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# Integrated Monetary and Exchange Rate Frameworks

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# "Integrated Monetary and Exchange Rate Frameworks: Are There Empirical Differences?"

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**Abstract:** Here the author empirically estimates if the different monetary and exchange rate frameworks observed in the Accession Countries of Central and Eastern Europe and the Baltics do yield different outcomes in terms of *level and variance* of a set of nominal and real variables. The author follows and extends the methodology developed by Kuttner and Posen (2001), who perform a combined analysis of the individual effects of exchange rate regimes, central bank independence and announced targets in nominal variables, for a large set of developed and developing countries, and estimate that a setup that combines a free float, an independent monetary authority and inflation targeting yields an outcome that mimics the price stabilization advantages of a hard peg *without* its drawbacks in terms of extreme volatility. This sample of countries, not covered by the Kuttner and Posen study, supports their conclusions, for both nominal and real variables, testing for both the individual and combined effects of the frameworks, indicating that a flexible exchange rate regime, coupled with a independent monetary authority and inflation targeting, would be Pareto-improving when compared to harder regimes.

**JEL Codes:** E5, P2.

**Keywords:** monetary authority independence, inflation targeting, exchange rate regimes, EU Enlargement.

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## Combined Frameworks in the Accession Countries.

The aim of this paper is to empirically evaluate which, among the combined exchange rate and institutional frameworks that are available for the Accession Countries during the period until full Euroarea membership, would seem to deliver better results in terms of level and variability of such a set of variables, using a simple and transparent framework. Namely, the author aims to verify if the *assumed* superiority of harder exchange rate regimes in terms of nominal volatility when compared to more flexible regimes is observed when the combined frameworks is taken into consideration, using the framework developed by Kuttner and Posen (2001) for a large sample of developed and developing countries (which didn't included the Accession Countries)[2].

Any specific type of monetary framework can be thought as of providing a commitment technology. In the "first best", a stable equilibrium is achieved in an environment without any kind of distortions or rigidities (i.e., prices and quantities adjust freely, costlessly and immediately, there are no market frictions of any kind, etc), where monetary policy "surprises" would have no short or long run effects, since inflation expectations always equal their realizations.

Nevertheless, if rigidities do exist (like multi-period work contracts with rigid nominal wages, "menu costs" or staggered prices adjustments), policy "surprises" would have potential short-run real effects: in such a framework, even if it is optimal for a policy maker to commit ex-ante, it is not optimal for him to commit ex-post (for the classic reference on the so-called "time inconsistency problem", see Barro and Gordon, 1983). Forward-looking agents incorporate such possibility in their expectations, yielding an outcome of higher inflation without even short-run output gains: this is the so-called "inflation bias" of a discretionary policy regime. One of the ways to correct this bias is through a "commitment" or a "rule" technology: the use of a credible monetary policy rule applied by a conservative and independent monetary authority is what is called a "commitment" equilibrium[3] (see Rogoff, 1985).

The resulting one shot-game eliminates the "inflation bias" and the "stabilization bias"[4], thus mimicking the "second best" solution on a static context. Nevertheless, on a dynamic setting, both biases re-appears on Rogoff's solution (see Walsh, 1995). Nevertheless, as Svensson (1997 (b)) shows, a monetary authority that acts as a combination of a Rogoff-type independent central bank with a non-negative (i.e., asymmetric) inflation-targeting rule would successfully eliminate both the inflation and the stabilization bias, successfully mimicking, therefore, the attainable "second best" equilibrium. Therefore, the introduction of an explicit monetary or inflation target (inflation being generally considered a superior target, due to its timely production, easy understanding by the domestic economic agents and its full incorporation of available information in a single indicator) in the monetary

[2]This paper is based on work done during my stay as a "Visiting Researcher" at the Bank of Estonia in late 2001, and is forthcoming at the Working Papers Series of the Bank of Estonia in 2002.

[3]Of course, a currency board is just a commitment mechanism that transfers the solution of the "time inconsistency problem" to the policy makers of the nation that the currency is pegged to.

[4]The theoretical possibility of a monetary authority to care "too little" about output stabilization (informally know as the "inflation nutter" scenario). The current dispute about setting an explicit non-negative inflation target for the Bank of Japan –which only became institutionally independent from the Japanese Ministry of Finance back in 1998- partially reflects such concerns, and gives them empirical relevance. Japan is, due to a continuous deflationary process, mired in a classic Keynesian "liquidity trap", and it is argued that above zero inflation caused by a deliberate monetary expansion would make monetary policy effective again.

authority's loss function is one way to achieve the results of a "second-best", commitment-type, equilibrium through this "constrained discretion" mechanism (see Mishkin, 2000).

The exchange rate framework, of course, must be set in a consistent fashion with monetary framework. In a currency board mechanism, this consistent is simple and automatic: monetary policy is completely (in a pure currency board) endogenous to the arrangement[5], since the monetary base must equal –at least- the amount of reserves held by the monetary authority, being, therefore, a framework completely determined by the exchange rate arrangement. On the other hand, a pure float regime (under the assumption of free movement of capital) is necessary for the effectiveness of an active monetary policy[6].

Working within such an implicit theoretical referential, Kuttner and Posen (2001) perform a combined empirical analysis of central bank independence, announced targets and exchange rate regimes for a large set of developed and developing countries in a post Bretton Woods time sample, and estimate that a setup that combines a free float, an independent monetary authority and inflation targeting yields an outcome that mimics the price stabilization advantages of a hard peg without its drawbacks in terms of "extreme" nominal[7] events (like very large devaluations), which could imply that a move from one framework to the other would be welfare improving, in a Pareto sense. Our aim is to verify if such an outcome is also observed in our sub-sample of Accession Countries (not covered by the Kuttner and Posen study). If so, the policy implications can be non-trivial.

