b>Product market regulation</b>			0.245 (0.032)			
<b>Number of observations</b>	6,256	6,212	812	812	816	816
<b>Adj. R<sup>2</sup></b>	0.01	0.03	0.09	0.02	0.01	0.01

Notes: OLS regression. Dependent variable is the absolute trade imbalance as a fraction of total bilateral trade. Robust standard errors are reported in parentheses. Year fixed effects are included but not reported.

b) Pair-wise fixed effects

<b>Period</b>	<b>1985-2008</b>	<b>1985-2008</b>	<b>1998, 2003, 2008</b>	<b>1998, 2003, 2008</b>	<b>1998, 2003, 2008</b>	<b>1998, 2003, 2008</b>
<b>EMU</b>	0.026 (0.006)	0.025 (0.006)	-0.014 (0.016)	-0.024 (0.015)	-0.015 (0.015)	-0.015 (0.015)
<b>Other fixed exchange rate</b>	0.011 (0.009)	0.011 (0.009)	0.005 (0.027)	0.005 (0.026)	0.002 (0.026)	
<b>Employment protection</b>		-0.001 (0.007)	-0.039 (0.021)	-0.044 (0.021)		
<b>Product market regulation</b>			0.087 (0.033)			
<b>Number of observations</b>	6,256	6,212	812	812	816	816
<b>Adj. R<sup>2</sup></b>	0.73	0.74	0.83	0.83	0.82	0.82

Notes: OLS regression. Dependent variable is the absolute trade imbalance as a fraction of total bilateral trade. Robust standard errors are reported in parentheses. Year and pair-wise fixed effects are included but not reported.

## Appendix: Data Description

<b>Variable</b>	<b>Description</b>	<b>Source</b>	<b>Period</b>
Trade balance	(Exports-Imports)/ (Exports+Imports)	IMF Direction of Trade Statistics	1985-2008
EMU	Dummy for common membership in euro area (time- variant)		1985-2008
Other fixed exchange rate	Dummy for exchange rate volatility $< 0.1$ in a given year		1985-2008
Employment protection	Strictness of employment protection	OECD	1985-2008
Product market regulation	Product market regulation	OECD	1998, 2003, 2008