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# 1221

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# Monetary Commitment and Structural Reforms

## A Dynamic Panel Analysis for Transition Economies

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Opinions expressed in this paper are those of the author(s) and do not necessarily reflect views of the institute.

#### IMPRESSUM

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# **Monetary commitment and structural reforms: A dynamic panel analysis for transition economies<sup>\*</sup>**

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## **Abstract**

This paper examines the contemporaneous relationship between the exchange rate regime and structural economic reforms for a sample of CEEC/CIS transition countries. We investigate empirically whether structural reforms are complements or substitutes for monetary commitment in the attempt to improve macroeconomic performance. Both EBRD and EFW data suggest a negative relationship between flexible exchange rate arrangements and external liberalization. Another finding from the EFW sample is that economic liberalisation has tended to be stronger under better macroeconomic fundamentals, suggesting that the impact of good macroeconomic conditions as facilitating structural reforms outweighs countervailing effects in the sense of lower reform pressure.

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*Keywords:* exchange rate regime, structural reform, panel data, political economy of reform, transition countries.

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## 1. Introduction

Addressing unsatisfactory economic performance by means of structural reforms and an appropriate monetary policy strategy is an important challenge for industrial countries and transition economies alike. The incentives and disincentives for labor, product and financial market reforms and liberalization, on the one side, and the costs and benefits of monetary policy rules, on the other side, have long been analyzed in separation. However, in the absence of a unified approach it was impossible to analyze whether monetary rules and structural reforms act either as complements or as substitutes in improving macroeconomic performance.

In the following we present an empirical analysis of the relationship between monetary commitment in the form of an exchange rate peg and structural economic reforms for the CEEC/CIS transition countries. We investigate empirically whether the implementation of structural reforms and an exchange rate commitment constitute either alternative or complementary policy choices. There are theoretical arguments for both relations. On the one hand, exchange rate flexibility is a possible shock absorber that could substitute for structural change and real wage adjustment. An exchange rate commitment may then increase the pressure and the incentive to increase real flexibility by implementing structural reforms. More generally, monetary commitment may force labor unions to lower wage demands, as monetary policy does not accommodate the negative employment effect of excessive wage claims. Monetary commitment and structural reforms should then occur together and, thus, can be regarded as complementary to each other.

On the other hand, structural reforms that improve the economic performance typically reduce the central bank's incentive to exploit the short-run Phillips curve trade-off (Barro and Gordon, 1983, 1983a, and Kydland and Prescott, 1977). Hence, they tend to reduce inflationary expectations as well. From this point of view, structural reforms lower the costs of monetary discretion and the benefits of commitment. Monetary commitment and structural reforms can be regarded as alternative, i.e. substituting, policy choices.

With a couple of case-study results already available, we conduct an econometric analysis for a large sample of countries that goes beyond the often chosen but too limited

EMU focus. We define market-oriented structural reforms as economic liberalization in the definition of the EBRD transition indicator and, alternatively, also of the *Economic Freedom of the World (EFW)* and some of its sub-indices. We thus investigate a wider range of economic reforms than our reference studies such as Duval and Elmeskov (2005).

The remainder of the paper is structured as follows. Section 2 discusses the main theoretical links between monetary autonomy and structural reforms. In section 3 we extend our analysis to the specific case of the CEEC/CIS transition economies and derive testable hypotheses on the relationship between exchange rate commitment and the extent of economic reforms. Our empirical approach, including a thorough analysis of our data set, is presented in section 4. Section 5 comes up with a wide array panel estimates based on the EBRD transition indicator. In section 6, we substitute the EBRD index by the EFW index. The regressions include a set of additional variables and a number of robustness checks. Section 7 summarizes the results and concludes.

## **2. Theoretical framework**

The discussion on monetary policy autonomy and structural reforms is characterized by a wide spectrum of conflicting views as described, for instance, by Duval and Elmeskov (2005) and Hochreiter and Tavlas (2005).

Taking the EMU as a benchmark variant of a rule-based monetary policy is often said to have a disciplinary impact on national labor markets. The reason is that it enhances the credibility of monetary policy and, thus, lowers inflation expectations since negative employment effects stemming from (too) high wage claims can no longer be accommodated by discretionary monetary policy. The responsibility of wage setters for unemployment increases significantly, because they no longer negotiate nominal but *real* wages. In contrast, autonomous discretionary monetary policy makes it more difficult to remove market rigidities because there is still one option to solve or at least to shift the unemployment problem onto third parties –an *expansionary monetary policy*.

Since the single currency increases transparency, the costs of structural rigidities, as reflected in relative prices, become more evident. Lower trading costs and higher trans-

parency jointly tend to foster competition in goods markets, which in turn reduces the available product market rents. With shrinking rents the incentive to resist reforms should also decline.

Summing up, undertaking reforms in order to facilitate the market-based adjustment to shocks is the only available option if labor is immobile, as is the case in most parts of the Euro area, and changes in monetary policy and the nominal exchange rate are not available. Hence, a credible currency peg may be considered as a version of Mrs. Thatcher's There-Is-No-Alternative (TINA) strategy (Calmfors, 1998, p. 28, Duval and Elmeskov, 2005, p. 5).

On the other hand, arguments against a positive impact of monetary rules on economic reform have also been raised. With respect to EMU, the so-called up-front costs of structural reforms may be larger within a currency union. Removing restrictions in financial markets tends to stimulate demand more than labor market reforms and hence allows an easier and quicker "crowding-in" of the positive supply side effects of reforms (Duval and Elmeskov, 2005, pp. 10ff.). The prior in this case would be that rule-based monetary policy regimes lead to more reforms in the financial market than in the labor market. In addition, Calmfors (1997) and Sibert and Sutherland (1997) argue that monetary policy with its mainly short-run real effects is not likely to diminish structural unemployment significantly. Hence, rule-based monetary policy does not necessarily imply more reform pressure. This argument is in line with empirical findings which suggest that the capability of exchange rates to absorb asymmetric shocks to labor and goods markets is rather low. In this vein, exchange rate flexibility does not seem to be a good substitute for reforms and the degree of reforms is not necessarily higher under fixed exchange rates. Thirdly, some analysts support the view that rule-based monetary policy, at least if implemented via a fixed exchange rate regime, has no disciplinary effects on the wage setting process, but leads to centralization processes and strengthens the incentives to claim high wages on the part of unions (Haffner et al., 2000).