## A-Estimations

Any estimations performed on the set of countries that this work address here faces some obvious difficulties. The time series are notoriously short (in most cases, it doesn't make sense –or they are just not available, given the recent independence of some of them- to use data before 1992, rendering less than ten years available) and are clearly non-stationary (they are buffeted by the initial nominal and real shocks related to the transition process, which, as indicated in one of the previous section, also happened in different countries in different moments, and by what could be classified as "common external shocks" –again previously indicated- like the Russian Crisis in the second half of 1998 and the "oil shock" of 1999-2000).

The time dimension problem is minimized by using higher frequency series available for most of the variables of interest to us here. Those series are matched as closely as possible the series with regime dummies, following whenever possible the classification used by Kuttner and Posen (2001), Ibiden, from now on indicated as "KP".

[5]On the other hand, fiscal police is not automatically endogenized by this arrangement, and can place a serious strain on its sustainability, as the recent crisis in Argentina so clearly shows. The demise of its CBA -besides being a reminder of the potential fragility of this arrangement- did away with the myth that no "modern" CBA had ever collapsed. For descriptions of the monetary and currency arrangements of the ACs, see Vinhas de Souza, at al, 2002(a), Vinhas de Souza, 2002 (b), Vinhas de Souza and Hölscher, 2001(a) and 2001(b), Vinhas de Souza and Hallerberg, 2000, and Vinhas de Souza at al, 1999.

[6]This is the essential insight of the so-called "Mundell-Fleming" model, which is basically the formalization of a Keynesian IS/LM framework in an open economy setting.

[7]The explicit assumption in their work is that monetary or exchange rate arrangements have only nominal effects, and that real variables –like growth rates- are determined, on the long run, by the factor endowments and the production technology, and, on the middle to short run, by the business cycle.

The Central Bank Independence (CBI) dummies were constructed using as a reference the national Central Bank laws and their changes through time[8]. As KP indicates, from the usual criteria found in CBI-indexes, two tend to stick out in terms of their significance: the appointment and dismissal procedures of the head of the monetary authority and the prohibition (or otherwise) of monetary financing of the government debt. Here, those two are also used to classify the institutions either as partially independent (at least one of them is present) or independent (both are present).

The Targeting Regime dummies used here differentiate between narrow money targets (M0/M1), broad money targets (M2/M3), or an explicit inflation target (be either CPI one, as in Poland, or a "net inflation" one, as in the Czech case).

Finally, the Exchange Rate regime dummies distinguish between four *de jure*[9] classifications possible: CBA, hard pegs, an aggregate that encompasses sliding pegs, target zones and shifting baskets, and floats[10].

The data was taken from the IMF/IFS series, for the period from February 1989 (Hungary was an early reformer) to May 2001. The (heteroskedasticity-consistent) regressions will be done upon an unbalanced panel on "calendar" time[11], given that the individual national series have different time dimensions.

The general form of the equation(s) to be estimated for all series, which corresponds to the KP exchange rate variability equation, is given by

$$V_i^n = \alpha_0 + \alpha_1 Float_i^n + \alpha_2 CBA_i^n + \alpha_3 SPeg_i^n + \alpha_4 HPeg_i^n + \alpha_5 TargetMN_i^n$$
$$+ \alpha_6 TargetMB_i^n + \alpha_7 TargetIT_i^n + \alpha_8 CBIT_i^n + \alpha_9 CBIP_i^n + \mu$$

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[8]Cukierman at al (2001) produces an updated version of their famous index, now in terms of an yearly series for the period 1989-1998 that includes all countries in our sample, adding a time dimension to their analysis. One of their conclusions is that no level of CBI would have been able to have averted the inflationary jumps associated with the on-set of world price levels in the beginning of "transition". See also Loungani and Sheets (1997) and Äimä (1998).

[9]Certain studies stress the difference between *de facto* and *de jure* regimes. This distinction is particularly common on the "fear of float" literature (see Calvo and Reinhart (2000), for a recent review), and this usually assessed by comparing the volatility of the exchange rate with volatility of the reserves, but, as indicated by KP, just a *de jure* announcement is expected to have effects in terms of the expectations of the private agents.

[10]There is one possible policy option that is not analyzed it this framework, because no Accession Country –so far- has used it: Euroisation. For it, see the Annex I at the end of this work.

[11]Alternative estimations involving an adjustment for "transition time" were discarded by this author. In Bakanova at al (2001) ibid, this author estimates cross country "growth-regressions" for all the "transition" economies in Europe, both in "calendar" and in "transition" time, and the results do not differ in any significant manner: the reason for that is obvious: the further away you are from the onset of the transformation process, the less relevant such a distinction becomes. Alternatively, another way to deal with that would be to use a shorter, more recent sample, to adjust for the initial shocks related to the onset of "transition" and the "transition time" asymmetry. This was indeed done by this author in earlier versions of this paper, but it presented problems: as indicated in previous sections, all the economies in our set were being buffeted by a series of common shocks in the 1997-2000 period: the Asian crisis, the Russian crisis and the Energy shocks of 1999-2000. Due to that, some of the results were of very counterintuitive interpretation. Besides, one of our regressions (the GDP quarterly one, at the end of this section) just could not be estimated in this shorter sample. Decisively, the longer sample here used should be understood as a better approximation of the true long-run values of the parameters.

where V is the dependent variable, indexed for country n and period i, and the **α's** are the coefficients of the country and time varying dummies. I will estimate the same equation for all our series, as to unable a direct comparison of the results.

The set of variables is estimated both in terms of their levels but also, and mainly, on several "variability" measures, namely in terms of their standard deviations, the 90% standard deviations (i.e., excluding the extreme 5% realizations on both sides of the distribution) to measure eventual non-linearities of the frameworks in different portions of the distribution, the coefficient of skewness (which is a measure of asymmetry of the distribution of a series around its mean) and the coefficient of kurtosis (which measures the "peakedness" or "flatness" of a series, when compared to a normal distribution)[12]. Namely, the standard deviation s is here calculated as

$$\sqrt{\frac{n\sum x^2-\left(\Sigma x\right)^2}{n(n-1)}}$$

while skewness is here calculated as

$$\left\{\frac{n}{(n-1)(n-2)}\Sigma\left(\frac{x_j-\bar{x}}{s}\right)^3\right\}$$

where s is the standard deviation estimated as above, and kurtosis is here calculated as

$$\left\{\frac{n(n+1)}{(n-1)(n-2)(n-3)}\Sigma\left(\frac{x_j-\bar{x}}{s}\right)^4\right\}-\frac{3(n-1)^2}{(n-2)(n-3)}$$

where s is, again, the standard deviation estimated as above.

