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HAD TRADE ANY IMPORTANCE IN THE TRANSMISSION OF CURRENCY SHOCKS?

AN EMPIRICAL APPLICATION FOR NEW EU MEMBER STATES FROM CENTRAL AND EASTERN EUROPEAN COUNTRIES

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Abstract

The object of this study is to assess the role of trade in the transmission of currency shocks across geographically close countries. The analysis will focus on identifying and comparing the degree of vulnerability of new EU member states from the Central and Eastern European countries (CEECs) to currency shocks.

We interpret the interactions that a centre-periphery model identifies for periphery countries as a possible description of existing interdependencies among CEECs. According to the centre periphery model discussed by Corsetti et al. (1998b), "if there is no pass-through, then direct bilateral trade links may play a more important role than competition in the third market in determining the transmission of exchange rate shocks in the periphery. If there is full pass-through, a high share of bilateral trade within a region can actually limit the extent of beggar-thy-neighbour effects." These effects are emphasised by a high degree of export similarity among the countries in the periphery.

As a result of the heterogeneity in pass-through and trade structures, it is very difficult to derive a unitary policy implication on the potential sustainability of the exchange rate mechanism (ERM) II. Yet it is possible to single out the country pairs in which the likelihood of transmitting currency shocks is higher. Preliminary results point out that (other things being equal and given the contained intra-periphery trade) the transmission of currency disturbances is lower if the disturbance originates in countries with low a pass-through rate (the Slovak and Czech Republics, Estonia and Latvia) and higher if it originates in countries with a high pass-through rate (Poland, Hungary and Slovenia).

JEL Classification Codes: F31, F32, F41
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Introduction

The object of this study is to assess the role of trade in the transmission of currency shocks across geographically close countries. The analysis will focus on identifying and comparing the degree of vulnerability of EU members from Central Eastern European countries (CEECs) to currency shocks.

Recent empirical evidence shows that post-shock transmission mechanisms seem to be a continuation of close linkages existing during stable periods. Studies by Forbes (2001), Kaminsky & Reinhart (2000), Caramazza et al. (1999), Glick & Rose (1998) and Eichengreen et al. (1996) have provided evidence supporting the hypothesis that currency crises spread from one country to another because of trade linkages. They also show that explanations of the international transmission of currency shocks based on trade links across countries perform empirically better than explanations based on similarities in the macroeconomic characteristics of the economies concerned.

The relevance of trade has been considered mainly in empirical analyses characterised by few linkages with theoretical tools. Most of the above-mentioned empirical studies identified and measured trade links by means of total export shares, in either bilateral or common markets. Theoretical papers studying competitive devaluation in a centre periphery (CP) framework suggest that further progress in the empirical testing of the relevance of trade as a transmission channel can be achieved through a deeper analysis of trade structure and firms' pricing behaviour.

In the analysis that follows, the periphery will consist of a group of eight CEECs. We interpret the interactions that the CP model identifies for periphery countries as a possible description of the interdependencies that exist among geographically close countries. We build trade indicators for the CEECs and use these to gauge how specific features of their trade structures could affect the vulnerability of these countries to exchange-rate shocks.

Following accession to the EU, CEECs will have to adopt the euro, as no opt-out clause is allowed for new entrants. Official positions of the European Commission and the European Central Bank indicate that the CEECs should go through the exchange rate mechanism (ERM) II before adoption of the euro. This would imply two years in the ERM II system with a review of Maastricht Treaty indicators at the end of the first year. With few exceptions the CEECs will eventually have to change their exchange-rate regime, since at the moment most of them are experiencing a relatively more volatile one.

The main reasons for focussing on CEECs are because i) they have a high degree of trade integration with the EU, intra-regional trade occurs and they are very suitable in representing the periphery of the EU-15, ii) their financial markets are not yet fully developed and integrated, thus providing trade linkages that have a major role in transmitting the currency shocks and iii) as they are expected to join the ERM II, they are likely – with the exception of Hungary, Estonia and Lithuania, which are respectively featuring a peg to the euro and currency board agreements – to move, sooner or later, towards a less flexible exchange-rate regime.

The proposed approach attempts to make the following contributions to the existing literature: i) it aims to bridge the gap between the theory and the empirics of the transmission of currency shocks through trade linkages; ii) it intends to explicitly take into consideration trade structure and firms' pricing behaviour and their effects on the transmission of currency shocks; and iii) it focuses on CEECs to derive policy implications on the sustainability of the ERM II.

The paper is organised as follows: section 1 surveys the theory and empirics of the transmission of crises through trade links. Relationships between trade features and vulnerability to shocks in a centre-periphery framework are described in section 2. In section 3.1 we analyse the relationship between trade structure and currency-shock transmission. Some preliminary results are presented in the conclusion.

1. Transmission of crises through trade links: Theory and empirics

1.1 Contagion: Some conceptual and empirical issues

The study of international transmission mechanisms has attracted a renewed interest after the Asian crises,[1] whose general feature was their propagation from one or some countries to whole regions (i.e. 'contagion'). After 1997 a large body of theoretical and empirical literature[2] has focused on identifying the economic and financial variables that prior to a crisis differ significantly between crisis and non-crisis countries.

Determining whether contagion has occurred during a specific period is complicated by a number of econometric issues. Furthermore, isolating the channels through which crises are transmitted is made problematic by the interactions among various propagation mechanisms. Data availability often aggravates both of these difficulties. It should be emphasised, moreover, that there is not even consensus on exactly how contagion should be defined.

In 1999, Forbes & Rigobon proposed a restrictive definition of contagion: the "shift contagion". According to the authors this definition is useful in evaluating the effectiveness of international diversification, justifying multilateral intervention and differentiating among the various transmission mechanisms (i.e. crisis-contingent theories and non-crisis-contingent theories) (Forbes & Rigobon, 2001).

Crisis-contingent theories are those that explain why transmission mechanisms change during a crisis and therefore why cross-market linkages increase after a shock. Non-crisis-contingent theories assume that transmission mechanisms are the same during a crisis as they are in more

[1] Prior to the East Asian financial crisis there was relatively little analysis of why country-specific crises may spread internationally. A few economists had considered these issues after the departure of several European countries from the exchange rate mechanism (ERM) in 1992 and after the Mexican peso crisis in 1994.

[2] For a survey see Claessens et al. (2001).

stable periods and therefore that cross-market linkages do not increase after a shock. Evidence of shift contagion would support the group of crisis-contingent theories, while no evidence of shift contagion would support the group of non-crisis-contingent theories.

Forbes & Rigobon (2001) have shown that, although tests for contagion appear straightforward, they are biased because of the presence of heterodasticity, endogeneity and omitted variables. Pesaran & Pick (2003) Corsetti et al. (2002), Forbes & Rigobon (1999), Rigobon (1999) and Lomakin & Paiz (1999) have corrected empirical works for each of these problems, finding that in most cases no (shift) contagion has occurred in recent crises. Therefore these studies show that cross-market linkages after a shock are simply continuations of strong transmission mechanisms that exist as interdependences.

