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Contagion, Herding and Exchange-rate Instability – A Survey

Despite the considerable body of literature on the subject of currency crises there is still very little agreement on the true drivers of these crises and their transmission across countries. This article focuses in particular on the role of herd behaviour and financial contagion, and the high exchange-rate volatility which is a direct consequence of these. It also looks at the adverse macroeconomic consequences of episodes with high exchange-rate volatility, especially in terms of labour market performance.

The deep currency crises in Europe, Latin America and Southeast Asia in the last decade were characterised not only by collapsing currencies or a sharp swing of international capital flows. An additional important feature of these crises was the fast transmission of crises across countries, regardless of economic fundamentals. For instance, Argentina was affected by the Mexican Peso crisis (1995), the Thai crisis (1997) created major turmoil in Malaysia, Indonesia, Korea and the Philippines, and the Russian crisis (1998) reached a seemingly unrelated country like Brazil. More recently, the severity of the transmission of the Brazilian crises (1999) to Argentina surprised many analysts given the low degree of openness of these countries.

A common view is that the asset allocation and strategies of international investors, especially mutual funds, have led to the quick spreading of recent financial crises and the high degree of exchange-rate instability. Given the increasing importance of international capital flows, many authors see international investors at the core of the recent financial distress. Until now, however, the literature has failed to provide strong evidence for or against this view.

The ability to predict currency crises and exchange-rate movements remains a challenging task. Despite a voluminous theoretical and empirical body of literature there is still very little agreement about what the true drivers of these developments are. Hence, it comes as no surprise that extensive research based on work by Meese and Rogoff,¹ and Meese,² has shown that the random walk model outperforms other standard exchange-rate models in out-of-sample forecasting of exchange-rate movements. This still holds even when seemingly relevant economic variables are included.

This paper first presents an overview of the theory on currency crises, focusing in particular on the role of herd behaviour and financial contagion. A direct consequence of herd behaviour and financial contagion are large and unpredictable exchange-rate swings, leading to high exchange-rate volatility. The paper goes on to deal with the adverse macroeconomic consequences of episodes with high exchange-rate volatility, especially in terms of labour market performance.

¹ R. Meese, K. Rogoff: Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?, in: Journal of International Economics, Vol. 14, No. 2, 1983, pp. 3-24.

² R. Meese: Currency Fluctuations in the Post-Bretton Woods Era, in: Journal of Economic Perspectives, Vol. 4, No. 1, 1990, pp. 117-134.

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First and Second Generation Models of Currency Crises

A large body of literature has identified a variety of factors that cause or influence financial crisis. The early work on currency crises, initiated by Krugman,³ is characterised by inconsistencies in fundamental macroeconomic variables with the maintenance of a currency peg. In these *first generation models*, the government runs a lax fiscal policy and finances the deficit by printing money. As a consequence, the money supply grows in a way which is incompatible with the proclaimed level of the fixed exchange rate. Individuals realise this inconsistency and seek to convert large amounts of their holdings in domestic currency into foreign-denominated securities. As a result, the domestic currency experiences downward pressure. In order to defend its exchange-rate commitment, the central bank is then forced to purchase the excessive supply of domestic currency on international financial markets, thereby reducing its foreign exchange reserves. Finally, if the central bank's foreign reserves run low, the monetary authorities are forced to give up their defence of the original parity. According to this early work, currency crises are foreseen perfectly. This implies that the depreciation does not occur at the date when all reserves are exhausted, but in form of a speculative attack at some earlier date. Rational market participants observing the inconsistency between monetary expansion and the exchange-rate peg act in anticipation of the depreciation and will start a speculative attack on the currency when the stock of reserves is still relatively high.

Although first generation models well explained the causes of currency crises in the 1970s and 1980s, more recent crises indicated that the link between unsustainable economic policy and the abandonment of an exchange-rate peg is not as mechanical as presumed. For instance, the experiences of the European crisis 1992-1993 or the Mexican Crisis 1994-95 have shown that speculative attack can occur even without poor economic fundamentals. Moreover, the severity of the crises could not be explained by first generation models.