Also, to try to eliminate expectational effects -arising from regime changes that were credibly and previously announced- that might "contaminate" different regimes from our dependent variables, the same estimations were done on series that excluded the month of the announcement in the level series, the month of the announcement and the previous and precedent months in the case of the standard deviation series, the month of the announcement and two previous and precedent months in the case of the skewness series, and the month of the announcement and the three previous and precedent months in the case of the kurtosis series. The tables with those results are listed at the end of this section.

[12]An email discussion with Kenneth Kuttner clarified that the process in KP for the calculation of all their "variability" series used a sample that remained constant while all the elements of the framework remained unchanged. This author decided to use a centered "sliding sample" of two, there and four observation for the estimation, respectively, of our standard deviation(s), skewness and kurtosis series, for practical reasons: for countries with essentially unchanged frameworks during most of our sample the process used by KP would generate series that would have very few observations (or even be constant terms, like for Estonia) to be used as the dependent variables in our estimations.

## Exchange Rate:

The monthly series of changes in the average monthly exchange rate of the national currency to the USD (with the exception of Lithuania, where the DEM was used, as it was still on a USD peg during our sample) were used in the estimations[13]: negative movements indicate appreciation, positive ones depreciation.

**Table-1**

| **Sample:** | **Exchange Rate: Depreciation and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Depreciation | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 1.63* | 2.33* | 1.36* | 0.28** | 0.43 |
| **CBA** | -0.20 | 1.35* | 1.26* | 0.11 | -0.07 |
| **Sliding Peg** | 1.04* | 1.26* | 1.00* | 0.14 | 0.04 |
| **Hard Peg** | 1.05* | 1.45* | 0.95* | 0.31* | 0.02 |
| **Narrow Money Target** | 3.67 | 1.66 | 0.18 | 0.08 | -0.13 |
| **Broad Money Target** | -1.41* | -0.31* | -0.02 | -0.07 | -0.14 |
| **Inflation Target** | -1.63* | -0.44* | 0.45* | 0.09 | -0.70*** |
| **Total CB Independence** | 0.48*** | 0.20** | -0.13 | -0.26*** | -0.37 |
| **Part. CB Independence** | 0.77* | 0.09 | 0.01 | -0.24** | -0.08 |
| **R2** | 0.008 | 0.12 | 0.03 | 0.02 | 0.01 |

*: significant at the 1% level, **: significant at the 5% level; ***:significant at the 10% level.

As can be seen from the estimation results in Table-1 above, in terms of changes, floats lead to the highest significant degree of depreciation, while other institutional components (namely, targeting frameworks) seems to be able to almost fully counteract this tendency; on the other hand, central bank independence seem to actually increase it. In terms of their full standard deviations, the highest volatility is indeed observed in a float –while the lowest is associated with a sliding peg- is partially counteracted by certain types of targeting frameworks, especially by inflation targeting; when using the 90% standard deviations, now the point estimates are roughly similar for both the float –which still has the highest value- and the CBA, but the lowest value is actually associated with the hard peg, and an inflation targeting framework would actually increase the variability. Considering the skew, the significant coefficients on float and hard pegs are rather similar, and the institutional framework could offset most of those tendencies. In terms of kurtosis, the only significant coefficient is associated with an inflation-targeting framework: given that it is negative, it may be assumed that it could be used to partially counteract a "peaked" distribution. The series "corrected" for expectational effects (see Table-15, Annex II) not only confirm most of those results, but they are actually stronger,especially for the skew and kurtosis series (the scale of the coefficients is, as a rule, greater, and the statististical significance stronger and more common).

In terms of general conclusions, it could be said that any assumed substantial advantage in terms of lower variability associated with "harder" regimes is not observed, when the combined framework is taken into consideration. Also noteworthy, most of the gains are associated with targeting frameworks, not with the independence level of the monetary authority.

[13] KP also use nominal rates, due to the same data problem faced in this study: the lack of complete monthly real effective exchange rate series for the countries in our sample.

Of course, the conclusion above comes from an implicit assumption that the effects associated with the individual components of a joint framework would be additive[14]: to test for that, the individual elements are estimated in a "interactive dummy framework", to estimate the joint effects of relevant combinations of frameworks. As we may see from the results of our estimation on Table-2, below, this is indeed the case: the individual elements do show "additive" properties, besides their individual effects. Floats combined with inflation targeting and a high degree of independence would yield similar results -in terms of changes in levels of the exchange rate- to a high independence CBA: both are among the lowest coefficients of level variability. The same "dampening" effect on the volatility of the float towards "harder" regimes' levels is observed in terms of the standard deviations, both for the full and 90% series. Again, the series "corrected" for expectational effects (see Table-16, Annex) confirm most of those results.