This result suggests that there is little support for crisis-contingent channels and prompts us to turn to non-crisis-contingent theories. The non-crisis-contingent theories identify financial markets, the banking sector and trade as the main channels for the transmission of economic disturbances – which are not mutually exclusive – because of their links among different countries. Thus, after accounting for the effects of fiscal factors, financial and currency crises spread along the lines of trade linkages.

This paper concentrates on trade linkages as a channel for spreading the effects of economic disturbances and in particular currency crises. The decision to study CEECs is based on the fact that in these countries, the financial markets and the banking sector are not yet fully developed and integrated, thus trade linkages have a major role in transmitting the shocks.

Furthermore, recent empirical studies such as Forbes (2001), Kaminsky & Reinhart (2000), Caramazza et al. (1999), Glick & Rose (1998) and Eichengreen et al. (1996) have found strong evidence to support the hypothesis that currency and financial crises spread from one country to another because of trade linkages.

1.2 The theoretical literature

Theoretical and empirical investigation into the role of trade channels has to date been rather limited in its scope. In particular, the relevance of trade has often only been considered by empirical analyses.

To explain why crises tend to be regional, some recent theoretical models[3] have revived the Nurske (1944) model of competitive devaluation. According to the latter, in the context of bilateral trade or that with a third party (or both), when one country devalues, it becomes costly – in term of competitiveness and output – for other countries to maintain their parity. An empirical implication of this type of model is that a high volume of trade among the countries involved in crises could be observed.

These models analyse how devaluations in one country spread to others adopting a centre-periphery framework. They enable disentanglement of the income and price effects that a devaluation in country A in the periphery exerts on country B in the same region through direct links between these countries and competition in a third country of the centre (C).

The price effect is the result of the fact that devaluations in country A, in the presence of nominal rigidities, improve its competitiveness. This causes both an increase in the demand

[3] See Bentivogli & Monti (2001) for a complete survey that includes a further three, sometimes overlapping, categories: i) models with strategic interactions ii) models that examine the characteristics of trade structure; and iii) models that emphasise geography.

from centre to periphery goods and a diversion in world demand away from country B goods towards country A goods. The income effect operates through the improvement in the terms of trade for countries B and C and the worsening of those of country A.

These two effects have been modelled by Gerlach & Smets (1995) and, in a fully micro-founded general equilibrium model, by Corsetti et al. (1998b).[4] Both models capture bilateral trade and competition in the third market by describing a three-country world where countries A and B peg their currencies to that of country C. In the models, a nominal devaluation in country A translates into a competitiveness gain at least in the short term owing to either sticky wages or price rigidities.

Gerlach and Smets formally model how devaluation in country A can affect trade flows and thereby cause a crisis in country B. They assume that the economies are structurally identical and that each of them produces only one specific good, but consume all three goods. A devaluation in country A gives rise, with sticky wages, to a fall in output, a trade deficit and a reduction in country B's price level because of the fact that the prices of A goods fall in country B's currency. The excess demand for money arising in country B (assuming non-accommodating monetary policy) exerts downward pressure on the nominal interest rate – leading to capital outflows and reserve losses and possibly to a currency crisis.

The model shows that the intensity of the transmission through trade is stronger the higher the substitutability between A and B goods is and the greater the weight of foreign goods in B's consumption basket. This model highlights some important aspects. Nevertheless, belonging to the traditional Mundell-Fleming framework, it lacks a micro-foundation, it does not focus on the role played by competition in third markets and it only touches on the issue of pass-through.

Corsetti et al. (1998b) use a micro-foundation to develop a more detailed and rigorous model of how trade can transmit crises internationally. They use a general equilibrium choice–theoretic framework to compute the welfare repercussions of a devaluation of country A's currency, finding that the negative effects on a partner country as emphasised by traditional theory are not always present. Indeed, if the effects derived from the change in the terms of trade are taken into account, the results may be rather different.

1.3 Main empirical studies

Studies on the transmission of financial and currency crises through trade have followed various routes on the basis of the methodologies and variables set out in the empirical literature. Moreover, they are not closely linked to the theoretical literature. This literature might be grouped into two broad categories: i) contagion and trade linkages, and ii) contagion and trade structure.

i) Contagion and trade linkages. One of the first analyses in this field was produced by Eichengreen et al. (1996), who tested the influence of bilateral trade and competition in the third market on the transmission of currency crises. They defined contagion as "a systematic effect on the probability of a speculative attack which stems from attacks on [an]other currency".

[4] The latter constitutes the theoretical basis for the empirical application that we conduct in this paper, thoroughly discussed in section 2.

To test contagion from country *j* to country *i*, they regressed a binary variable of currency crisis[5] – the 'crisis dummy' – in country *i* on the same variable for country *j* weighted by trade data and on other macroeconomic variables:

$$Crisis_{i,t} = \omega\, W_{ij,t}\, Crisis_{j,t} + \square\, I(L)_{i,t} + \square_{i,t} \qquad (1)$$

where W_{ij} for $j \neq i$ is equal to the weight of country *j* in country *i*'s IMF real effective exchange-rate index. These weights take account of both bilateral trade and competition in third markets.[6]

Eichengreen et al. (1996) also substituted W_{ij} with a weight measuring relative macroeconomic similarity. This weight is closer to one, the more similar the standardised growth rates of the relevant macroeconomic variables are. I(L)i,t is an information set of contemporaneous and lagged macroeconomic variables. Eichengreen et al. estimated the equation by using a probit model with quarterly data.

Their estimate for 20 industrial countries from 1959 to 1993 showed that the occurrence of a currency crisis in one country increased the likelihood of speculative attacks in other countries by about 8%. The coefficient of contagion ω was positive and significant when trade weights were used, while the macroeconomic weights did not perform as well. The authors therefore concluded that trade links are the main channel through which a crisis is transmitted.

Caramazza et al. (1999) have estimated a similar equation using a panel probit regression with 41 emerging market countries and, separately, 20 industrial countries during the Mexican, Asian and Russian crises, excluding for each crisis the first country to experience it. Their crisis variable is very similar in structure to than of Eichengreen et al. (1996). In country *I*, it is regressed on (among other variables) a set of external variables in the years preceding the crisis[7] plus a proxy for trade effect:

$$Crisis_{i,t} = \square TC_{ij,t} + \square FC_{i,t} + \square\, \square_{i,t} + \square_{i,t} \qquad (2)$$

The proxy TC is a weighted average of the price and income effects expected to spread from devaluation in a partner country. Caramazza et al. choose a relative weight of one to two on the basis of estimates of historical export elasticities. They identify the price effect with the expected loss of competitiveness in country *i* owing to a crisis in other countries, proxying this effect with the change in the IMF real effective exchange-rate index for country *i*. This index weights the devaluation in partner countries both by bilateral trade and by competition in third markets. Caramazza et al. adjust it to exclude own-country effects by replacing the actual exchange-rate change and inflation of country *i* during the crisis with a projection based on trends over the three years prior to the crisis.