During the discussions about the pros and cons of EMU at the end of the nineties it was also argued that market-oriented reforms could achieve a 'double dividend' if monetary policy was discretionary (autonomous). As a first effect reforms reduce –like a rule-based monetary policy – the costs of structural unemployment. They also lessen equilib-



rium inflation since they diminish the credibility problem of discretionary monetary policy. This second effect is absent in the case of rule-based monetary policy as a rule-based monetary policy does not suffer from a credibility problem by definition.

The usual result of this literature is that for individual member countries a fixed exchange rate rule like EMU implies a lower degree of reforms than an autonomous monetary policy, where reforms reduce both unemployment and the inflation bias. In contrast, a rule-based monetary policy inside EMU limits the benefits of reforms to a positive impact on employment. Expressed more generally, the degree of reforms is therefore higher in the case of autonomous policy (discretion) and lower in the case of commitment (Calmfors, 1997 and 1998). Hence, our central research question relates to the correlation among reform intensity and the degree of autonomy of monetary policy. The latter might, in turn, be mainly determined by the exchange rate regime if the country is small and open. It should have come clear that the implementation of specific monetary policy rules for instance by fixing the exchange rate a priori changes the conditions for and the efficiency of structural reforms significantly.

### **3. Extensions**

The theoretical argument and the focus on exchange rate policy as proxy of monetary commitment can be forcefully made for CEEC/CIS transition economies, where EXR commitment has been explicitly used as anchor/commitment technique in the absence of inherited institutional credibility and in the presence of domestic instability in the early phase of transition (see, for instance, Allard, 2009, and as an early source Hobza, 2002, and National Bank of Hungary, 2002).<sup>1</sup> Since transition economies are frequently exposed to foreign exchange risks, pegging may reduce transaction costs and stimulate domestic economic activity through an increase in trade or capital inflows (Jurtyk and Fritz-Krockow, 2004). From a theoretical point of view, disinflation through pegging the exchange rate is equivalent to disinflation through reducing monetary growth in case

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<sup>1</sup> For a an array of contributions in the context of the political economy of labour market reform in transition countries which, however, do in most cases do not allude explicitly to the exchange rate regime, see “IZA/ Volkswagen Foundation Topic Week: The Political Economy of Labor Market Reform in Transition and Emerging Economies”, IZA Bonn, October 9-10. 2009; web: [http://www.iza.org/conference\\_files/TransEconTW2009/viewProgram...](http://www.iza.org/conference_files/TransEconTW2009/viewProgram...)

of an initial currency revaluation. The reason is an element of policy preannouncement (Fender and Rankin, 2006).

Hence both hypotheses – complementarity and substitutability of EXR fixing and reforms - may apply, depending on the concrete situation of the country under consideration:

- Exchange rate commitment as credible inflation anchor was considered a necessary requirement to proceed with domestic reforms such as price liberalization (to avoid hyperinflation): EXR fixing and reforms as complements, or
- Countries with exchange rate commitment (e.g., Latvia) had to go the hard way of depression and internal devaluation in crisis time): EXR fixing and reforms as substitutes.

#### 4. Empirical approach

To investigate the empirical relationship between economic reforms on the one side and the exchange rate regime as indicator of monetary commitment, we estimate the following equation (see also Belke et al., 2006 and 2007):

$$(1) \quad P_{it} = \alpha_0 + \alpha_1 P_{i,t-1} + \alpha_2 EXR_{it} + \alpha_3' X_{it} + \alpha_4' Y_{it} + \eta_i + \lambda_t + \varepsilon_{it},$$

where  $P$  is our index of structural policy, hence changes  $\Delta P > 0$  indicate structural reform, and  $EXR$  corresponds to our measure of nominal exchange rate flexibility. Countries and time periods are indexed by  $i$  and  $t$  respectively.  $X$  and  $Y$  are vectors of macroeconomic (growth, inflation, openness, resource endowment) and political (domestic political constraints, international agreements) variables that can be expected to affect the extent of economic reform. Adding  $X$  and  $Y$  controls for economic and political determinants of economic reforms beyond the potential impact of monetary/exchange rate flexibility or commitment. We add country-specific effects ( $\eta_i$ ) to control for omitted country-specific factors (e.g., initial income levels) and test for the significance of time-specific effects ( $\lambda_t$ ) capturing omitted time-specific determinants.

Investigating the relationship between exchange rate flexibility and structural reforms places the focus of the analysis on the parameter  $\alpha_2$ :

a. If monetary commitment reduces the incentive for structural reforms, i.e. monetary commitment and structural reforms are substitutes, more flexible exchange rates should be associated with more/stronger structural reforms net of other factors. Given that observations of  $\Delta P > 0$  indicate reforms (liberalization) and larger values of EXR higher exchange rate flexibility, the hypothesis implies  $\alpha_2 > 0$ .

b. If monetary commitment in the form of exchange rate fixing raises the demand for structural reforms to improve economic resilience and adjustment to adverse shocks, i.e. exchange rate rules and structural reforms are complements, one should expect the contrary, namely  $\alpha_2 < 0$ .

c. If incidence and extent of structural reforms are dominated by other economic and political factors (reform pressure, political barriers, international obligations), the relationship between the exchange rate regime and structural reforms will be weak.

We estimate equation (1) on a panel of 25 Central and East European (CEE) and Commonwealth of Independent States (CIS) countries covering two decades of economic transition. The 25 countries are listed in Table 1 and coincide with the country sample used by Schweickert et al. (2011) in their analysis of institutional reforms in the political system. The initial political conditions in the sample countries in 1990 were relatively homogeneous, but economic and political developments (e.g., political transition, regional integration and exchange rate arrangements) have differed strongly since. The data is annual and covers the time period 1990 to 2010.

### **[Table 1]**

As the dependent variable we use indices of economic transition or liberalisation to quantify structural economic reforms. We focus on the EBRD transition indicators, which cover the entire country and time dimension of our sample. The EBRD indicators provide annual assessments of the state of economic transition in nine areas, namely large scale privatization, small scale privatization, governance and enterprise restructuring, price liberalisation, trade and foreign exchange system, competition policy, banking reform and interest rate liberalisation, securities markets and non-bank financial institutions, and infrastructure. The scores fall in the range 1.00 to 4.33 in steps of 0.33, where

values of 1.00 refer to the largest transition gaps and values of 4.33 to negligible ones; see EBRD (2011) for further details about the measures.