In the *second generation models* of currency crises attention therefore shifted to how changes in expectations cause crises. The key point is that these models question the view of a single correct equilibrium. Instead, different outcomes can result,

depending on economic agents' expectations.⁴ For example, a situation where policies are consistent with an exchange-rate commitment, resulting in strong fundamentals and a sufficient stock of foreign reserves, can suddenly change as markets create the conditions for a speculative attack. The sudden shift in market expectations may be due to uncertainty about the future path of economic policy, in particular the willingness or the ability of the government to maintain the exchange-rate parity. For instance, a rising unemployment rate increases the cost of the exchange-rate commitment. Investors thus anticipate a future loosening of monetary policy and the abandonment of the currency peg. This in turn triggers a speculative attack as market participants convert their domestic assets into foreign currency. The key result is that crises leave the economy in a suboptimal, inefficient equilibrium. Crises are thus self-fulfilling as the expectation of a devaluation makes a devaluation more likely.

It has been argued that the two crisis models outlined above overlook important features that characterise recent currency crises. First, a common feature of recent crisis episodes has been the fast transmission of shocks across many countries. The latest explanations of currency crises are therefore extended to take contagion effects into account. Second, recent financial turmoil shows that the sudden stop or reversal of capital inflows causes severe economic downturns generally associated with a high exchange-rate volatility.

Contagion

The literature has used different definitions of contagion. In its most general form, contagion refers simply to the international transmission of shocks. Eichengreen et al.⁵ or Kaminsky and Reinhart⁶ define contagion as a situation *where the knowledge that there is a crisis elsewhere increases the likelihood of a crisis at home*. A more restrictive definition is provided by Edwards.⁷ According to his definition, contagion attributes only the excess co-movement that persists after common fundamentals as well as common shocks have been taken into account.

⁴ See, for example, B. Eichengreen, A. Rose and C. Wyplosz: Contagious Currency Crises, NBER Working Paper 5681, 1996, National Bureau of Economic Research; and M. Obstfeld: Rational and Self-fulfilling Balance of Payment Crises, in: American Economic Review, Vol. 76, No. 1, 1996, pp. 72-81.

⁵ B. Eichengreen, A. Rose and C. Wyplosz, op. cit.

⁶ G. Kaminsky, C. Reinhart: On Crises, Contagion and Confusion, in: Journal of International Economics, Vol. 51, No. 1, 2000, pp. 145-163.

⁷ S. Edwards: Contagion, Paper presented at the 1999 World Economy Lecture, 28th October, 1999, University of Nottingham.

³ P. Krugman: A Model of Balance of Payments Crises, in: Journal of Money, Credit and Banking, Vol. 11, No. 3, 1979, pp. 311-25.

Other authors restrict the term even further and state that contagion should only be applied to cases when cross-market correlation increases during crisis episodes.

What constitutes a contagion episode? Following Kaminsky et al.⁸ one can distinguish between at least three different possible channels of contagion: fundamentals-based contagion, common-cause contagion and pure contagion.⁹ This classification guarantees the differentiation between contagion obviously not related to changes in fundamentals and a common shock that affects many countries in the same way.

Fundamentals-based and Common-cause Contagion

Contagion is fundamentals-based if the transmission of shocks takes place through trade or financial links.¹⁰ In terms of trade linkages, the transmission channel may be either directly through bilateral trade or indirectly through competition on third markets. The resulting "spillover effects"¹¹ have been modelled formally by Gerlach and Smets¹² and Eichengreen et al.¹³ The transmission channel starts from the observation that a currency crisis in one of our main trading partner countries will result in a depreciation of the foreign currency which in turn weakens domestic price competitiveness. The resulting drop in demand for domestic export goods will deteriorate the current account. This increases the cost of the exchange-rate commitment and makes a devaluation more likely.