The income effect is captured by an indicator of the expected output contraction of countries that are export markets for country *i*. The output contraction is measured with respect to the average growth rates in the three years before the crisis and trade weights are used to aggregate the data. FC is a set of indicators of financial linkages including the share of debt

[5] They developed an index of foreign exchange-rate pressure as a weighted average of exchange rate changes and short-term interest rates relative to Germany. This variable 'crisis' took a value of 1 if the index was above a certain threshold and 0 otherwise.

[6] IMF weights only consider trade in manufacturing and are time invariant. For a detailed description of the methodology see IMF, *International Financial Statistics*.

[7] The current-account balance/GDP ratio and the change in the real effective exchange-rate, in the export/GDP ratio and in the terms of trade.

borrowed by country *i* from a common creditor country and Mit is a set of macroeconomic variables. Caramazza et al. find that TC is not significant, but that it becomes so when multiplied by previous years' current account balances. This seems to suggest that the trade channel significantly affects country *i*'s probability of crisis only when it is already suffering from external imbalances.

Another interesting finding by Caramazza et al. is that region-specific dummies are not significantly different from each other. This suggests that the clustering of crises is explained by the independent variables and therefore crises are not strictly regional phenomena.

Glick and Rose (1998) test trade against other macroeconomic factors in order to check whether contagion is regional. They estimate a cross-country equation with 161 countries in five crisis episodes:

$$\text{Crisis}_i = \square\text{Trade}_i + \square\square_i + \square_I \tag{3}$$

where Crisis is a binary variable, M is a set of macroeconomic indicators that include the annual growth rate of internal credit and real GDP, the current account balance divided by GDP and the change in the nominal effective exchange-rate during the year of crisis compared with the average of the past three years. Trade is an indicator of trade linkages defined as:

$$\text{Trade}_i = \sum_k \left\{\left[\left(x_{0k} + x_{ik}\right)/\left(x_0 + x_i\right)\right] * \left[1 - \left|x_{ik} - x_{0k}\right| / \left(x_{ik} + x_{0k}\right)\right]\right\} \tag{4}$$

where x_{ik} are exports from *i* to *k* ($k \neq i$, 0) and 0 is the first victim country, x_0 are total exports of country 0 and x_i are total exports of country *i*. This indicator is a weighted average of the contribution of third markets for the first victim country 0 and for country *i*. The weights, the second term of the index, imply that country *k* is more important for countries 0 and *i*, the more similar the importance of country *k* is for each of them.

Glick and Rose also use other indicators: *direct trade*, *total trade* and *trade share*, which they define respectively as follows:

$$\text{DirectTrade}_i = 1 - \left|x_{i0} - x_{0i}\right| / \left(x_{i0} + x_{0i}\right) \tag{5}$$

$$\text{Total Trade}_i = \left[1 - \left|x_{i0} - x_{0i}\right| / \left(x_{i0} + x_{0i}\right)\right] * \textit{Trade}_i + \textit{DirectTrade}_i * \left[\left(x_{i0} + x_{0i}\right)/\left(x_0 + x_i\right)\right]$$

$$\text{Tr.Share}_i = \sum_k \left\{\left[\left(x_{0k} + x_{ik}\right)/\left(x_0 + x_i\right)\right] * \left[1 - \left|\left(x_{0k}/x_0\right) - \left(x_{ik}/x_i\right)\right| / \left(\left(x_{0k}/x_0\right) + \left(x_{ik}/xi\right)\right)\right]\right\}$$

Direct trade is a measure of bilateral trade, *total trade* is a weighted index of bilateral trade, and with respect to the third market and *trade share*, it is an index similar to *trade* but adjusted for trade shares to control for the different sizes of the countries. These measures seem to be relatively insensitive to the way in which trade linkages are measured.

Glick and Rose (1998) find strong evidence to support the hypothesis that currency crises spread from one country to another because of trade linkages. They accordingly conclude that currency crises are fundamentally regional phenomena.[8]

ii) Contagion and trade structure. Diwan and Hoeckman (1999) analyse the effects of trade structure on transmission of shocks in terms of "competition versus complementarity". They

[8] A limitation of the trade linkages used in the studies described above is that all of them are calculated on total trade flows, with no analysis of the trade structure in terms of products.

argue that countries with very similar export structures will compete mainly in third markets outside the region. In this case, the price effect of devaluations by a trade competitor will be negative and the positive income effect almost absent, with a consequent strong incentive to match the devaluation. On the other hand, if most of the trade in a region concerns goods that are complementary in production (i.e. intermediate goods), then the price effect of a devaluation by a partner is positive for all countries in the region because it enhances the competitiveness of the 'joint' production.

Taking indicators of trade structure into account, Diwan and Hoeckman test the hypothesis of competition versus complementarity for East Asian countries by using a set of trade indicators. They analyse intra- and inter-regional demand linkages by calculating shares of intra-extra regional trade of each country and a trade intensity index (XI) on both total merchandise exports and intermediate goods defined as:

$$XIi = (Xij/Xi)/[Mj/(Mw-Mi)] \quad (6)$$

where X and M are respectively exports and imports, and *i*, *j* and *w* denote the reporting country, the partner and the world. If this index control for the size of the partner country is greater than 1, trade is more intense than would be expected, given a share *j* of world imports. This index has the defect that it allows neither cross-country nor cross-time comparisons. Moreover, it is sensitive to the size of country *i*: the bigger the country, the lower the index.

In order to test the competition hypothesis, Diwan and Hoeckman compute export correlations and export similarity indexes for extra- and intra-regional trade.[9]

$$XSij = \sum_{a} [\min (xai , xaj)] * 100 \quad (7)$$

where xai and xaj are the industry *a* exports shares in country *i's* and *j's* total exports, calculated at the 4 digit SITC level.

The index ranges between 0 and 100, with 0 indicating complete dissimilarity and 100 identical export composition. The authors find a high degree of intra-regional trade in total and intermediate goods, supporting the close interdependence and complementarity hypothesis of East Asian trade.[10]

Kaminsky and Reinhart (2000) recognise that most of the empirical studies focus on bilateral trade and that when third-party trade is considered, little attention is given to the commodity composition of potential competitors.

The authors select groups of countries in terms of either high bilateral trade between them or of competition in a relevant third market, examining a sample of industrial and developing countries for the period 1970–98, including 80 currency crises. They choose bilateral trade clusters by inspecting the ratios of exports in the region to total exports of each country. For third-market competitors they also inspect similarities in the product composition of trade.