We create an overall transition indicator and summary indicators for market liberalisation and financial sector reform and use them in the analysis along with the sub-indices of market liberalisation and financial reform: The *overall* indicator is the unweighted average of the indicators for the nine areas of economic transition; the *liberalisation* indicator is the unweighted average of the indices for price and external (trade and foreign exchange) liberalisation; the *financial market* indicator is the unweighted average of the banking and non-banking indices. We focus on the summary indicator and the areas liberalisation and financial sector because the latter two have a closer conceptual link to our hypotheses and macroeconomic resilience (e.g., price and wage flexibility as substitute for nominal exchange rate adjustment) than the other areas (see, e.g., Duval et al., 2007). Table 2 shows the correlation between the selected indicators and their components.

#### [Table 2]

The section on robustness checks will also use the Economic Freedom of the World (EFW) index as an alternative indicator of structural reform in the direction of economic liberalisation. The EFW index provides scores for overall liberalization and sub-indices for government size, the legal system, money and banking, trade, and labour, credit and business regulation. The indices use a scale from 0 to 10; higher values correspond to higher scores of economic freedom (see Gwartney et al., 2011).

Arguably, the OECD indicators for product market regulation (PMR) and employment protection legislation (EPL) would correspond best to our hypotheses from the conceptual point of view, and they would allow for a more disaggregated analysis of particular product and labour market policies (see Duval and Elmeskov, 2005). However, the OECD PMR and EPL data are not available in sufficient quantity for our sample.

Among the explanatory variables, our discussion focuses on the measure of exchange rate flexibility. In section 2, we argued that fixed exchange rate agreements are a good proxy for monetary commitment in transition countries. We focus the empirical analysis on the Ilzetzki-Reinhart-Rogoff (IRR) index of *de facto* exchange rate arrangements

(Ilzetzi et al. 2008). We prefer the *de facto* measure to the IMF *de jure* classification since *de jure* arrangements do not necessarily coincide with actual practice. In our sample, e.g., the IRR *de facto* and the IMF *de jure* classification coincide for only around one fifth of the observations. We use the IRR coarse classification, which distinguishes between exchange rate pegs (1), limited flexibility (2), managed floating (3), freely floating (4), freely falling (5), and dual markets (6). Thus, the higher the index value, the higher is the *de facto* flexibility of exchange rates.

In addition to the coarse classification, Ilzetzi et al. (2008) also provide a fine classification of *de facto* exchange rate arrangements which distinguishes between 15 categories (Table 3). However, given that the number of observations in each of the 15 categories is small for our sample of transition economies, the precision of coefficient estimates for the exchange rate regime with the fine classification would be low.

### [Table 3]

The exchange rate regime classification is a variable with ordinal scale: Higher values indicate higher flexibility, but imposing identical distance between neighbouring categories would be arbitrary. Therefore, we include the exchange rate regime in the form of regime dummies in regression equation (1), not as a linear index. Taking the case of exchange rate pegging (1) as baseline, we introduce dummy variables for the categories limited flexibility (IRRC2), managed floating (IRRC3), freely floating (IRRC4), freely falling (IRRC5) and dual markets (IRRC6). Table 4 provides some summary statistics for the EBRD and EFW indices and the exchange rate regime classifications as our key variables.

### [Table 4]

With an eye on the political decision and implementation lags of structural reforms one might expect a lagged instead of a contemporaneous influence of exchange rate flexibility on reforms. But if one interprets exchange rate flexibility as an imminent restriction or incentive to reform, the use of the contemporaneous realisation of exchange rate flexibility is more appropriate than using a lagged indicator. Table 4 suggests significant contemporaneous correlation between *de facto* exchange rate flexibility and structural reforms.

### [Table 5]

The additional control variables that we include are economic growth, inflation and the endowment with natural resources for economic reform pressure, and EU association, WTO membership and the *polcon3* indicator of effective political constraints (Henisz 2002) as controls for political commitment and political restrictions (Table 6). The *polcon3* index ranges from zero to one, where higher values indicate stronger political constraints on the government. Initial levels of per-capita income and factors like political cohesion and conflict that are (almost) invariant in time and/or not available in time series dimension should be captured by the country-specific effects.

### [Table 6]

Dynamic panel methods are used to estimate equation (1), which includes the lagged dependent variable among the regressors. More precisely, we use the GMM system estimator of Arellano and Bover (1995) and Blundell and Bond (1998) and focus the discussion on one-step regression results. The GMM system estimator exploits information from the level and the first differences of the variables. Lagged values of the variables are used as instruments for endogenous and predetermined explanatory variables. Our baseline regressions treat the exchange rate regime, growth, inflation, EU association and WTO membership as predetermined variables, i.e. as independent from current structural reforms, but (potentially) affected by past reform. Resource endowment and political constraints, on the other hand, are included as exogenous regressors.

Equation (1) relates the quantitative measures of structural reforms linearly to the regressors. Other studies of the political economy of economic reform (e.g., Duval and Elmeskov, 2005, Duval, 2008) complement linear regressions by probit models to test the impact of economic and political factors on the likelihood of reform. The results from probit models are naturally sensitive to the precise definition of reform events, i.e. to the threshold applied to distinguish between reform and non-reform events. E.g., if reform was defined as any positive change in the index value, countries with gradual transition strategies would display many reform events, whereas few reform episodes would be counted in countries with *big bang* strategy. Hence, we focus our analysis on

*linear regressions*, which strike a better balance between the frequency and the extent of structural change especially in our sample of transition economies.

## 5. Results

This section presents the regression results for EBRD transition indicators. We report the regression results for the summary indicator, liberalisation, financial reform and the sub-indices price liberalisation, external liberalisation, banking and non-banking financial reform as dependent variables. Time-specific effects have turned out statistically insignificant at conventional levels and have therefore been excluded from the reported regressions.