Other authors see the global diversification of financial portfolios at the root of contagion. There is, in particular for emerging markets, some evidence that the stronger financial interdependence between

countries makes it more likely that multiple countries are affected by the same crisis. Kaminsky and Reinhart,¹⁴ for instance, found empirical evidence in favour of the hypothesis that banks contributed to the propagation of the Asian crisis. Their theoretical explanation starts from the observation that international banks which have a large share of outstanding debts in a country going through a crisis are faced with a lot of non-performing loans. In order to cover their losses and to guarantee the quality of their portfolio, they will call loans and cut off credit lines in third countries. Hence, countries which were unaffected by the original crisis suddenly suffer from "liquidity squeezes". The financial transmission will be particularly strong for those countries which are exposed to the same banks as the original crisis country.

Another variant of fundamentals-based contagion is *common-cause contagion* which occurs when market participants reallocate their assets on the basis of common fundamentals news. Under the assumption of incomplete information, a crisis in one country (for instance, due to a deterioration in its terms of trade) will constitute a wake-up call for market participants to re-evaluate the risks of investments in other countries with similar market fundamentals. Since investors get scared by the possible collapse of similar countries, they will sell the assets of the identified countries, thereby rapidly spreading instability to multiple countries. Empirical evidence by Eichengreen et al.¹⁵ indicates that trade links appear to be more important than similar fundamentals. However, given the relatively low trade linkages among emerging market countries, some authors have pointed out that this scenario hardly provides a general explanation for major crises.

Pure or True Contagion

One of the key features of recent financial crises was the rapid international transmission of shocks even to countries where the economic linkage appeared to be minor. The magnitude of this transmission cannot be explained by real or financial fundamental linkages alone. It is therefore a common view that pure contagion contributed to these crises. *Pure contagion* challenges the view of efficient speculative behaviour as it leads to exacerbating volatility. The theoretical focus on pure contagion centres around herding. Following Borenstein and Gelos¹⁶ herding can be defined as the

⁸ G. Kaminsky, R. Lyons, S. Schmukler: Managers, Investors, and Crises: Mutual Fund Strategies in Emerging Markets, NBER Working Papers, No. 7855, 2000, National Bureau of Economic Research.

⁹ A further explanation of contagion is provided by A. Drazen: Political Contagion in Currency Crisis, in: P. R. Krugman (ed.): Currency Crises, Chicago 2000, University of Chicago Press. The political costs (in terms of a loss of reputation) of the abandonment of an exchange-rate commitment are lower when other countries also devalue. In such a context, the loss of reputation associated with the devaluation will be lower for each country and the willingness to give up exchange-rate parity higher. Hence, the probability of a devaluation increases with other countries devaluing.

¹⁰ B. Eichengreen, A. Rose and C. Wyploz, op. cit.; G. Kaminsky, C. Reinhart, op. cit.

¹¹ P. Masson: Contagion: Monsoonal Effects, Spillovers and Jumps Between Multiple Equilibria, International Monetary Fund, IMF Working Paper 98/142, Washington DC 1998.

¹² S. Gerlach, F. Smets: Contagious Speculative Attacks, in: European Journal of Political Economy, Vol. 11, 1995, pp. 45-63.

¹³ B. Eichengreen, A. Rose and C. Wyploz, op. cit.

¹⁴ G. Kaminsky, C. Reinhart, op. cit.

¹⁵ B. Eichengreen, A. Rose and C. Wyploz, op. cit.

"tendency of some market participants to buy or sell assets simply because they observe other investors doing so". Markets move jointly because of investors' obvious intent to copy the behaviour of other market participants. The literature has identified different kinds of herding, both rational and irrational. Concerning the former, the most important reasons for herding are information cascades, fixed costs of acquiring information and reputational concerns. Irrational herd behaviour is usually explained by momentum trading strategies.