[9] This measure was first proposed by Finger and Kreinin (1979).

[10] According to Bentivogli and Monti (2001), "Diwan and Hoeckman's account is unsatisfactory in relating the trade structure to the transmission of crisis. As the 'new trade theories' explain, countries which export very similar goods will have a large amount of bilateral (intra-industry) trade, so that competition will be strong both in regional markets and outside the region. This pattern of trade is typical of all industrial countries and of some emerging market economies as well. Diwan and Hoeckman's 'competition story' probably only applies to a region in which all countries export largely the same raw materials, so that bilateral trade is limited and competition in third markets is high."

For each cluster of countries, Kaminsky and Reinhart compare the unconditional probability of a crisis occurring in the next 24 months P(C) with the probability conditioned on the information that there is a crisis elsewhere P(C/CE). They treat the difference between these two probabilities as an indicator of the relevance of the trade channel.

They find evidence that belonging to the same region as a crisis country increases the probability that other countries will experience a currency crisis owing to trade linkages.

Forbes (2000) utilises firm-level information to measure the importance of trade in the international transmission of crises. The paper sample includes information on over 10,000 companies from around the world during the Asian and the Russian crises. It focuses on the variation of different firms' stock market performance, which not only tests which types of companies were most affected by these crises but also how these crises spread internationally. Results show that companies that had sales exposure to the crisis country or competed in the same industries as crisis-country exports (or both) had significantly lower stock returns during these two crises. The paper concludes that direct trade effects (income effects) as well as competition in export industries (product-competitiveness effects) "were both important transmission mechanisms during the later part of the Asian and the Russian crisis".

Forbes (2001) seeks to establish whether trade linkages are important determinants of a country's vulnerability to crises originating elsewhere in the world. She maintains that trade can transmit crises internationally through three distinct (and possibly counteracting) channels: i) the competitiveness effect, when changes in relative prices affect a country's ability to compete abroad; ii) the income effect, when a crisis affects income and demand for imports; and iii) the cheap-import effect, when a crisis reduces import prices and acts as a positive supply shock.

Forbes develops a series of statistics measuring each of these linkages for a sample of 58 countries during 16 crises from 1994 to 1999. Of particular interest is the competitiveness statistic, which uses 4-digit industry information to calculate how each crisis affects exports from other countries. The empirical results of Forbes' study suggest that countries which compete with exports from a crisis country and export to the crisis country (i.e. competitiveness and income effects) have significantly lower stock market returns. Although trade linkages only partially explain stock market returns during recent crises, they are significantly and economically important.

Bentivogli and Monti (2001) concentrate on trade linkages as a channel for spreading the effects of economic disturbances, from one source country to other countries. They compare the degree of vulnerability to external shocks of five Latin American countries and five Asian crisis countries in the 1990s, computing theoretically-backed indicators of vulnerability owing to trade linkages.

The indexes show that Latin America is much less vulnerable than Asia to an international transmission of economic disturbances from a country in the same region. This is because of: i) the relatively lower openness of Latin American countries, ii) the higher share of raw materials in their exports and iii) the lower degree of similarity both of the manufactured goods exported inside their region and of those exported to their common industrial markets.

Moreover, Southeast Asian countries are more likely than Latin American ones to transmit economic disturbances to industrial countries because of the higher substitutability of their manufactured exports with those of more advanced economies.

2. Trade features and vulnerability to currency shocks in a centre-periphery framework

Previous sections have shown that one of the main shortcomings of the literature on the transmission of crises through trade is the fact that empirical studies are not closely linked to the theoretical literature.

One of the aims of this paper is to use the theoretical results of recent, open macroeconomic models to develop a 'theoretically consistent' empirical analysis of how economic disturbances spread. The purpose is to obtain indications on how exposed CEECs are to currency shocks given their trade structure.

Among the theoretical models, the one suited to this purpose seems to be the centre-periphery (CP) model developed by Corsetti et al. (1998b). Under certain hypotheses these authors reject the traditional hypothesis that devaluations have negative welfare repercussions on partner countries. The impact of devaluations in fact depends on the relative and absolute size of the parameters of the model, the most important of which are discussed below.

i) Elasticity of substitution between goods. The degree of substitutability of internationally traded goods is relevant when evaluating the impact of devaluation in one country owing to the transmission of shocks through trade because it determines the size and the direction of the demand-switching effects.[11]

ii) Firms pricing behaviour and exchange rate pass-through. The model determines the extent to which the effects of an exchange rate change are 'passed-through' to a firm's export price. If the exchange rate is reflected in a one-for-one change in prices abroad, then it is referred to as 'full pass-through'. If none of the exchange rate change is reflected in prices abroad it is referred to as 'no pass-through'.

With full pass-through, a devaluation of country A's currency gives rise to an improvement in country B's terms of trade, a reallocation of consumption away from country B goods, a decline in the market share of B exports in country C and a depreciation of country B's exchange rate vis-à-vis country C. If country B wants to maintain the peg with country C, it must reduce the money supply, which implies greater appreciation vis-à-vis country A and a greater loss of market share in country C. If country B instead matches the devaluation of A's currency, country B's terms of trade and market shares do not change. The model shows that the negative affects arising from devaluation in a partner country are off-set in some cases by an improvement in the terms of trade. In fact, with full pass-through, country B also obtains a welfare gain from devaluation in country A because of the strong effect of its improvement in terms of trade on welfare.

In case of no pass-through, Corsetti et al. (1998b) show that there are no relative price competitiveness effects and export shares of the devaluating country remain the same. Country A's devaluation has a beggar-thy-neighbour effect as it reduces the exports, revenues and profits of producers in country B. The conclusion is more striking than the ones derived under the assumption of full pass-through: the optimal response for country B is always to devalue. Therefore, based on the centre periphery model, Corsetti et al. reach the conclusion that "if there is no pass-through, then direct bilateral trade links may play a more important role than competition in the third market in determining the transmission of exchange rate

[11] The authors assume that the elasticity of substitution between centre and periphery goods is lower than or equal to that between periphery goods, i.e. $\rho \leq \psi$.

shocks in the periphery. If there is full pass-through, a high share of bilateral trade within a region can actually limit the extent of beggar-thy-neighbour effects." (See Box 1 below.)