**Table-2**

| **Sample:** | **Exchange Rate: Depreciation and variability** | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Dep. | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 0.38* | 1.65* | 1.46* | -0.23** | -0.57* |
| CBA with Partial CB Independence | 0.21* | 1.09* | 0.98* | -0.01 | 0.06 |
| Sliding Peg with a Broad Money Target | 7.00 | 9.91*** | 0.95** | 0.45 | 2.58* |
| Sliding Peg with Partial CB Independence | 1.31* | 1.49* | 1.36* | 0.09 | 0.13 |
| Sliding Peg with a Broad Money Target and Partial CB Independence | -7.91 | -10.28*** | -1.37* | -0.69 | -3.08* |
| Hard Peg with a Broad Money Target | -12.02* | -3.86* | 0.11 | -0.37 | 0.32 |
| Hard Peg with Partial CB Independence | 11.85* | 5.05* | 1.03** | 0.03 | -0.24 |
| Hard Peg with a Broad Money Target and Total CB Independence | 12.13* | 4.61* | 0.59 | 0.41 | -0.93 |
| Float with a Narrow Money Target | 5.26*** | 3.96 | 1.53* | 0.36* | 0.28 |
| Float with a Broad Money Target | 12.34** | 12.44** | 2.32* | 0.48** | 0.34 |
| Float with a Broad Money Target and Partial CB Independence | -11.09*** | -10.30*** | -0.87*** | -0.61** | -0.28 |
| Float with a Broad Money Target and Total CB Independence | -12.58** | -10.00*** | -1.37* | -0.15 | 0.35 |
| Float with an Inflation Target and Total CB Independence | 0.49* | 2.07* | 1.59* | 0.13 | 0.30 |
| Float with an Inflation Target and Partial CB Independence | -0.09 | 1.94* | 1.59* | -0.14 | -1.58** |
| **R2** | 0.02 | 0.04 | 0.01 | 0.03 | 0.03 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

Given the availability of monthly nominal and real effective exchange rate indexes series -NEEXR and REEXR- for, respectively, 8 and 9 of the countries in our sample (Latvia and Lithuania were the countries excluded from the nominal effective series, and Latvia from the real effective series), provided by the IMF/IFS database and by the national central banks, I also used them for some limited estimations. We must note that even some of the included series had a somewhat reduced temporal dimension, so those results should be examined with some care: they are presented in Tables V-3 to 6.

[14]This author thanks Űlo Kaasik, from the Bank of Estonia, for making this point.

**Table-3**

| Sample: | Nominal Effective Exchange Rate Index: Depreciation and variability. | | | | |
|---|---|---|---|---|---|
| **1989:02-2001:03** | Depreciation | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 131.09* | 3.21* | 2.92* | 0.01 | -0.47 |
| **CBA** | 50.82* | 2.01* | 1.66* | 0.15 | -1.02*** |
| **Sliding Peg** | 120.66* | 1.79* | 1.90* | -0.05 | -0.50** |
| **Hard Peg** | 164.01* | 2.74* | 2.02* | -0.09 | -0.34 |
| **Narrow Money Target** | -25.16** | 0.24 | 0.28 | 0.14 | 0.66 |
| **Broad Money Target** | -52.66 | -19.13* | -8.81* | -0.01 | 0.28 |
| **Inflation Target** | -56.52* | -0.93 | -0.84 | 0.13 | -0.49 |
| **Total CB Independence** | 23.74* | -1.52* | -1.22* | -0.04 | 0.85 |
| **Part. CB Independence** | 29.34 | 17.31* | 7.27* | 0.12 | 0.03 |
| **R2** | 0.31 | 0.11 | 0.08 | 0.004 | 0.01 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

In terms of level changes for NEEXR in Table-3 above (note that here a stable level would correspond to *100*), floats are associated with depreciation, and CBA with a substantially larger appreciation, while inflation target and full central bank independence can counteract this. As considering the standard deviations, floats indeed show the highest one, but, again, total CBI would counteract this, but not to the point where it would surpass a float, or a sliding peg, the best performer (note also the relative greater improvement of CBA with 90% standard deviations, an indication of the harder regime bias to "extreme events"). The additive regressions in Table-4 confirm those results (the almost completely stable NEEXR with a float cum CBI and DIT is noteworthy, as is the rather small standard deviation "advantage" of a harder regime).

**Table-4**

| Sample: | NEER Index: Depreciation and variability. | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Dep. | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 83.60* | 0.82* | 0.83* | 0.11 | -0.19 |
| CBA with Partial CB Independence | | | | | |
| Sliding Peg with a Broad Money Target | 3638.93* | 168.07 | 168.07 | 0.35 | 1.07 |
| Sliding Peg with Partial CB Independence | 110.78* | 1.27* | 1.29* | 0.06 | -0.48* |
| Sliding Peg with Broad Money Target and Partial CBI | -3647.23* | -168.76 | -168.78 | -0.38 | -0.83 |
| Hard Peg with a Broad Money Target | | | | | |
| Hard Peg with Partial CB Independence | 1006.01* | 93.68* | 49.51* | 0.26 | -0.31 |
| Hard Peg with a Broad Money Target and Partial CB Independence | -906.63** | -93.44* | -49.28* | -0.33 | 0.03 |
| Float with a Narrow Money Target | 105.55* | 3.44* | 3.20* | 0.15 | 0.20 |
| Float with a Broad Money Target | 399.15* | 57.29 | 57.29 | 0.06 | -0.47 |
| Float with a Broad Money Target and Partial CB Independence | -305.69* | -56.43 | -56.37 | 0.04 | 0.64 |
| Float with a Broad Money Target and Total CB Independence | | | | | |
| Float with an Inflation Target and Total CBI | 99.16* | 0.89* | 0.89* | 0.10 | -0.03 |
| Float with Inflation Target and Partial CBI | 78.14* | 1.04* | 1.03* | 0.20 | -1.42** |
| **R2** | 0.99 | 0.10 | 0.07 | 0.006 | 0.01 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

For REEXR level series in Table-5 below it is noteworthy that a float, as one could expect, *per se*, is almost all that is necessary for a stable exchange rate (while CBAs are associated with the highest level of depreciation), and that CBI and DIT partially counteract each other effects. In terms of standard deviations, the highest value is associated with a CBA –and, again, the lowest with sliding pegs, and the float variation can be almost totally counteracted by full CBI with a targeting framework (again, the use of 95% standard deviations shows the larger relative improvement of a harder regimes, confirming the tendency to "extreme events" of those arrangements).