Information cascades are generally considered to be the most common explanation for herding.¹⁷ The typical setting of this kind of approach is provided by two crucial assumptions. First, there is private but imperfect information. However, investors also react to other actions. Second, a selling or buying wave by investors does not lead to corresponding price changes, essentially meaning that prices are fixed. This appears to be an implausible assumption for most assets. However, in the case of exchange rates it seems justified, given the high share of pegged exchange rates in emerging markets.¹⁸

The basic idea of the information cascades approach is that market participants act sequentially and that the first few individuals decide on the future course of action. For instance, an information cascade may arise when the first two investors, having wrong information about the country's fundamentals, flee the country. The subsequent investor will mimic the trade of its predecessors, disregarding its own (possibly superior) information as its own information is outweighed by the behaviour of the first two uninformed investors. As a consequence, all later decision-makers will follow and sell the assets (or not buy them), even if they are better informed than the first investor about the country's fundamentals. However, as their private information is not revealed by their action, the information of the following investors is not added to the "public pool of knowledge"¹⁹ and will therefore not have any influence on investment decisions. The concept of the

information cascades shows that even when market participants act rationally, a country with sound fundamentals is not protected from a speculative attack. Moreover, the equilibrium is extremely fragile as with the arrival of new information an information cascade may start in the other direction, thereby leading to excess volatility.

A related theoretical explanation for herding starts from the idea that it is *costly to acquire information*. Calvo and Mendoza²⁰ argue that as the world becomes more globalised, optimal portfolio diversification results in a higher degree of contagion and financial volatility. The authors develop a model of an integrated financial market with incomplete information and identical mean-variance optimising investors. The investors can choose whether or not to pay for relevant country-specific information to eliminate the idiosyncratic uncertainty of an investment in an emerging market economy. The authors show that the willingness of global investors to acquire and process country-specific information declines as global market integration progresses and the number of countries on the market increases. In such a context, demand for emerging markets' assets is likely to be highly sensitive to rumours, which may result in rumour-initiated contagion. The effect is aggravated by an incentive structure that incurs a cost to asset managers when they underperform in the market. It is then rational for a risk-averse investor to imitate the given benchmark.

The model by Calvo and Mendoza and the information cascades bear several policy implications. If herding and contagion effects can arise due to low, costly information about international investment, these effects should be less prevalent in countries that have more transparent macroeconomic policies. When more and accurate information is provided by the authorities, uncertainty is reduced and capital inflows are more sustainable. In line with these arguments, Gelos and Wei²¹ find that herding is less pronounced in more transparent countries.

A third explanation of herding behaviour has emphasised *reputational concerns of fund managers*. Scharfstein and Stein²² show that it can be rational for fund managers to disregard their own informa-

¹⁶ E. Borensztein, R. G. Gelos: A Panic Prone Pack? The Behavior of Emerging Market Mutual Funds, in: IMF Staff Papers, Vol. 50, No. 1, 2003.

¹⁷ S. Bikhchandani, D. Hirshleifer, I. Welch: A Theory of Fads, Fashion, Customs and Cultural Change as Information Cascades, in: Journal of Political Economy, Vol. 100, 1992, pp. 992-1026; A. Banerjee: A Simple Model of Herd Behavior, in: Quarterly Journal of Economics, Vol. 107, No. 3, 1992, pp. 797-818.

¹⁸ S. Bikhchandani, S. Sharma: Herd Behavior in Financial Markets – A Review, in: IMF Staff Papers, Vol. 47, No. 3, 2001.

¹⁹ Ibid.

²⁰ G. Calvo, E. Mendoza: Rational Contagion and the Globalization of Securities Markets, in: Journal of International Economics, Vol. 51, No. 1, 2000, pp. 79-113.

²¹ R. G. Gelos, S. J. Wei: Transparency and International Investor Behavior, IMF Working Paper No. 174, 2002.

²² D. S. Scharfstein, J. C. Stein: Herd Behavior and Investment, in: American Economic Review, Vol. 80, No. 3, 1990, pp. 465-479.

tion and imitate their peers so that they cannot be identified as managers with low skills. The effect may be aggravated by the underlying *compensation structure of fund managers*. The relationship between the fund manager and his/her employer entails a *principal-agent relationship* as the agent (the manager) has more information concerning profit opportunities than the principal (the employer). Particularly in an international context, when monitoring costs are high as there is high uncertainty about the fund manager's ability to invest in the right assets, it is optimal for the principal to tie the manager's redemption to his performance in comparison with his peers. Such a performance contract provides an incentive for the fund manager to copy his/her benchmark. If other managers also have relative performance contracts, their behaviour would be based on herding. Disyatat and Gelos²³ provide empirical evidence for models suggesting that international investors follow the benchmark against which their performance is measured.