Box 1. Results of the centre-periphery model developed by Corsetti et al. (1998b)

Corsetti et al. show that in the case of devaluations
if: (i) $\rho>1$* and $\psi>\rho$,
(ii) intra- periphery trade =0
then:

	$\psi>1$	$\psi\leq1$
Full pass-through (sellers currency)	Beggar-thy-neighbour	Ambiguous (price effect and terms-of-trade effect)
No pass-through (buyer's currency)	Low vulnerability to currency crisis	Low vulnerability to currency crisis

if: (i) $\rho>1$* and $\psi>\rho$,
(ii) intra- periphery trade > 0
then:

	$\psi>1$	$\psi\leq1$
Full pass-through (seller's currency)	Ambiguous (price effect and terms-of-trade effect)	Ambiguous (price effect and terms-of-trade effect)
No pass-through (buyer's currency)	Beggar-thy-neighbour	Beggar-thy-neighbour

Notes: *The periphery as a whole runs a current account surplus vis-à-vis the centre when country A devalues;
ψ elasticity of substitution between periphery goods;
ρ elasticity of substitution between centre and periphery goods.

iii) Degree of trade integration within the region. The stronger the intra-regional trade links are the more vulnerable the partner countries are because of the negative demand-switching effects of devaluations by competitors. Nevertheless, it has to be emphasised that under the assumption of full pass-through there are also positive effects of the improvement in the terms of trade of the devaluing country partner.

3. Indicators of vulnerability linked to trade structure

3.1 Why analyse the CEECs?

The CEECs are a group of geographically close countries on the periphery of the European Union. All of the eight CEECs that joined the EU in May 2004 have declared their intention to adopt the euro as early as possible.[12] In terms of the announced monetary strategies of the countries it can be seen that for some of them the decision to join the ERM II[13] soon, from today's perspective, may not suffer from substantial objections.

[12] Following the procedures laid down in the Treaty of the Union, their aim is to introduce the euro at the beginning of 2007, subsequent to a two-year mandatory period within the ERM II starting around mid-2004 and a positive convergence assessment made around mid-2006.

[13] The ERM II is a pegged but adjustable system in which central parities are defined against the euro and not between all other participating countries. Hence this bilateral nature is expected to reduce the frequency and the

In the case of the Czech Republic, Hungary, Poland and the Slovak Republic – the four larger Central European economies – the announced strategies suggest a careful examination. The open question is whether these countries would be able to cope with structural trends towards higher and more volatile output growth, increasing relative price levels and structural fiscal deficits without an independent monetary policy. Also, these four economies are the ones that would need the most aggressive fiscal tightening to meet the Maastricht criteria in time for an early adoption of the euro, which may significantly aggravate the economic costs of joining the ERM II.

Hungary and the Slovak Republic are those that have most closely managed the exchange rate vis-à-vis the euro, in the first case through a peg to the euro and in the latter case from unilaterally shadowing a kind of ERM II framework. Therefore, they might consider continuing the present arrangements and joining the ERM II soon after EU accession, provided that fiscal imbalances are being contained.

For the Czech Republic and Poland, it may be preferable to maintain their current floating exchange-rate regime for some time after EU entry, as inflationary targeting in these countries has overall proved a well-functioning framework for monetary policy and has delivered the primary objective of low inflation.

In the case of Estonia, Latvia, Lithuania and Slovenia the decision to join the ERM II soon and to adopt the euro after a short stay in the ERM II may not run counter to substantial objections. In fact, these countries have already renounced an autonomous monetary policy and they have managed to accommodate a catching-up process without using the exchange rate as an adjustment tool. Furthermore, fiscal deficit are contained, public debt is small and structural policy have been supportive.

The eight countries, with the relative exception of Poland, are small and highly open economies that have tight trade relations with the EU. The degree of financial integration between the eight CEECs and the euro area still does not appear to be high and considerable differences exist across indicators and countries (see Table 1). All countries have experienced large and increasing capital inflows in recent years. By far the largest component of these flows is foreign direct investment, which is the component of capital flows less vulnerable to financial and currency disturbances.

Although the total assets of banking systems as a ratio to GDP have risen in most acceding countries in recent years, the level of financial intermediation is low. This is because of the moderate GDP-per-capita levels, the relatively short history of banking sectors and the transition process that included bank consolidation and a strong presence of foreign-owned companies.

Monetary transmission through interest and credit channels has become more effective in most acceding countries owing to improved banking sector soundness but it is still constrained as a consequence of the low depth of financial intermediation.

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scope of interventions. Central rates and fluctuation bands are set by common agreement involving the ministers of the eurozone, the SECB governors of the AC. The standard fluctuation band is +-15% while not excluding the possibility of setting a narrower band. Intervention support of the ECB to NCB is automatic at the margins of the band (marginal interventions), any interventions within the band (intra-marginal intervention) need not to be (but may be) supported by the ECB. Finally, realignments of central parity are made by the common procedure, which both the ECB and the member states have the right to initiate.

Table 1. Exchange-rate regimes and compatibility with the ERM II

	Exchange rate regime	**Currency**	**Features**	**Compatibility with the ERM II?**
Currency board				
Estonia	Currency Board to euro	Estonian kroon – EEK (€ 1 = 15.6466 EEK)	Peg to euro since 1999 (to DM before)	Yes; Estonia will join the ERM II after acceding in 2004.
Lithuania	Currency Board to euro	Lithuanian litas – LTL (€ 1 = 3.4528 LTL)	Peg to euro since 2 February 2002 (to $US from 1 April 1994 to 2 February 2002)	Yes; Lithuania is planning to join ERM II.
Fixed peg				
Latvia	Peg to the SDR basket of currencies	Latvian lats – LVL	Exchange rate bands ±1% of the central rate	No, but it is planning to join the ERM II and to peg to the euro on 1 January 2005.
Pegged exchange rates within horizontal bands (Unilateral shadowing of ERM II)				
Hungary	Peg to euro	Hungarian forint – HUF (€ 1= 284.1 HUF)	Peg to euro with ± 15% fluctuation band; parity changed to 284.1 from 276.1 as of 4 June 2003.	Yes.
Managed float				
Slovak Republic	Managed float	Slovakian koruna – SKK	Euro as a reference currency; foreign exchange market interventions.	No; the Slovak Republic envisages participation in the ERM II in the medium term.
Slovenia	Managed float	Slovenian tolar	Euro informally used as a reference currency	No; Slovenia intends to enter the ERM II in the first half of 2005.
Czech Republic	Managed float	Czech koruna – CZK	Floating regime since May 1997	No; but it is planning to join the ERM II in the medium term.
Free float				
Poland	Free float	Polish zloty – PLN	Inflation targeting	No; but it is planning to join the ERM II and to peg to euro soon.

Sources: Pre-Acceding Economic Programs 2003, ECB, EC.

According to this research, the case of the CEECs is of great interest to study the transmission of currency shocks through trade, for three main reasons:

i) The CEECs are going to join the ERM II and eventually the EMU, abandoning (with the exception of Hungary, Estonia and Lithuania) a flexible exchange rate as an effective instrument for absorbing shocks.

ii) The CEECs are a group of geographically close countries that are very suitable for representing the periphery of the EU. They have a high degree of trade integration with

the EU. It is possible to interpret the interdependences existing among the CEECs as the interaction that the centre-periphery model identifies for these periphery countries.

iii) The CEECs' financial markets are not yet developed and integrated. They seem to have a minor role in transmitting currency shocks. Thus trade linkages seem to be the main channel of transmission of disturbances.