**Table-5**

| **Sample:** | **Real Effective Exchange Rate Index: Depreciation and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:02-2001:03** | Depreciation | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 100.77* | 1.59* | 1.54* | -0.33** | -0.32 |
| **CBA** | 124.93* | 1.61* | 1.14* | -0.00 | 0.04 |
| **Sliding Peg** | 102.03* | 0.92* | 0.80* | -0.03 | -0.36 |
| **Hard Peg** | 92.05* | 1.10* | 0.94* | -0.04 | -0.15 |
| **Narrow Money Target** | -1.86 | 1.13** | 1.20** | 0.36*** | 0.20 |
| **Broad Money Target** | 6.25* | -0.45* | -0.64* | 0.19 | 0.02 |
| **Inflation Target** | 23.64* | 0.10 | -0.44* | 0.31 | 0.50 |
| **Total CB Independence** | -10.76* | -0.56** | -0.11 | -0.02 | -0.36 |
| **Part. CB Independence** | -4.87* | 0.05 | 0.38** | 0.04 | 0.06 |
| **R2** | 0.95 | 0.01 | 0.01 | 0.006 | 0.003 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

Also, again the additivity assumption, tested in Table-6 below is confirmed as statistically significant, and supports the previous results.

**Table-6**

| **Sample:** | **Real Effective Exchange Rate Index: Depreciation and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Dep. | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 114.27* | 1.10* | 1.08* | 0.00 | -0.43*** |
| CBA with Partial CB Independence | 129.86* | 1.33* | 1.31* | 0.02 | 0.26 |
| Sliding Peg with a Broad Money Target | 121.89* | 7.68** | 7.68** | 0.23 | -0.47 |
| Sliding Peg with Partial CBI | 102.34* | 1.11* | 1.09* | 0.06 | -0.25 |
| Sliding Peg with Broad Money Target & Partial CBI | 122.55* | -8.18** | -8.14** | -0.14 | 0.54 |
| Hard Peg with a Broad Money Target | | | | | |
| Hard Peg with Partial CB Independence | 62.40* | 2.85* | 2.75* | -0.01 | -0.02 |
| Hard Peg with Broad Money Target and Partial CBI | 34.41* | -2.45* | -2.34* | 0.28 | -0.16 |
| Float with a Narrow Money Target | 97.86* | 2.71* | 2.74* | 0.02 | -0.12 |
| Float with a Broad Money Target | 88.42* | 4.97 | 4.72 | -0.12 | -0.22 |
| Float with Broad Money Target and Partial CBI | 15.53* | -3.86 | -3.41 | 0.01 | -0.22 |
| Float with a Broad Money Target and Total CBI | | | | | |
| Float with an Inflation Target and Total CBI | 113.79 | 1.11* | 0.94* | -0.11 | 0.13 |
| Float with an Inflation Target and Partial CBI | 125.12* | 1.60* | 1.56* | 0.24 | -0.74 |
| **R2** | 0.98 | 0.02 | 0.005 | 0.005 | 0.004 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

And again, the series “corrected” for expectational effects (see Table-17 and V-18, Annex) –done only for the REER series- confirm those results.

As a general conclusion for the block of tested exchange rate series –nominal, nominal effective or real effective, *the assumed advantage of harder regimes in terms of variability is not empirically observed.*

**Inflation:**

Here, monthly CPI series were used as the dependent nominal variable. The results of the estimation on Table-7 below, in terms of levels, floats lead to a marginally higher inflation level than a CBA, but the lowest inflation is actually associated with pegs, while other institutional components (namely, inflation targeting and CBI) would seem to be able to almost fully counteract it. In terms of their full standard deviations, the highest volatility is again indeed observed in a float, but is only marginally greater them the one in a CBA, and, once again, the lowest is associated with a peg, but this can be partially counteracted by the CBI level; when using the 90% standard deviations, the float still has the highest value and the CBA the lowest, and a targeting framework (especially inflation targeting) would decrease the variability. Considering the skew, the significant coefficients on float, CBA and pegs are rather similar: the CBI institutional framework would actually increase those tendencies, but targeting frameworks could contain it. In terms of kurtosis, the picture is rather similar.

**Table-7**

| **Sample:** | **CPI: Level and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 3.40* | 1.39* | 0.70* | 2.22* | 11.68* |
| **CBA** | 3.42* | 1.32* | 0.49* | 2.10* | 10.83* |
| **Sliding Peg** | 2.55* | 1.04* | 0.58* | 2.08* | 9.85* |
| **Hard Peg** | 2.69* | 1.15* | 0.63* | 1.72* | 6.47* |
| **Narrow Money Target** | 1.07 | 0.24 | 0.59* | 0.04 | -2.97* |
| **Broad Money Target** | 0.43 | 0.00 | -0.35* | -1.47* | -9.26* |
| **Inflation Target** | -1.17*** | -0.44 | -0.63* | -1.26* | -7.58* |
| **Total CB Independence** | -1.74* | -0.45 | 0.20 | 2.68* | 16.87* |
| **Part. CB Independence** | -2.37* | -0.80* | 0.03 | 1.20* | 6.80* |
| **R2** | 0.02 | 0.002 | 0.05 | 0.43 | 0.30 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

Again, our conclusion is that the assumed advantage in terms of lower variability associated with “harder” regimes is not clearly registered, and, again, most of the gains in terms of volatility are associated with targeting frameworks, and not necessarily with the independence level of the monetary authority. This is also observed at the series “corrected” for expectational effects (see Table-19, Annex II).

As we see in Table-8 below, the “additive” assumption is again confirmed: Floats combined with inflation targeting and a high degree of independence would yield the lowest average inflation (the large negative significant coefficient for the float with money targeting and a partial degree of independence is of difficult interpretation) and the lowest standard deviations, both for the full and 90% series, while the lowest skew and one of the lowest excess kurtosis are associated with the combination that includes money targeting. Again, the series "corrected" for expectations (see Table-20, Annex II) yield similar results.