Another form of instability is due to irrational behaviour by individuals. *Momentum trading or positive feedback strategies* describe the behaviour of market participants who systematically buy assets which have recently performed above-average and sell assets which have performed below-average. This behaviour is irrational since prices should already include all the available information. Hence, the strategy of buying "past winners" and selling "past losers" because of the expectation that an asset whose value has been increasing recently will rise faster than the price of an asset whose value has been decreasing, drives prices away from fundamentals and is incompatible with the assumption that economic information is processed efficiently.²⁴

While the theoretical work on contagion has provided a bulk of explanation for contagion and herding, the *empirical evidence* on this subject is still relatively thin. Despite some progress in recent years, measuring the extent of herding still poses a major challenge to empirical analysis. The main problem is that it is difficult to distinguish between fundamentals-based contagion and true contagion. In most cases, several factors will contribute to the crisis transmission. As long as data about individual market expectations are unavailable, empirical support will be hard to find.

Due to these difficulties, most studies focus only on regions or on a few countries and use data on a quarterly or even a semi-annual basis. Borensztein and Gelos²⁵ who focus on differences in behaviour across different types of funds on a global scale are one of the rare exceptions from this. Using data on a more disaggregated level than previous studies and armed with a new dataset collected on emerging markets worldwide, the authors find statistically significant evidence for herding *although the degree appears to be lower than often expected* so that international investors can hardly be blamed for the high volatility in financial markets. Some of their most important results are as follows. There seem to be large differences in the behaviour of funds, as open-end funds tend to herd more than closed-end funds. This finding indicates that individual investors tend to herd more than institutional investors. In line with this finding, the authors detect a leader-follower relationship as individual investors tend to flee from vulnerable countries first.

Another leader-follower relationship is prevalent with regard to single-country and global-country funds. Single-country funds appear to have better country-specific information and, as a consequence, their strategy will be imitated by multi-country funds' managers. However, and in contrast to previous research by Kaminsky et al.²⁶, the degree of herding does not appear to be more accentuated during crises episodes. Finally, Borensztein and Gelos²⁷ find empirical evidence for momentum strategies in liquid markets, though the overall effect is only moderate.

Real Impacts of Exchange-rate Variability

The previous considerations show that it is difficult to prove that international investors can be blamed for the recent financial turmoil in many emerging market countries. Furthermore, it could be argued that large swings in capital flows in response to economic shocks generally are welfare-improving compared to less exchange-rate volatility in the face of the same shock. Exchange-rate swings can smooth out abrupt changes in the terms of trade. Hence, why should politicians and economists care about exchange-rate volatility? The answer is that

²³ P. Disyatat, R. G. Gelos: The Asset Allocation of Emerging Market Funds?, IMF Working Paper No. 11, 2001.

²⁴ S. Bikhchandani, S. Sharma, op. cit.

²⁵ E. Borensztein, R. G. Gelos, op. cit.; see also E. Borensztein, R. G. Gelos: Leaders and Followers: Emerging Market Fund Behavior During Tranquil and Turbulent Times, in: Emerging Market Review, Vol. 4, 2003, pp. 25-38.

²⁶ G. Kaminsky, R. Lyons, S. Schmukler, op. cit.

²⁷ E. Borensztein, R. G. Gelos: A Panic Prone Pack? ... , op. cit.