This paper attempts to answer two main issues: What role, if any, does trade and firms pricing behaviour have in determining the vulnerability of CEECs to currency shocks? What are the implications for the ERM II sustainability? If after or because of joining the ERM II a currency shock occurs in one of CEECs, what is the probability of a contagious devaluation occurring in the other countries in the group?

3.2 Trade integration with the EU and intra-regional trade

The evolution of trade in acceding countries has been remarkable in the 1990s. The degree of openness increased dramatically. The integration with the EU market (further strengthened by the Association Agreement signed bilaterally by those countries) led to an increase of their market shares in EU trade (Zaghini, 2003).

The degree of openness is on average 92% of GDP (56.7% when taking into account only trade with the EU). The most open countries are Estonia, the Slovak Republic and Slovenia. The eight CEECs (CEEC-8) entertain close trade relations with the EU, accounting on average for about 63.7% of total export and about 60.5% of total import (Table 2). This compares well with the level of trade integration among the current EU members, whose exports and imports within the EU are on average around 60% of total trade.

It is worth noticing that, in the group, the countries that are relatively more highly integrated with the EU (Hungary, Latvia and Poland) are those with the lowest degree of openness. The most open economies, such as Estonia, Slovenia and the Czech and Slovak Republics, are less well-integrated with the EU. The lower trade integration with the EU might suggest that these countries, which also trade significantly with non-EU countries, could be somewhat more exposed to external demand shocks originating from non-EU counties than in the EU area.

Table 2. Degree of openness and trade integration among the CEEC-8 (2002)

	Degree of openness (Exp+imp)/GDP, (%)		(ExpEu+ImpEu) /(ExpWorld+Imp World)	**Trade integration with the EU** (EU export and import in % of total export and import)	
	To World	**To EU**		**Export**	**Import**
Czech Rep.	94.9	60.8	0.64	68.3	60.1
Estonia	**133.3**	**82.8**	**0.62**	68.0	57.9
Hungary	91.1	59.4	0.65	75.1	56.3
Latvia	75.7	57.2	0.76	60.4	84.1
Lithuania	92.1	43.3	0.47	49.6	45.2
Poland	42.3	27.4	0.65	68.7	61.7
Slovak Rep.	**109.4**	**60.2**	**0.55**	60.5	50.3
Slovenia	**97.3**	**62.1**	**0.64**	59.4	68.0
Average	**92%**	**56.7%**	**0.62**	**63.7%**	**60.5%**

Sources: WEO IMF, Eurostat Newcronos, Bilateral Trade Database (BTD) and International Trade by Commodity Statistics (ITCS), 2003.

The analysis of CEECs' bilateral export shares by destination confirms that the EU is the main market of destinations, the US and Japan having a minor role as export markets. Among the eight countries, trade shares with the other CEECs are heterogeneous with the lowest shares for Slovenia and the highest for Latvia (Table 3).

Table 3. Bilateral export shares by destination (% total exports, 2002)

Report Partner	**Czech Rep.**	**Hungary**	**Poland**	**Slovak Rep.**	**Estonia**	**Latvia**	**Lithuania**	**Slovenia**
Czech Rep.	–	2.4	4.7	7.7	0.3	1	0.8	0.1
Hungary	1.9	–	2.1	1.4	0.6	0.2	1.6	0.4
Poland	4	2.3		1.4	0.5	0.3	6.3	0.1
Slov.Rep.	15.2	5.4	5.3	–	1.8	1.8	2.8	0.1
Estonia	–	–	–	–		6	3.2	0.1
Latvia	–	–	–	–	7.7		12.6	12.6
Lith.*	–	–	–	–	4.1	8.35	–	0.3
Slovenia	–	–	–	–	0.02	0.1	0.0	–
EU	68.3	75.1	68.7	60.5	60	67.3	63.1	66.2
USA	2.9	3.5	2.7	1.4	2.2	4.3	3.8	2.8
Japan	0.4	0.6	0.2	1	0.6	0.8	0.4	0.2
World	100	100	100	100	100	100	100	100

Notes: *2001

Sources: OECD, Bilateral Trade Database (BTD) and International Trade by Commodity Statistics (ITCS) (2003) and author calculations on United Nations, Comtrade (2003).

Two sub-groups emerge in which trade is more intensive. The first one is composed of the four largest countries (and also OECD members), the Czech Republic, Hungary, Poland and the Slovak Republic, while the second includes the Baltics (Estonia, Latvia and Lithuania) plus Slovenia. There is evidence of intra-group trade in the region, though it seems to play a minor role.

Based on classification SITC Rev. 3, in each of the eight countries manufactured goods account on average for about 77.4% of exports towards the EU. The national export shares of each product proxy the importance for any given country of the demand-switching effects that could arise from a devaluation by a competitor in that specific market. Interestingly, all the eight countries have a very similar export product composition, with machinery and transport equipment ranking first. Manufactured goods, miscellaneous manufactured articles and chemicals, and related products also have a major role in the export structure of most of CEECs. A large part of CEECs' trade with the EU is intra-industrial, most of which is classified as vertical intra-industrial trade. This may suggest that countries with a high degree of intra-industrial trade will be subject to similar shocks and patterns of industrial activity.

Table 4 shows the Glick and Rose (1998) trade share and direct trade indexes measuring competition in the third market (EU) and the direct trade linkages of CEECs respectively. The indexes prove that there is high competition among country pairs in the EU market and an extremely high number of bilateral trade links. It is worth noting that, even given the very high manufactured content of CEEC trade, the indexes computed for total trade and trade in manufactured goods only are not very similar.

Table 4. Glick and Rose trade linkages (2002)*

Country pairs	Competition in third markets (EU) (TradeShare[14] SITC Rev. 3)		Direct linkages (Direct trade,[15] SITC Rev. 3)	
	Total	**Manufactures**	**Total**	**Manufactures**
ee-lv	0.59	0.69	0.58	0.59
ee-sk	0.62	0.72	0.85	0.53
ee-sl	0.62	0.70	0.32	0.27
ee-hu	0.68	0.78	0.74	0.48
ee-pol	0.66	0.76	0.51	0.55
ee-cz	0.65	0.74	0.52	0.41
cz-lv	0.67	0.81	0.36	0.31
cz-sk	0.65	0.81	0.85	0.80
cz-sl	0.65	0.83	0.87	0.93
cz-hu	0.71	0.79	0.83	0.81
cz-pol	0.68	0.79	0.94	0.86
hu-lv	0.73	0.99	0.22	0.27
hu-sk	0.70	0.96	0.78	0.83
hu-sl	0.70	0.98	0.76	0.90
hu-pol	0.72	0.92	0.89	0.86
sl-sk	0.58	0.69	0.92	0.97
sl-pol	0.66	0.73	0.62	0.56
sl-lv	0.57	0.66	0.27	0.26
pol-sk	0.66	0.88	0.83	0.79
pol-lv	0.68	0.89	0.24	0.24
sk-lv	0.59	0.72	0.51	0.43

Note: *2002 data for Lithuania are not available.