Table 7 displays estimates for the impact of the exchange rate regime without additional controls besides the lagged value, the constant and country-specific effects. Estimated coefficients of below 1 for the lagged dependent variable indicate that reform intensity has decreased with transition progress. The results do not point to a robust unconditional impact, i.e. without controlling for additional time-varying factors and restrictions, of the exchange rate regime on economic transition. Especially and contrary to what the resilience argument of substitutability between nominal exchange rate and domestic price/wage adjustment would suggest, there is *no significant impact of exchange rate flexibility on price liberalisation*. On the other hand, there is also no strong evidence for the view that exchange rate pegging has been more supportive to price liberalisation by providing a nominal anchor against hyperinflation. Significantly positive coefficients for the impact of the exchange rate regime on price liberalisation are obtained for the intermediate solutions (IRRC2 and IRRC3) in regressions (not further reported here) that treat the exchange rate regime as strictly exogenous. Treating the exchange rate regime as strictly exogenous does, however, neglect the fact that (lack of) reforms in the past may affect the subsequent choices of exchange rate policy.<sup>2</sup>

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<sup>2</sup> With respect to the specification test, note that unbiased and efficient GMM system estimations requires the absence of residual autocorrelation in first differences, but not absence of residual autocorrelation in levels. We report p-values for the null hypothesis of no first-order and no second-order residual autocorrelation respectively. Hence, rejection of the AR(1) null hypothesis does not invalidate of our results. The Sargan test statistics indicates problems with the validity of instruments, which is its null hypothesis, in several cases. However, Sargan test statistics from 1-step estimation tend to be biased towards rejecting the null hypothesis in the presence of heteroskedasticity (Arellano and Bond 1991). The Sargan statistics

### [Table 7]

The absence of robust effects of exchange rate policy on price liberalisation continues to hold in Table 8 where we control for the impact of factors like inflation, growth, political constraints and international commitment. Controlling for inflation should, e.g., account for indirect effects of exchange rate policy on reform incentives or constraints that pass through domestic inflation.

### [Table 8]

The only coefficient estimates for the exchange rate regime which are significant at conventional levels in Table 8 relate to financial sector reform. Financial sector reform has been stronger in episodes of limited exchange rate flexibility (IRRC2). In regressions analogous to Table 8 that treat the choice of exchange rate policy as strictly exogenous (Table 9) we also find a significantly positive effect of *limited flexibility* (IRRC2) on (non-banking) financial sector reform. In addition, there are significantly positive effect coefficients estimated for the impact of *freely falling* (IRRC5) on (non-banking) financial sector reform. In our view, the IRRC5 category is more an indicator of problem pressure, however, than one of deliberate exchange rate policy.

### [Table 9]

Taken together, the finding of no positive correlation between exchange rate flexibility and price, trade and foreign exchange liberalisations contradicts the hypothesis that exchange rate commitment and domestic price adjustment or a strengthening of the trade elasticity are substitutes. On the other hand, the sample does not reveal a strong negative impact of exchange rate flexibility that would support the anchor hypothesis, i.e. complementarity between domestic reforms and the anchoring of expectations through exchange rate commitment. The coefficient estimates for the impact of limited flexibility on financial reform point to a stronger degree of non-banking reforms compared to exchange rate pegs.

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from 2-step estimation do not reject the null in any of the cases of 1-step rejection in the tables. We use the `xtdpdys` option in Stata11 for the GMM system estimation.



## 6. Robustness checks

The estimation results for EBRD indices in section 5 provide no robust evidence for either complementarity or substitutability between commitment in the form of exchange rate fixation and structural reforms in our sample of transition economies. The weak/insignificant net effect may be the outcome of neutralisation between factors that work in opposite direction: there is more structural reform under exchange rate fixation to compensate for the stabilising impact of exchange rate adjustment, anchoring of inflation expectations by exchange rate commitment as precondition for price and financial liberalisation, or lower reform incentives given the existence of an anchor. It may, however, also reflect limits of the EBRD indices as measure for the kind of structural reforms that the hypotheses focus on. The advantage of the EBRD data is their broad and regular coverage of the CEE and CIS countries in our sample over a period of two decades. A drawback is the strong focus on long-term transition towards developed market economies as a theoretical concept that abstracts from diversity in the group of developed market economies. Labour market regulation, which is an important channel of the theoretical hypotheses, is not (separately) captured by the EBRD measures. Another problem is sample truncation: as countries graduate from transition the indicator value shows no further improvement whatever the exchange rate regime; potentially problematic in our sample is the sub-indicator of liberalisation and its components price and external liberalisation, because a number of sample countries have reached the highest possible score during the sample period.

An alternative is therefore to use an alternative indicator of structural reform, namely the EFW indicator and its components described in section 3. The advantages of the EFW index are the strong focus on regulatory reform in goods, labour and financial markets, which are areas of reform that are central to the theoretical hypotheses, and the avoidance of the truncation problem, because the upper or lower bounds of the indices are never reached in our sample. The EFW data's drawback is their more limited coverage across countries and time (annual observations only in the 2000s), which reduces the sample to around one fourth of the sample with EBRD indicators.

The regression results on the basis of the EFW indicators are also rather mixed. The coefficient estimates in Table 10 suggest that overall economic liberalisation tended to

be stronger under *limited flexibility* (IRRC2) and weaker under *fully flexible* (IRRC4) exchange rate arrangements compared to the baseline of exchange rate fixation. The negative impact of flexibility also applies to monetary reforms. As inflation is an important component of the EFW monetary system sub-indicator for the, the negative coefficient on exchange rate flexibility is possibly due to the role of exchange rate fixation as nominal anchor. All other things equal, countries with managed floating (IRRC3) also show less monetary reform and trade liberalisation. Liberalisation of business, credit and labour market regulations appears to be more pronounced under limited exchange rate flexibility (IRRC2) and - in the case of labour markets - managed floating arrangements (IRRC3). Although restrictions on credit seem to be stronger with full exchange rate flexibility (IRRC4), this coefficient estimate stems from just one pair of observations and acts therefore as an observation rather than a group dummy.

#### **[Table 10]**

Comparing results between EBRD and EFW data, both suggest a negative relationship between flexible exchange rate arrangements and external (trade and foreign exchange) liberalisation, whereas the intermediate case of limited exchange rate flexibility appears to be associated with stronger regulatory reform in the business sector and in financial and labour markets. Another interesting finding from the EFW sample is that economic liberalisation has tended to be stronger under better macroeconomic fundamentals, which suggests that the impact of good macroeconomic conditions as facilitating structural reforms outweighs countervailing effects in the sense of lower reform pressure.

## **7. Conclusions**

In this paper, we examined the contemporaneous relationship between the exchange rate regime and structural economic reforms over a period from 1990 to 2010, based on annual data. Using up-to-date panel data techniques, we looked at a rich sample of CEEC/CIS transition countries. We investigated empirically whether structural reforms, as measured by the EBRD transition index or the Economic Freedom of the World index, are complements or substitutes for monetary commitment in the attempt to improve macroeconomic performance.