**Table-8**

| Sample: | CPI: Level and variability. | | | | |
|---|---|---|---|---|---|
| 1989:01-2001:05 | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 1.24* | 14.91* | 0.64* | 5.45* | 39.53* |
| CBA with Partial CB Independence | 0.98* | 7.90* | 0.56* | 1.92* | 5.92* |
| Sliding Peg with a Broad Money Target | 10.04* | 7.66* | 2.71* | 0.67* | 2.15* |
| Sliding Peg with Partial CB Independence | 1.73* | 11.95* | 0.68* | 4.21* | 23.16* |
| Sliding Peg with a Broad Money Target and Partial CB Independence | -11.12 | -19.16* | -3.12* | -3.71* | -20.48* |
| Hard Peg with a Broad Money Target | -11.68 | -15.30* | -1.05* | -0.65* | -1.94* |
| Hard Peg with Partial CB Independence | 12.45* | 15.72* | 1.33* | 1.48* | 4.96* |
| Hard Peg with Broad Money Target & Total CBI | 12.45* | 23.81* | 1.49* | 3.98* | 17.96* |
| Float with a Narrow Money Target | 4.39* | 10.56* | 1.26* | 2.33* | 9.24* |
| Float with a Broad Money Target | 8.89* | 6.36* | 1.74* | 1.07* | 3.98* |
| Float with a Broad Money Target and Partial CBI | -7.78* | -3.91* | -1.41* | 1.59* | 8.43* |
| Float with a Broad Money Target and Total CBI | -2.19 | 6.73* | -0.02 | 0.26* | 0.14 |
| Float with an Inflation Target and Total CBI | 0.49* | 0.67* | 0.25* | 2.46* | 11.37* |
| Float with an Inflation Target and Partial CBI | 0.53* | 9.21* | 0.25* | 5.55* | 38.01* |
| **R2** | 0.01 | 0.81 | 0.18 | 0.82 | 0.83 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

### Interest rates:

Estimating the same equation for the real interest rate[15] the results listed at Table-9 below are found.

**Table-9**

| Sample: | Real Interest Rate: Level and variability | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 50.20* | 7.18* | 2.34* | 0.81* | 6.96* |
| **CBA** | 31.43* | 3.61 | 0.60* | -3.17* | -16.76* |
| **Sliding Peg** | 24.48* | 1.44* | 0.71* | 0.05 | 3.05* |
| **Hard Peg** | 28.69* | 2.31* | 1.26* | -0.15* | 1.90* |
| **Narrow Money Target** | 9.92* | 0.50*** | 1.39** | -1.45* | 6.12* |
| **Broad Money Target** | 4.76 | 1.16 | -0.91* | -3.23* | -20.13* |
| **Inflation Target** | -26.90* | -4.66** | -2.41* | -2.10** | 2.72 |
| **Total CB Independence** | -13.84* | -1.93 | 0.65 | 3.86* | 20.58* |
| **Part. CB Independence** | -17.02* | -2.40 | 0.52 | 4.62* | 25.22* |
| **R2** | 0.37 | 0.06 | 0.02 | 0.30 | 0.16 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

[15]"Real Interest Rate" is here defined as just the lending rate in time *t* minus the consumer price inflation realized also on time *t*. No consistent series of "expected inflation" would be available for all countries throughout all the sample.

In terms of levels, floats lead to the highest interest rate levels, and pegs the lowest, while the other components (namely, inflation targeting and CBI) would again seem to be able to substantially reduce it. Again, in terms of their full standard deviations, the highest volatility is, by far, again observed in a float, but this can be partially counteracted by a inflation targeting framework; when using the 90% standard deviations, the float still has the highest value and the CBA the lowest, and inflation targeting would still decrease the variability substantially. Considering the skew, the lowest significant coefficients is on the float, the CBI institutional framework would actually increase those tendencies, but targeting frameworks could contain it. Again, in terms of kurtosis, the picture is rather similar. The coefficients from the series "corrected" for expectational effects (see Table-21, Annex II) again confirm those results.

As we see in Table below, the "additive" assumption is once again confirmed: Floats combined with inflation targeting and a high degree of independence would yield the lowest positive real interest rates and the lowest standard deviations and the lowest skew, but the lowest excess kurtosis are associated with CBA, followed by the float cum CBI cum IT. Again, the series "corrected" for expectational effects (see Table-22, Annex II) yield similar results.

**Table-10**

| **Sample:** | **Real Interest Rate: Level and variability** | | | | |
|---|---|---|---|---|---|
| **1991:01-2001:05** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 14.62* | 15.02* | 1.15* | 0.79* | 3.43* |
| CBA with Partial CB Independence | 19.63* | | | 0.85* | 3.00* |
| Sliding Peg with Partial CB Independence | 27.43* | 530.84* | 0.93* | 8.54* | 77.95* |
| Sliding Peg with a Broad Money Target and Partial CB Independence | -14.81* | -530.09* | -0.51* | -8.17* | -74.28* |
| Hard Peg with a Broad Money Target | 203.45 | -680.67* | -4.32* | -2.88* | -12.04* |
| Hard Peg with Partial CB Independence | 215.96 | 681.31* | 4.72* | 2.78* | 14.15* |
| Hard Peg with a Broad Money Target and Total CB Independence | 225.75 | 698.31* | 5.94* | 3.55* | 14.59* |
| Float with a Narrow Money Target | 59.27* | 23.88* | 3.73* | -0.57 | 10.54* |
| Float with a Broad Money Target | 70.23* | 14.50* | 2.80* | 2.01* | 6.53* |
| Float with a Broad Money Target and Partial CB Independence | -51.52* | 74.73* | -1.09* | | |
| Float with a Broad Money Target and Total CB Independence | -2.26 | -8.29* | -0.36* | | |
| Float with an Inflation Target and Total CB Independence | 9.43* | 1.46* | 0.53* | -0.41* | 4.11* |
| Float with an Inflation Target and Partial CB Independence | 19.71* | 388.34* | 0.40* | 11.37* | 132.65* |
| **R2** | 0.62 | 0.67 | 0.04 | 0.72 | 0.56 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

So far, our set of nominal variables confirms –with surprisingly robust results- the outcome of KP: when taken into consideration as a combined framework, harder regimes do not necessarily outperform floating ones, either in terms of level or variability (regardless of the exclusion or not of extreme events).