Sources: Author's calculations based on COMTRADE UN.

According to the Glick and Rose, trade share indexes, all countries, with no exception, seem to compete more heavily with each other in the manufactured goods sector, having the EU as the destination market.

The same result does not hold for intra-regional trade. In fact, the direct trade indexes show that all the CEECs compete against each other with few exceptions (Estonia-Slovenia, Hungary-Latvia, Slovenia-Latvia and Poland-Latvia). Nevertheless, the degree of competition, if only trade in manufactured goods is considered, decreases in more than half of the country pairs.

3.3 Elasticity of substitution and trade structure

The degree of substitutability of the different internationally traded goods is relevant in assessing a country's vulnerability to the transmission of currency shocks. Other things being

[14] Trade share i = $\Sigma k\{[(x0k+xik)/(x0+xi)]*[1-|(x0k/x0)-(xik/xi)|((x0k/x0)+(xik/xi))]\}$ •where: xik = export from i to k ($k \neq i$, 0), 0 is the first victim country, x0 is total export of 0, xi is total export of i. This is a measure of trade linkages and competition in third markets that uses trade share so as to adjust for the varying size of countries.

[15] Direct trade i = 1- (| xi0-x0i |$\diagup$(xi0 +x0i)). This index is higher the more equal the bilateral export is between countries 0 and *i*.

equal, it determines the size and the direction of the demand-switching effects. Indeed, the probability of devaluation is higher in countries producing exports similar to those of the 'first victim' countries than in the others. One simple measure of the substitutability of each country's export is the Finger and Kreinin index (Table 5).[16]

Table 5. Indexes of export similarity: the Finger and Kreinin index[17] (on manufactures in % of manufactured goods exported, 2002, export market EU, SITC)

	Estonia	**Hungary**	**Latvia**	**Lithuania**	**Poland**	**Slovak Rep.**	**Slovenia**
Czech Rep.	80.7	85.3	47.7	61.1	87.4	94.7	88.4
Estonia	–	70.4	66.6	75.4	91.2	85.2	88.4
Hungary	–	–	71.2	53.6	76.7	80.4	74.5
Latvia	–	–	–	59.1	60.2	51.9	57.7
Lithuania	–	–	–	–	68.8	65.4	68.6
Poland	–	–	–	–	–	92.2	95.3
Slovak Rep.	–	–	–	–	–	–	93.4

Source: author's calculations based on Eurostat Newcronos.

Table 5 shows the index values for manufactured products as a percentage of total manufactured exports for 2002. These are computed for country pairs with SITC data. The common export market for country pairs is the EU-15. The indexes show a high degree of similarity among the CEECs, with the exception of the Czech Republic-Latvia country pair, whereby the index is relatively smaller. According to these results, trade channels seem to have a powerful role in transmitting currency shocks.

Moreover, the evidence that countries of the same group produce goods that are very similar or a substitute in consumption suggests that changes in their bilateral exchange rates may reduce, even significantly, the welfare of its regional trading partners, through the reduction in the demand for their exports.

3.4 Firms' pricing policies in response to exchange-rate movements

The exchange rate pass-through determines the extent to which the effects of an exchange-rate change are 'passed-through' to a firm's export price. If the exchange rate is reflected in a one-for-one change in prices abroad, then it is referred to as 'full pass-through'. If none of the exchange-rate changes are reflected in prices abroad, it is referred to as 'no pass-through' or pricing-to-market. Theoretical analyses list a number of factors underlying the pricing decisions taken by export firms following an appreciation (or depreciation) of their currency.

For example, let *e* be the nominal exchange rate, P^F the foreign firm's price level expressed in domestic currency terms, with the foreign currency price being P^F/ e; the phenomenon of pass-through can be, therefore, expressed by dP^F/ de. Alternatively, a more convenient way of expressing the pass-through is by computing the price elasticity in the form $(dP^F/ de) (e / P^F)$.

[16] See Finger and Kreinin (1979); it is worth underlining that the use of aggregate data for the manufactured goods sector (given the lack of more disaggregated data) could produce an overestimation of the indexes.

17 •ESij =□a [min (xai, xaj)]* 100, xai and xaj are export shares of country *i*'s and country *j*'s manufactures exports in industry a. •ES = 0 = complete dissimilarity, ES = 100 = identical export composition.

In case the latter elasticity equals 1, the full pass-through condition holds, while no pass-through arises in case of $(dP^F / de)\ (e / P^F) = 0$.

The phenomenon of pass-through is the result of a combination of multiple factors, such as the degree of competitiveness of the market, the degree of substitutability among products, the possibility of achieving economies of scale relative to foreign competitors and how permanent the exchange rate devaluation is perceived to be. Therefore, it is difficult to make empirical generalisations or inferences about firms' pricing behaviour merely based on the extent of the observed pass-through.

In line with the scope of our work, we use a simple measure of exchange rate pass-through on export price, based on correlation coefficients and average price elasticity to exchange rate (Table 6).

Table 6. Correlation between the export price index and the exchange rate against the euro

(quarterly data, Q1-1999 to Q4-2002)

	Czech Rep.	**Hungary**	**Poland**	**Slovak Rep.**
Correlation coefficient	0.2	0.9	0.8	-0.1
Average elasticity	0.3	1	0.9	0.1

(quarterly data, Q2-1999 to Q4-2002)

	Estonia	**Latvia**	**Lithuania**	**Slovenia**
Correlation coefficient	0.0	-0.0	0.5	Hps *Coricelli, Zsolt PT=1
Average elasticity	0.0	-0.2	0.4	

Notes: * Quarterly export price index data for Slovenia are not available, therefore we introduce assumption that the pass-through is = 1 derived by Coricelli et al. (2003) and Zsolt (2001).

Source: Datastream.

According to both correlation coefficients and average elasticities, the firms' pricing behaviour in Hungary, Poland and Slovenia in the period 1999-2002 has been that of maintaining export prices in terms of their currency close to the pre-appreciation (depreciation) levels. This firm policy in case of appreciation of the national currency against the euro implies a 'skimming' pricing strategy while in case of depreciation a 'penetration' or 'market share' pricing strategy (Sundaram and Mishra, 1992).