In the main part of our empirical analysis, we employed the EBRD transition index as a proxy of structural reforms in the CEEC/CIS transition countries. In this case, the finding of no positive correlation between exchange rate flexibility and price, trade and foreign exchange liberalisations *contradicts* the hypothesis that exchange rate commitment and domestic price adjustment or a strengthening of the trade elasticity are *substitutes*. On the other hand, the sample does not reveal a (rather) strong negative impact of exchange rate flexibility that would support the anchor hypothesis, i.e. complementarity between domestic reforms and the anchoring of expectations through exchange rate commitment. The coefficient estimates for the impact of limited flexibility on financial reform point to a stronger degree of non-banking reforms compared to exchange rate pegs.

The weak/insignificant net effect may be the outcome of neutralisation between factors that work in opposite direction: there is more structural reform under exchange rate fixation to compensate for the stabilising impact of exchange rate adjustment, anchoring of inflation expectations by exchange rate commitment as precondition for price and financial liberalisation, or lower reform incentives given the existence of an anchor.

It may, however, also reflect limits of the EBRD indices as measure for the kind of structural reforms that the hypotheses focus on. Labour market regulation, which is an important channel of the theoretical hypotheses, is not (separately) captured by the EBRD measures. Another problem is sample truncation: as countries graduate from transition the indicator value shows no further improvement whatever the exchange rate regime.

As an alternative we thus used an alternative indicator of structural reform, namely the EFW indicator. Comparing results between EBRD and EFW data, both suggest a negative relationship between flexible exchange rate arrangements and external (trade and foreign exchange) liberalisation, whereas the intermediate case of limited exchange rate flexibility appears to be associated with stronger regulatory reform in the business sector and in financial and labour markets. Another interesting finding from the EFW sample is that economic liberalisation has tended to be stronger under better macroeconomic fundamentals, which suggests that the impact of good macroeconomic conditions as

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## Tables

**Table 1: Sample countries**

|            |                |            |          |              |
|------------|----------------|------------|----------|--------------|
| Albania    | Croatia        | Hungary    | Moldova  | Slovenia     |
| Armenia    | Czech Republic | Kazakhstan | Poland   | Tajikistan   |
| Azerbaijan | Estonia        | Kirgizstan | Romania  | Turkmenistan |
| Belarus    | FYR Macedonia  | Latvia     | Russia   | Ukraine      |
| Bulgaria   | Georgia        | Lithuania  | Slovakia | Uzbekistan   |

**Table 2: Correlation between changes in EBRD index values**

|                            | Total index | Liberalisation | Financial sector |
|----------------------------|-------------|----------------|------------------|
| Liberalisation             | 0.83***     |                |                  |
| Prices                     | 0.63***     | 0.43***        |                  |
| Trade and foreign exchange | 0.75***     | 0.89***        |                  |
| Financial sector           | 0.61***     |                |                  |
| Banking                    | 0.59***     |                | 0.78***          |
| Non-banking                | 0.29***     |                | 0.69***          |

Note: \*\*\* P < 0.01, \*\* P < 0.05, \* P < 0.10.

**Table 3: Exchange rate classifications**

| Exchange rate arrangement  | IRR coarse | IRR fine | IMF |
|--|------------|----------|-----|
| No separate legal tender   | 1          | 1        | 1   |
| Pre announced peg or currency board arrangement  | 1          | 2        | 1   |
| Pre announced horizontal band narrower than or equal to +/-2%  | 1          | 3        | 1   |
| De facto peg   | 1          | 4        | 1   |
| Pre announced crawling peg   | 2          | 5        | 2   |
| Pre announced crawling band narrower than or equal to +/-2%  | 2          | 6        | 2   |
| De facto crawling peg  | 2          | 7        | 2   |
| De facto crawling band narrower than or equal to +/-2%   | 2          | 8        | 2   |
| Pre announced crawling band wider than or equal to +/-2%   | 3          | 9        | 3   |
| De facto crawling band narrower than or equal to +/-5%   | 3          | 10       | 3   |
| Moving band narrower than or equal to +/-2%<br>(i.e., allows for both appreciation and depreciation over time) | 3          | 11       | 3   |
| Managed floating   | 3          | 12       | 3   |
| Freely floating  | 4          | 13       | 4   |
| Freely falling   | 5          | 14       |     |
| Dual market in which parallel market data is missing   | 6          | 15       |     |

Source: Ilzetzi at al. (2008).

**Table 4: Summary statistics for structural reform and exchange rate indicators**

|                            | Mean  | Median | Maximum | Minimum | Observations |
|----------------------------|-------|--------|---------|---------|--------------|
| Total reforms (EBRD)       | 0.10  | 0.04   | 1.11    | -0.41   | 522          |
| Liberalisation             | 0.13  | 0.00   | 2.00    | -0.84   | 522          |
| Prices                     | 0.13  | 0.00   | 3.33    | -1.33   | 522          |
| Trade and foreign exchange | 0.13  | 0.00   | 3.00    | -1.67   | 522          |
| Financial sector           | 0.09  | 0.00   | 1.00    | -0.83   | 522          |
| Banking                    | 0.10  | 0.00   | 1.00    | -1.00   | 522          |
| Non-banking                | 0.08  | 0.00   | 1.00    | -1.33   | 522          |
| Total reforms (EFW)        | 0.10  | 0.06   | 0.81    | -0.27   | 126          |
| Trade                      | -0.02 | -0.05  | 0.73    | -0.51   | 126          |
| Domestic regulation        | 0.10  | 0.05   | 1.49    | -0.81   | 126          |
| Business                   | 0.02  | 0.07   | 1.43    | -2.10   | 155          |
| Credit                     | 0.16  | 0.04   | 1.79    | -1.50   | 160          |
| Labour                     | 0.19  | 0.08   | 2.13    | -1.96   | 157          |
| IRR coarse                 | 2.92  | 2      | 6       | 1       | 485          |
| IRR fine                   | 9.26  | 8      | 15      | 1       | 485          |
| IMF                        | 2.61  | 3      | 4       | 1       | 467          |

*Source:* Own calculations based on EBRD (2011), Gwartney et al. (2011) and Ilzetzki et al. (2008).

**Table 5: Correlation between EBRD index and exchange rate regime**

|                            | IRR coarse | IRR fine | IMF   |
|----------------------------|------------|----------|-------|
| Total reforms              | 0.22***    | 0.17***  | 0.01  |
| Liberalisation             | 0.26***    | 0.21***  | 0.08* |
| Prices                     | 0.22***    | 0.18***  | -0.07 |
| Trade and foreign exchange | 0.20***    | 0.17***  | 0.07  |
| Financial sector           | 0.08*      | 0.06     | 0.01  |
| Banking                    | 0.10**     | 0.08*    | 0.02  |
| Non-banking                | 0.01       | 0.01     | -0.01 |

*Note:* \*\*\* P < 0.01, \*\* P < 0.05, \* P < 0.10.