## B-Real variables[16]

One of the underlying assumption of the previous estimations was that nominal frameworks, as the ones analyzed here, would only have effects in terms of nominal variables. Nevertheless, several works do try to access the effects of exchange rate frameworks on growth rates (for an empirical estimation, see Ghosh at al, 1997, for a model based simulation for the Accession Countries, see Vinhas de Souza and Ledrut, 2002), albeit it is not clear a priori why and through which channels a nominal mechanism would have persistent effects in real variables' growth paths (and, indeed, but studies above tend to find that the differences in growth performance of different regimes tends to be non-significant). Nevertheless, a recent work by Levy-Yeyati and Sturzenegger (2001) find consistent positive growth effects from float regimes, using modified Barro-type "growth equations"[17]. On the other hand, and far less controversially, one of the major assumed advantages associated with floating regimes is indeed their assumed capacity to smooth or cushion shocks, which would indicate that they might affect the "variability" of real variables. Therefore, and as a consistency test, the framework above was extended to real series. Given that I deal here with monthly and quarterly data, the effects could be understood as the short run effects of the framework on their level and variability.

### Unemployment:

As the first of our two real variable series, monthly unemployment series were used. A series of provisos must be made here concerning our data in this section: all the countries in our sample suffered massive productive dislocations with the onset of transition, leading to high, and, in some cases, due to skills mismatch, persistent unemployment levels. Also, ethnic and linguistic concerns, especially in the Baltic countries, may contribute to above equilibrium unemployment levels, while, on the other hand, the official registered unemployment series may likely suffer from a downward bias (see IMF, 2001 (b)). Finally, this is a shorter sample, starting only on January 1991.

**Table-11**

| **Sample:** | **Unemployment: Level and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:01-2001:05** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 11.56* | 0.03 | 0.23* | -0.39* | 1.88* |
| **CBA** | 7.08* | 0.05 | 0.27* | -0.30* | 2.29* |
| **Sliding Peg** | 9.44* | 0.20* | 0.24* | -0.11* | 3.40* |
| **Hard Peg** | 7.20* | 0.40* | 0.19* | -0.32* | 2.23* |
| **Narrow Money Target** | -1.43** | 0.22* | 0.01 | -0.44* | 1.21* |
| **Broad Money Target** | -2.50* | 0.17* | -0.02 | -0.30* | 1.34* |
| **Inflation Target** | -3.69* | 0.03 | 0.02 | 1.12* | 0.70* |
| **Total CB Independence** | 2.89* | 0.29* | -0.08* | -0.39* | 0.88* |
| **Part. CB Independence** | 4.39* | -0.05* | -0.07* | 0.02 | -0.07 |
| **R2** | 0.82 | 0.25 | 0.01 | 0.45 | 0.27 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

[16]In this section, the IMF/IFS series were complemented with data from the Vienna Institute for Comparative International Studies (WIIW).

[17]Those effects are due completely to the developing countries in their sample (which do includes all the Accession Countries, with the exception of Hungary), and the results are robust to the introduction of, among other test, regional dummies.

Estimating the same equation as before for the unemployment rate I get the results at Table-11 above: in terms of levels, floats lead to the highest unemployment levels and CBAs to the lowest (perhaps as an indication that one of the assumed mechanism to underpin the sustainability of a currency board, namely, flexible labor markets, is indeed present those countries), while inflation targeting frameworks would be able to reduce it, and CBI would actually increase it. The significant standard deviations are rather small and similar across regimes, with some targeting frameworks increasing it, and CBI decreasing it. Considering the skew and the kurtosis, the picture is similar. As we see in Table-12 below, the "additive" assumption is once again confirmed, and here, the assumed variability advantages of more flexible regimes is more strongly observed. Both set of results are confirmed by the series "corrected" for expectational effects (see Table-23 and 24, Annex II).

**Table-12**

| **Sample:** | **Unemployment: Level and variability** | | | | |
|---|---|---|---|---|---|
| **1991:01-2001:05** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 11.39* | 2.40* | 0.18* | | 3.30* |
| CBA with Partial CB Independence | 7.41* | 1.42* | 0.20* | 0.03 | 2.32* |
| Sliding Peg with Partial CB Independence | 13.36* | 2.56* | 0.17* | -0.72* | |
| Sliding Peg with Broad Money Target & Partial CBI | -1.12* | 0.02 | -0.02 | -0.66* | 4.95* |
| Hard Peg with a Broad Money Target | -5.30* | 0.02 | -0.31* | -0.77* | 1.81* |
| Hard Peg with Partial CB Independence | 8.39* | 0.68* | 0.39* | 0.38* | 1.77* |
| Hard Peg with Broad Money Target & Total CBI | 12.88* | 1.17* | 0.40* | -0.21** | 2.60* |
| Float with a Narrow Money Target | 10.29* | 2.61* | 0.24* | -0.86* | 3.23* |
| Float with a Broad Money Target | 8.63* | 1.89* | 0.22* | -0.39* | 2.02* |
| Float with Broad Money Target & Partial CBI | 5.32* | -0.53* | -0.08* | -0.65* | 1.86* |
| Float with Broad Money Target & Total CBI | -3.76* | -1.05* | -0.08* | 0.04 | -0.19* |
| Float with an Inflation Target and Total CBI | 7.52* | 1.55* | 0.16* | 0.90* | 3.71* |
| Float with an Inflation Target & Partial CBI | 14.53* | 2.42* | 0.16* | -0.46* | 2.56* |
| **R2** | 0.86 | 0.85 | 0.00 | 0.52 | 0.81 |

*: significant at the 1% level, **: significant at the 5% level; ***:significant at the 10% level.