that part of exchange-rate volatility which is not caused by movements of fundamentals can do harm to an economy in several ways. Unexpected spikes in volatility, a phenomenon which frequently occurs during crisis episodes, might have real effects, for example through the trade channel. Unfortunately, the extensive empirical literature on this issue has been unable to document a strong link between exchange-rate variability and the volume of trade. Recent research shows, however, that the absence of a strong impact of exchange-rate variability on the volume of trade does not imply that exchange-rate variability may not have adverse consequences on the real economy. There is strong empirical evidence that exchange-rate variability has had a statistically significant – and economically non-negligible – negative impact on labour market performance in a number of regions across the world. For instance, Belke and Gros²⁸ find a positive impact of exchange-rate volatility on unemployment and a negative effect on employment and investment for most EU member countries (including France and Germany), a result which is consistent with further studies by Buscher and Mueller²⁹ and Stirboeck and Buscher.³⁰ These findings had an important bearing on the evaluation of the costs and benefits of EMU. A second category of studies deals with the costs of transatlantic, i.e. euro-dollar exchange-rate variability, in real terms. Results by Belke and Gros³¹ indicate that transatlantic exchange-rate variability does have a significant negative impact on labour markets in the EU, and possibly also in the USA. The basic idea behind these studies is that volatility matters because employment and investment decisions have some degree of irreversibility in those cases where rigidities matter. These decisions are discouraged by exchange-rate variability as can be shown in a variety of economic models, mostly of the Dixit-Pindyck style.

However, more important in our context are the negative effects of exchange-rate variability in emerging markets. With the exception of the Eu-

ropean Crisis 1992-1993, all recent financial crises took place in these countries. The main purpose of the remainder is thus to evaluate the costs of the present exchange-rate systems among (a) the currencies of the Southern Cone countries vis-à-vis the dollar or the euro and (b) the CEEC currencies vis-à-vis the euro. The following passages heavily rely on recent work by the present authors.

The Cost of Financial Market Variability in the Southern Cone

Belke and Gros³² evaluate the costs and benefits of exchange-rate (and interest-rate) stability for the Mercosur Countries Argentina, Brazil, Paraguay and Uruguay. In general, their results are rather strong in that they find in almost all cases, and despite extensive tests for robustness, that exchange-rate and interest-rate variability have a significant impact on investment and employment. Moreover, it was to be expected that economies with relatively close ties to the USA like Brazil would show a stronger impact of dollar exchange-rate variability, a result confirmed by the data. The estimated impact coefficients for Argentina were in most of the cases smaller than for Brazil.

These results have important implications for the debate on exchange-rate policy in Mercosur. By accepting the main result of these studies one could jump to the policy conclusion that fixing exchange rates either within the Mercosur or against G-3 currencies should bring about significant benefits. The estimates are not precise enough to decide which option would yield larger benefits. One key aspect for emerging markets in this context is the relationship between exchange-rate and interest-rate variability. Whether there are benefits from fixing the exchange-rate depends essentially on whether the gains from suppressing exchange-rate variability are lost if the volatility reappears elsewhere, for example in a higher interest-rate variability or the slow build up of large disequilibria. In Europe, a country that fixes its exchange rate to an external anchor (the DM in the past, the euro today) can expect that its domestic interest rate will be determined by the interest rate in the anchor country. Hence, exchange-rate and interest-rate variability can be expected to go together. However, for emerging

²⁸ A. Belke, D. Gros: Designing EU-US Monetary Relations: The Impact of Exchange Rate Variability on Labor Markets on Both Sides of the Atlantic, in: *The World Economy*, Vol. 25, No. 6, 2002, pp. 789-813.

²⁹ H. S. Buscher, C. Mueller: Exchange Rate Volatility Effects on the German Labour Market: A Survey of Recent Results and Extensions, IZA Working Paper No. 37, 1999, Institute for the Study of Labor.

³⁰ C. Stirboeck, H. S. Buscher: Exchange Rate Volatility Effects on Labour Markets, in: *INTERECONOMICS*, Vol. 35, No. 1, 2000, pp. 9-22.

³¹ A. Belke, D. Gros, op. cit.