**Table 6: Data description and sources**

| Variable                      | Description  | Source                    |
|-------------------------------|--|---------------------------|
| <u>Dependent variable:</u>    |  |                           |
| EBRD transition index         | Running from 1 to 4.33 and ascending with progress in transition                           |                           |
| Total                         | Average value of all nine categories   | EBRD (2011)               |
| Liberalisation                | Average of <i>price</i> liberalisation and <i>trade and foreign exchange</i>               | EBRD (2011)               |
| Financial sector              | Average of <i>banking</i> and <i>non-banking</i> sectors                                   | EBRD (2011)               |
| <u>Explanatory variables:</u> |  |                           |
| Exchange rate                 | <i>De facto</i> classification in 6 categories (IRR coarse)                                | Ilzetzki et al. (2008)    |
| Growth                        | Real GDP growth, geometric average over current and previous 2 years                       | World Bank (2011)         |
| Inflation                     | CPI inflation, geometric average over current and previous 2 years                         | World Bank (2011)         |
| Resources                     | Resource rich=2, moderate=1, poor=0  | Schweickert et al. (2011) |
| EU                            | Dummy variable: value 1 in years under association agreement                               | Schweickert et al. (2011) |
| WTO                           | Dummy variable: value 1 in years of GATT/WTO membership                                    | Schweickert et al. (2011) |
| Polcon3                       | Index value between zero (weakest) and one (strongest) political constraints on government | Henisz (2002)             |



**Table 7: Panel regression results without additional controls**

| Dependent        | Total       | Liberalisation |             |             | Financial   |             |             |
|------------------|-------------|----------------|-------------|-------------|-------------|-------------|-------------|
|                  |             | Average        | Prices      | External    | Average     | Banking     | Non-Banking |
| EBRD index       | 0.81***     | 0.76***        | 0.52***     | 0.72***     | 0.87***     | 0.81***     | 0.87***     |
|                  | <i>0.03</i> | <i>0.04</i>    | <i>0.06</i> | <i>0.04</i> | <i>0.02</i> | <i>0.03</i> | <i>0.02</i> |
| IRRC 2           | 0.02        | 0.03           | 0.07        | 0.04        | 0.03        | 0.06        | 0.03        |
|                  | <i>0.04</i> | <i>0.06</i>    | <i>0.06</i> | <i>0.06</i> | <i>0.03</i> | <i>0.05</i> | <i>0.03</i> |
| IRRC 3           | -0.02       | -0.05          | 0.09        | 0.00        | 0.02        | 0.02        | 0.06        |
|                  | <i>0.03</i> | <i>0.05</i>    | <i>0.07</i> | <i>0.06</i> | <i>0.03</i> | <i>0.05</i> | <i>0.04</i> |
| IRRC 4           | -0.03       | -0.08          | -0.03       | -0.10*      | 0.04        | 0.05        | 0.04        |
|                  | <i>0.03</i> | <i>0.05</i>    | <i>0.07</i> | <i>0.06</i> | <i>0.03</i> | <i>0.06</i> | <i>0.03</i> |
| IRRC 5           | -0.02       | -0.02          | -0.07       | -0.08       | -0.01       | -0.07       | 0.01        |
|                  | <i>0.05</i> | <i>0.09</i>    | <i>0.09</i> | <i>0.10</i> | <i>0.03</i> | <i>0.07</i> | <i>0.03</i> |
| IRRC 6           | -0.03       | -0.09          | 0.06        | -0.07       | -0.02       | 0.02        | -0.11       |
|                  | <i>0.05</i> | <i>0.10</i>    | <i>0.15</i> | <i>0.15</i> | <i>0.05</i> | <i>0.07</i> | <i>0.07</i> |
| Constant         | 0.60***     | 0.96***        | 1.85***     | 1.10***     | 0.37***     | 0.55***     | 0.33***     |
|                  | <i>0.09</i> | <i>0.15</i>    | <i>0.26</i> | <i>0.19</i> | <i>0.06</i> | <i>0.09</i> | <i>0.04</i> |
| AR1 (p-value)    | 0.00        | 0.00           | 0.01        | 0.00        | 0.00        | 0.00        | 0.00        |
| AR2 (p-value)    | 0.94        | 0.50           | 0.17        | 0.10        | 0.47        | 0.43        | 0.22        |
| Sargan (p-value) | 0.00        | 0.00           | 0.21        | 0.31        | 0.75        | 0.75        | 0.76        |
| Cross sections   | 25          | 25             | 25          | 25          | 25          | 25          | 25          |
| Observations     | 478         | 478            | 478         | 478         | 478         | 478         | 478         |

Note: Robust standard errors in italics; \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.10.