Lithuania is in a middle case with an average correlation between the export price index and the exchange rate against the euro of around 0.5. The export pricing policy of firms in the Czech and Slovak Republics, Estonia and Latvia in the same period appears not to have followed exchange-rate movements.[18]

As mentioned before, a devaluation in a country in which there is pass-through and intra-periphery trade lead on the one hand to the worsening of price competitiveness of its main trade partners and on the other hand to the improvement of their terms of trade. Thus under certain conditions if one of these countries devaluates the others have no incentive in matching the devaluation.

[18] These results are in line with the studies of Coricelli, Jazbec and Masten (2003) and Zsolt (2001), according to which the point estimates of pass-through are higher in Slovenia and Hungary than in Poland, while the pass-through is low in the Czech Republic.

In the case of Estonia, Latvia and the Slovak Republic, which seem to have a low pass-through, if a devaluation arises, the intra-periphery effect of beggar-thy-neighbour owing to competition in the EU disappears. Yet there could be another source of the beggar-thy-neighbour effect, owing to the decrease of export shares towards the devaluing country. This effect could worsen the economic conditions of trading partners in the periphery, giving them an incentive to match the devaluation.

4. Conclusion

In Table 7, the values of the similarity index and of pass-through are presented for each of the country pairs. The joint analysis of these indicators provides us with some indications concerning currency-shock transmission for each of the country pairs under examination.

Table 7. The currency shock vulnerability of CEECs (2002)

PT / F.K	0			0.2	0.5	0.8	0.9	1
	Sk	Lv	Ee	Cz	Lt	Pl	Hu	Sl
95.3	–	–	–	–	–	Pl-Sl	–	Sl-Pl
94.7	Sk-Cz	–	–	Cz-Sk	–	–	–	–
93.4	Sk-Sl	–	–	–	–	–	–	Sl-Sk
92.2	Sk-Pl	–	–	–	–	Pl-Sk	–	–
91.2	–	–	Ee-Pl	–	–	Pl-Ee	–	–
88.4	–	–	Ee-Sl	Cz-Sl	–	–	–	Sl-Cz, Sl-Ee
87.4	–	–	–	Cz-Pl	–	Pl-Cz	–	–
85.3	–	–	–	Cz-Hu	–	–	Hu-Cz	–
85.2	Sk-Ee	–	Ee-Sk	–	–	–	–	–
80.7	–	–	Ee-Cz	Cz-Ee	–	–	–	–
80.4	Sk-Hu	–	–	–	–	–	Hu-Sk	–
76.7	–	–	–	–	–	Pl-Hu	Hu-Pl	–
75.4	–	–	Ee-Lt	–	Lt-Ee	–	–	–
74.5	–	–	–	–	–	–	Hu-Sl	Sl-Hu
71.2	–	Lv-Hu	–	–	–	–	Hu-Lv	–
70.4	–	–	Ee-Hu	–	–	–	Hu-Ee	–
	–	–	–	–	–	–	–	–
68.8	–	–	–	–	Lt-Pl	Pl-Lt	–	–
68.6	–	–	–	–	–	–	–	Sl-Lt
65.4	Sk-Lt	–	–	–	Lt-Sk	–	–	–
66.6	–	Lv-Ee	EE-Lv	–	–	–	–	–
61.1	–	–	–	Cz-Lt	Lt-Cz	–	–	–
60.2	–	Lv-Pl	–	–		Pl-Lv	–	–
59.1	–	Lv-Lt	–	–	Lt-Lv	–	–	–
57.7	–	Lv-Sl	–	–	–	–	–	Sl-Lv
53.6	–	–	–	–	Lt-Hu	–	Hu-Lt	–
51.9	Sk-Lv	Lv-Sk	–	–	–	–	–	–
47.7	–	Lv-Cz	–	Cz-Lv	–	–	–	–

Notes: PT= Pass-through; FK= Finger and Krenin Index.

In the northwest quadrant of the table – with an arbitrarily chosen lower threshold of the similarity index (70) and a low degree of pass-through (between 0 and 0.2) – there are the Slovak Republic, Latvia, Estonia and the Czech Republic. If a devaluation arises in these countries and there is intra-periphery trade, there is a higher probability that the currency disturbance will be transmitted to trading partners with similar trade structures. For example, if the Slovak Republic devalues, a devaluation could occur in the Czech Republic. This probability is enhanced by the following factors: i) a relatively high degree of bilateral trade between the two countries (15.2%), ii) a high index of export similarity (94.7%) as well as iii) bilateral competition (0.8%).

Given that the Slovak Republic has a *pass-through* equal to 0, the beggar-thy-neighbour factor that precipitates the transmission of currency shocks is not because of a price competitive effect. The transmission mechanism occurs mainly through the bilateral trade links: once its currency is devalued, the Slovak Republic could reduce its import demand from the Czech Republic because Czech goods are expensive in its currency. The impact of an import demand switch-off increases as the bilateral trade between the two countries is greater and the similarity index between them is higher. Interestingly, a feedback effect could arise between the two countries. The Czech Republic also has a low degree of pass-through, in fact it is in the same quadrant of the table. Thus implications similar to those for the Slovak Republic hold if a devaluation originates in the Czech Republic.

In the northeast quadrant of the table there are Poland, Hungary and Slovenia. If devaluation occurs in these countries, the shock could be transmitted through the channel of competition into the EU-15 market. Devaluation in Slovenia, which has a pass-through of 1, could prompt a devaluation in Poland, which has a very high similarity index with respect to Slovenia.

On the one hand, after devaluation, Slovenia would gain competitiveness. This could cause a loss of export shares for Poland in the EU-15 market. On the other hand, Poland would benefit from a positive terms-of-trade effect. The transmission of shocks is positively correlated to the degree of competition of the country pairs in the EU-15 and to the degree of the similarity of export structures. Yet bilateral trade between Slovenia and Poland would contain the contagion owing to the effect on the terms of trade.

It has to be noted that the bilateral trade between Poland and Slovenia is indeed very low (0.1%) This suggests that in this case the price-competitiveness effect will exceed the effect on the terms of trade, enhancing the possibility that currency disturbances would be transmitted. According to the previous findings (on low intra-periphery trade), this effect is likely for all of the country pairs in this quadrant. The remaining quadrants of the table represent intermediate situations and ambiguous results could be derived. Nevertheless, the logic underlying all the quadrants in the analysis is the same as in the northeast and northwest quadrants.

To conclude, a general, theoretically backed framework has been used to interpret the role of trade-structure variables in the transmission mechanisms of currency disturbances. As a result of the heterogeneity in pass-through and trade structures, it is very difficult to derive a unitary policy implication on the potential sustainability of the ERM II. Yet it is possible to single out the country pairs that have a higher likelihood that currency shocks will be transmitted. Preliminary results point out that (other things being equal and given the contained intra-periphery trade) the transmission of currency disturbances is lower if the disturbance originates in countries with low a pass-through rate (the Slovak and Czech Republics, Estonia and Latvia) and higher if it originates in countries with a high pass-through rate (Poland, Hungary and Slovenia).

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