³² A. Belke, D. Gros: Monetary Integration in the Southern Cone, in: *North American Journal of Economics and Finance*, Vol. 13, No. 3, 2002, pp. 323-349; and A. Belke, D. Gros: The Cost of Financial Market Variability in the Southern Cone, in: *Revue Economique*, Special issue on the 'Macroeconomics of Exchange Rate Regimes', forthcoming.

markets, for which the country risk premium is so much higher and variable, this is not necessarily the case. We would therefore argue that fixing the exchange rate might be beneficial if the underlying policies are compatible with this choice. This is a big "if", as the experience of Argentina shows. If fiscal policy is out of control, then fixing the exchange rate might just suppress the appearance of the true problem temporarily. In the case of Argentina, one might even argue that the currency board worked too well for too long, thus allowing a considerable disequilibrium to accumulate under the surface. The explosion that followed in the end then might have such high costs that it can easily offset the benefits of a stable exchange rate that were accumulated in the preceding 10 years. In sum, we maintain that the high degree of exchange-rate variability observed from time to time in Mercosur has tangible economic costs, but that fixing exchange rates was too often considered a free lunch by irresponsible politicians.

Empirical Evidence from the CEE Economies

Let us now turn to the Central and Eastern European Countries (CEECs in the following). In the same vein as for other regions of the world, Belke and Setzer³³ investigate the extent to which high exchange-rate variability can be made partly responsible for the depressing developments in CEEC labour markets. At the beginning of the transition process it was widely assumed that the sharp immediate increase in open unemployment would be of a temporary nature only. The recent economic slowdown in the CEECs has been accompanied by high unemployment rates. Though this was partly due to unfavourable developments in world markets, the longer-term effects of structural change in the candidate economies have also played an important role. The situation in the individual countries is, of course, highly differentiated, with Hungary and Estonia at the lower bound and Slovakia, Poland and Bulgaria at the upper bound with unemployment rates exceeding 15 per cent. Yet, in all the candidate countries labour markets suffer from structural rigidities that, in combination with continued restructuring, will put a lower limit on reductions in the unemployment rates.

³³ A. Belke, R. Setzer: Costs of Exchange Rate Volatility for Labor Markets: Empirical Evidence from the CEE Economies, in: *Economic and Social Review*, Vol. 34, No. 3, 2003, pp. 267-292; and A. Belke, R. Setzer: Exchange Rate Variability and Labor Market Performance in the Visegrád Countries, in: *Economics of Planning*, Vol. 36, No. 2, 2003, pp. 153-175.

The results of the studies by Belke and Setzer suggest that the high degree of exchange-rate variability observed from time to time in the CEECs has contributed to the poor labour market performance there. We investigate both effective and bilateral euro exchange-rate variability since we were interested in the costs of exchange-rate variability in general (effective volatilities) and in evaluating one partial benefit of euroisation – the elimination of the exchange-rate risk – in particular (bilateral volatilities vis-à-vis the euro). In general, our results are rather strong in that we find that exchange-rate variability in many cases has a significant impact on the unemployment rate. Moreover, the results confirm the expectation that economies with relatively close ties to the euro zone, such as the Czech Republic, would show a stronger impact of euro exchange-rate variability. This systematic correlation between openness and the strength of the impact of exchange-rate volatility on trade corresponds to the general finding of the literature, which is that for emerging markets this channel is much more important.

The results obtained warrant a new look at the costs and benefits of joining EMU or of using early euroisation³⁴ as a strategy for fulfilling the Maastricht criterion of exchange-rate stability. We argue that early entry strategies might be motivated with an eye to the benefits resulting from suppressed exchange-rate volatility. In this event the conclusion might be drawn that for some of the CEECs and other countries in similar situations monetary integration with the euro area would be the optimal monetary policy strategy.

Conclusions

One common feature of recent currency crises has been the strong deviation of the exchange rate from fundamentals, thereby triggering a high exchange-rate volatility. Though it is hard to blame international investors for this development, the constant threat of speculative attacks on emerging market currencies has tangible economic costs. A number of studies have shown that high exchange-rate uncertainty contributes to the poor unemployment performance in many emerging market economies. This insight might have some bearing with respect to the choice of the exchange-rate regime.

³⁴ Euroisation is defined as the wholesale unilateral adoption of the euro. For a survey on the costs and benefits of euroisation see M. Nuti: Costs and Benefits of Unilateral Euroization in Central Eastern Europe, in: *Economics of Transition*, Vol. 10, 2002, pp. 419-444.