**Table 8: Panel regression results with additional controls**

| Dependent        | Total       | Liberalisation |             |             | Financial   |             |             |
|------------------|-------------|----------------|-------------|-------------|-------------|-------------|-------------|
|                  |             | Average        | Prices      | External    | Average     | Banking     | Non-Banking |
| EBRD index       | 0.84***     | 0.78***        | 0.49***     | 0.70***     | 0.84***     | 0.73***     | 0.78***     |
|                  | <i>0.02</i> | <i>0.06</i>    | <i>0.09</i> | <i>0.07</i> | <i>0.03</i> | <i>0.03</i> | <i>0.04</i> |
| IRRC 2           | 0.02        | 0.01           | 0.01        | 0.01        | 0.05**      | 0.05        | 0.06**      |
|                  | <i>0.02</i> | <i>0.05</i>    | <i>0.05</i> | <i>0.07</i> | <i>0.02</i> | <i>0.05</i> | <i>0.03</i> |
| IRRC 3           | -0.02       | -0.06          | 0.03        | -0.02       | 0.01        | -0.02       | 0.04        |
|                  | <i>0.02</i> | <i>0.05</i>    | <i>0.05</i> | <i>0.06</i> | <i>0.04</i> | <i>0.06</i> | <i>0.04</i> |
| IRRC 4           | -0.05       | -0.15**        | 0.01        | -0.16*      | -0.02       | -0.05       | 0.00        |
|                  | <i>0.05</i> | <i>0.07</i>    | <i>0.09</i> | <i>0.09</i> | <i>0.05</i> | <i>0.08</i> | <i>0.05</i> |
| IRRC 5           | -0.05**     | -0.03          | -0.17*      | -0.04       | -0.01       | -0.09       | 0.05        |
|                  | <i>0.02</i> | <i>0.08</i>    | <i>0.09</i> | <i>0.10</i> | <i>0.04</i> | <i>0.07</i> | <i>0.04</i> |
| IRRC 6           | -0.04       | -0.15          | 0.02        | -0.12       | -0.02       | 0.06        | -0.12*      |
|                  | <i>0.03</i> | <i>0.10</i>    | <i>0.16</i> | <i>0.17</i> | <i>0.06</i> | <i>0.10</i> | <i>0.07</i> |
| RGDP growth      | -0.49***    | -0.26          | -1.35***    | 0.23        | 0.08        | 0.22        | 0.31        |
|                  | <i>0.10</i> | <i>0.59</i>    | <i>0.42</i> | <i>0.67</i> | <i>0.17</i> | <i>0.33</i> | <i>0.22</i> |
| Inflation        | 0.00*       | -0.01          | -0.01       | -0.01*      | 0.00        | 0.01        | 0.00        |
|                  | <i>0.00</i> | <i>0.01</i>    | <i>0.01</i> | <i>0.01</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> |
| Resources        | -0.06***    | -0.08          | 0.02        | -0.13       | -0.06*      | -0.10*      | -0.02       |
|                  | <i>0.02</i> | <i>0.07</i>    | <i>0.10</i> | <i>0.09</i> | <i>0.04</i> | <i>0.06</i> | <i>0.04</i> |
| Polcon3          | 0.19***     | 0.29*          | 0.54**      | 0.42**      | 0.21*       | 0.40***     | 0.06        |
|                  | <i>0.04</i> | <i>0.16</i>    | <i>0.22</i> | <i>0.20</i> | <i>0.11</i> | <i>0.13</i> | <i>0.11</i> |
| EU association   | -0.03       | -0.10**        | -0.12       | -0.11**     | 0.05        | 0.05        | 0.18**      |
|                  | <i>0.02</i> | <i>0.05</i>    | <i>0.09</i> | <i>0.05</i> | <i>0.06</i> | <i>0.08</i> | <i>0.08</i> |
| WTO member       | 0.00        | -0.02          | 0.18***     | 0.04        | -0.03       | 0.03        | -0.04       |
|                  | <i>0.02</i> | <i>0.05</i>    | <i>0.07</i> | <i>0.05</i> | <i>0.04</i> | <i>0.06</i> | <i>0.05</i> |
| Constant         | 0.54***     | 0.90***        | 1.89***     | 1.14***     | 0.39***     | 0.62***     | 0.43***     |
|                  | <i>0.04</i> | <i>0.24</i>    | <i>0.40</i> | <i>0.30</i> | <i>0.07</i> | <i>0.09</i> | <i>0.08</i> |
| AR1 (p-value)    | 0.00        | 0.00           | 0.01        | 0.00        | 0.00        | 0.00        | 0.00        |
| AR2 (p-value)    | 0.98        | 0.50           | 0.17        | 0.10        | 0.47        | 0.43        | 0.22        |
| Sargan (p-value) | 0.00        | 0.00           | 0.00        | 0.00        | 0.26        | 0.16        | 0.10        |
| Cross sections   | 25          | 25             | 25          | 25          | 25          | 25          | 25          |
| Observations     | 392         | 392            | 392         | 392         | 392         | 392         | 392         |

Note: Robust standard errors in italics; \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.10.

**Table 9: Panel regression results treating exchange rate regimes as strictly exogenous**

| Dependent        | Total       | Liberalisation |             |             | Financial   |             |             |
|------------------|-------------|----------------|-------------|-------------|-------------|-------------|-------------|
|                  |             | Average        | Prices      | External    | Average     | Banking     | Non-Banking |
| EBRD index       | 0.88***     | 0.85***        | 0.55***     | 0.75***     | 0.84***     | 0.78***     | 0.79***     |
|                  | <i>0.03</i> | <i>0.05</i>    | <i>0.08</i> | <i>0.06</i> | <i>0.04</i> | <i>0.03</i> | <i>0.04</i> |
| IRRC 2           | 0.01        | -0.02          | -0.05       | -0.03       | 0.09***     | 0.06        | 0.15***     |
|                  | <i>0.02</i> | <i>0.04</i>    | <i>0.06</i> | <i>0.05</i> | <i>0.02</i> | <i>0.05</i> | <i>0.04</i> |
| IRRC 3           | -0.02       | -0.05          | -0.05       | -0.03       | 0.05        | 0.00        | 0.09        |
|                  | <i>0.03</i> | <i>0.05</i>    | <i>0.05</i> | <i>0.06</i> | <i>0.04</i> | <i>0.06</i> | <i>0.06</i> |
| IRRC 4           | -0.01       | -0.07          | -0.03       | -0.04       | 0.03        | -0.06       | 0.17        |
|                  | <i>0.04</i> | <i>0.07</i>    | <i>0.12</i> | <i>0.07</i> | <i>0.07</i> | <i>0.11</i> | <i>0.10</i> |
| IRRC 5           | 0.02        | 0.06           | -0.15       | 0.07        | 0.06**      | 0.03        | 0.12**      |
|                  | <i>0.04</i> | <i>0.08</i>    | <i>0.10</i> | <i>0.09</i> | <i>0.03</i> | <i>0.07</i> | <i>0.05</i> |
| IRRC 6           | -0.07       | -0.20**        | -0.13       | -0.28       | -0.03       | 0.06        | -0.16       |
|                  | <i>0.06</i> | <i>0.09</i>    | <i>0.13</i> | <i>0.17</i> | <i>0.07</i> | <i>0.08</i> | <i>0.10</i> |
| RGDP growth      | -0.38       | -0.41          | -1.47***    | 0.38        | 0.25        | 0.46        | 0.34        |
|                  | <i>0.28</i> | <i>0.59</i>    | <i>0.48</i> | <i>0.69</i> | <i>0.18</i> | <i>0.31</i> | <i>0.24</i> |
| Inflation        | 0.00**      | -0.01*         | -0.02**     | -0.01*      | 0.00        | 0.01        | 0.00        |
|                  | <i>0.00</i> | <i>0.01</i>    | <i>0.01</i> | <i>0.01</i> | <i>0.00</i> | <i>0.00</i> | <i>0.00</i> |
| Resources        | -0.09**     | -0.07          | 0.03        | -0.14       | -0.13***    | -0.19**     | -0.07*      |
|                  | <i>0.04</i> | <i>0.07</i>    | <i>0.12</i> | <i>0.10</i> | <i>0.05</i> | <i>0.07</i> | <i>0.04</i> |
| Polcon3          | 0.12        | 0.18           | 0.28        | 0.34        | 0.21        | 0.37***     | 0.03        |
|                  | <i>0.08</i> | <i>0.15</i>    | <i>0.21</i> | <i>0.21</i> | <i>0.11</i> | <i>0.14</i> | <i>0.12</i> |
| EU association   | -0.06**     | -0.12***       | -0.12       | -0.14***    | 0.00        | -0.02       | 0.17*       |
|                  | <i>0.02</i> | <i>0.04</i>    | <i>0.09</i> | <i>0.04</i> | <i>0.06</i> | <i>0.08</i> | <i>0.09</i> |
| WTO member       | -0.01       | -0.02          | 0.21***     | 0.06        | -0.04       | 0.02        | -0.08       |
|                  | <i>0.02</i> | <i>0.04</i>    | <i>0.07</i> | <i>0.05</i> | <i>0.04</i> | <i>0.06</i> | <i>0.06</i> |
| Constant         | 0.48***     | 0.70***        | 1.76***     | 1.01***     | 0.40***     | 0.56***     | 0.41***     |
|                  | <i>0.11</i> | <i>0.23</i>    | <i>0.39</i> | <i>0.31</i> | <i>0.08</i> | <i>0.10</i> | <i>0.09</i> |
| AR1 (p-value)    | 0.00        | 0.01           | 0.05        | 0.01        | 0.00        | 0.00        | 0.00        |
| AR2 (p-value)    | 0.64        | 0.77           | 0.08        | 0.15        | 0.31        | 0.16        | 0.19        |
| Sargan (p-value) | 0.01        | 0.23           | 0.04        | 0.53        | 0.77        | 0.84        | 1.00        |
| Cross sections   | 25          | 25             | 25          | 25          | 25          | 25          | 25          |
| Observations     | 392         | 392            | 392         | 392         | 392         | 392         | 392         |

Note: Robust standard errors in italics; \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.10.

**Table 10: Panel regression results for the EFW index**

| Dependent        | Total       | Money       | Trade       | Regulation  |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                  |             |             |             | Total       | Business    | Credit      | Labour      |
| EFW index        | 0.66***     | 0.50***     | 0.75***     | 0.46***     | 0.10        | 0.63***     | 0.55***     |
|                  | <i>0.06</i> | <i>0.06</i> | <i>0.06</i> | <i>0.06</i> | <i>0.09</i> | <i>0.04</i> | <i>0.06</i> |
| IRRC 2           | 0.10**      | -0.16       | -0.06       | 0.25**      | 0.26*       | 0.20        | 0.31**      |
|                  | <i>0.04</i> | <i>0.10</i> | <i>0.05</i> | <i>0.10</i> | <i>0.16</i> | <i>0.20</i> | <i>0.13</i> |
| IRRC 3           | 0.01        | -0.23*      | -0.12*      | 0.21        | -0.02       | 0.05        | 0.61***     |
|                  | <i>0.05</i> | <i>0.13</i> | <i>0.06</i> | <i>0.17</i> | <i>0.17</i> | <i>0.18</i> | <i>0.21</i> |
| IRRC 4           | -0.38***    | -1.27***    | 0.08        | -0.15       | -           | -0.74***    | -           |
|                  | <i>0.08</i> | <i>0.25</i> | <i>0.15</i> | <i>0.32</i> |             | <i>0.20</i> |             |
| RGDP growth      | 1.15        | -3.05       | -0.61       | 6.12**      | 9.73***     | 1.38        | 1.94        |
|                  | <i>1.11</i> | <i>2.38</i> | <i>1.09</i> | <i>2.89</i> | <i>2.38</i> | <i>2.12</i> | <i>2.47</i> |
| Inflation        | -1.61***    | -5.06***    | -0.90       | -2.08***    | -1.95***    | -0.92       | -3.32***    |
|                  | <i>0.39</i> | <i>0.82</i> | <i>0.69</i> | <i>0.73</i> | <i>0.71</i> | <i>0.89</i> | <i>0.63</i> |
| Resources        | 0.16*       | 0.49        | 0.11        | -0.21       | -0.12       | -0.22       | 0.03        |
|                  | <i>0.08</i> | <i>0.30</i> | <i>0.11</i> | <i>0.17</i> | <i>0.30</i> | <i>0.19</i> | <i>0.29</i> |
| Polcon3          | 0.44***     | 1.73***     | 0.28*       | 0.26        | -0.33       | 0.04        | 0.33        |
|                  | <i>0.15</i> | <i>0.39</i> | <i>0.16</i> | <i>0.26</i> | <i>0.56</i> | <i>0.32</i> | <i>0.47</i> |
| EU association   | 0.06        | -0.05       | 0.42***     | 0.34**      | 0.03        | -0.31**     | 0.14        |
|                  | <i>0.04</i> | <i>0.10</i> | <i>0.10</i> | <i>0.15</i> | <i>0.38</i> | <i>0.13</i> | <i>0.22</i> |
| WTO member       | 0.38***     | 1.64***     | -0.21       | -0.40       | 1.37**      | 0.10        | -0.88       |
|                  | <i>0.14</i> | <i>0.38</i> | <i>0.23</i> | <i>0.44</i> | <i>0.68</i> | <i>0.30</i> | <i>0.61</i> |
| Constant         | 1.75***     | 2.61***     | 1.62***     | 3.19***     | 3.46***     | 3.37***     | 3.11***     |
|                  | <i>0.39</i> | <i>0.59</i> | <i>0.51</i> | <i>0.52</i> | <i>0.58</i> | <i>0.42</i> | <i>0.61</i> |
| AR1 (p-value)    | 0.01        | 0.08        | 0.02        | 0.00        | 0.04        | 0.00        | 0.00        |
| AR2 (p-value)    | 0.76        | 0.46        | 0.27        | 0.03        | 0.42        | 0.06        | 0.07        |
| Sargan (p-value) | 0.99        | 0.63        | 0.94        | 0.18        | 0.00        | 0.73        | 0.68        |
| Cross sections   | 14          | 14          | 14          | 14          | 21          | 21          | 21          |
| Observations     | 98          | 98          | 98          | 98          | 113         | 118         | 115         |

Note: Robust standard errors in italics; \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.10.