Nevertheless, in terms of a general conclusion, the prior of a worst employment variability performance of harder regimes as compared to floats is, perhaps surprisingly, not so clearly confirmed (this is true to a lesser degree, using 90% standard deviations).

**GDP:**

As the second of our two real variable series, quarterly GDP series were used[18]. Again, here, a proviso: not all countries produce adequately long quarterly GDP series, so for half of our sample (Hungary, Poland, Romania, Slovakia, Slovenia) industrial production series were used instead. As is know, industrial production can be a somewhat unreliable proxy for GDP[19]. Those nominal series are turned into real series (using the CPI as a

[18]Due to the quarterly periodicity, the "correction" for expectational effects was not done on this series.
[19]As a matter of fact, comparing the available short quarterly GDP series with the corresponding samples of the –available for much longer periods- Industrial Production series yielded an amazing 97% correlation for Hungary and Slovakia, and 87% for Slovenia. The smaller result was observed for Poland (-70%). As indicated before, Romania do not produces quarterly GDP series.

deflator), and them into indexes' series, the natural logs of which are used as the dependent variable on our regressions.

Estimating the same equation for the "GDP" series, I get the results at Table-13, below: in terms of levels, CBAs slightly outperform all other regimes, but the use of inflation targeting would more than fully compensate this difference. The standard deviations, on the other hand, are substantially smaller under a float, with inflation targeting increasing it somewhat, but this is counteracted by the institutional framework. Considering the skew, the float is the highest, but some targeting frameworks and CBI can control for this. In terms of the kurtosis, inflation targeting could help a float approach a normal distribution.

**Table-13**

| **Sample:** | **GDP: Level and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:1-2001:2** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| **Float** | 1.98* | 0.01* | 0.013* | 0.78* | -0.68*** |
| **CBA** | 2.01* | 0.04* | 0.040* | 0.44*** | 0.12 |
| **Sliding Peg** | 1.99* | 0.02* | 0.020* | 0.31*** | -0.27 |
| **Hard Peg** | 1.97* | 0.03* | 0.022* | 0.61* | -0.18 |
| **Narrow Money Target** | -0.03 | 0.01 | 0.001 | -0.99* | 0.23 |
| **Broad Money Target** | -0.03 | 0.00 | 0.000 | -0.50** | 0.55 |
| **Inflation Target** | 0.03** | 0.01* | -0.013* | 0.06 | 2.02* |
| **Total CB Independence** | -0.01 | -0.00* | -0.011* | -0.65** | -0.41 |
| **Part. CB Independence** | 0.00 | -0.00* | -0.008 | -0.43** | -0.20 |
| **R2** | 0.99 | 0.23 | 0.20 | 0.10 | 0.05 |

*: significant at the 1% level, **: significant at the 5% level; ***: significant at the 10% level.

The "dummy interaction" estimations mostly support those results (see Table-14, below).

**Table-14**

| **Sample:** | **GDP: Level and variability.** | | | | |
|---|---|---|---|---|---|
| **1989:1-2001:2** | Level | Std. Dev. | Std. Dev. 90% | Skewness | Kurtosis |
| CBA with Total CB Independence | 1.89* | 0.026* | 0.026* | -0.20 | -0.90** |
| CBA with Partial CB Independence | 1.89* | 0.036* | 0.035* | -0.01 | 0.34 |
| Sliding Peg with a Broad Money Target | 0.47* | 0.007* | 0.009* | -0.52* | 0.56 |
| Sliding Peg with Partial CB Independence | 1.54* | 0.010* | 0.009* | -0.19 | -0.20 |
| Hard Peg with Total CB Independence | 2.05* | 0.009* | 0.009* | -0.58** | 0.14 |
| Hard Peg with Broad Money Target and Partial CBI | 1.96* | 0.017* | 0.016* | 0.4 | 0.20 |
| Float with a Narrow Money Target | 1.91* | 0.017* | 0.016* | -0.22 | -0.50 |
| Float with a Broad Money Target | 1.95* | 0.020* | 0.016* | 0.03 | 0.36 |
| Float with a Broad Money Target and Partial CBI | 0.05* | -0.015* | -0.011 | -0.15 | -0.86 |
| Float with a Broad Money Target and Total CBI | 0.05* | | | | |
| Float with an Inflation Target and Total CBI | 1.98* | 0.017* | 0.017* | 0.23 | 1.23* |
| Float with an Inflation Target and Partial CBI | 2.02* | 0.008* | 0.008 | 0.41 | -1.49 |
| **R2** | 0.99 | 0.45 | 0.38 | 0.09 | 0.10 |

*: significant at the 1% level, **: significant at the 5% level; ***:significant at the 10% level.

As a conclusion, the variability and level of our "GDP" series does seem to be, respectively, smaller and greater under more flexible regimes. Therefore, here the usual priors about the regimes do seem to have been confirmed[20].

**C-Conclusions**

The aim of this section was to access if a combined framework that included the exchange rate arrangement, the institutional set-up of the monetary authority and the existence of different types of targeting frameworks would yield differences in terms of the level and variability of a set of nominal and real variables for a sample made of Accession Countries, following a methodology developed by Kuttner and Posen (2001, Ibiden).

Our results confirm most of the ones obtained by KP: once you take into consideration a combined framework with the three elements above, the assumed advantages of harder exchange rate regimes in terms of, if not the level, but at least the variability of series like exchange rate changes, inflation and interest rates, when compared with floating regimes, is no longer observed.

In addition to the work carried by KP, one of the fundamental underlying assumption in their conclusions is the "additivity" of the significant effects estimated for the individual component of a combined framework (which they do not test). This was assessed via the use of "interactive dummy models", and this assumed additive nature of the individual effects is indeed observed in those estimations.

Most of gains in the reduction of the variability can be linked to the use of targeting frameworks, especially inflation targeting. The level of independence of the monetary authority is also a significant element in terms of the effects of the arrangement, but given that the credibility effects associated with it can also be achieved within the institutional set-up of harder regimes, the additional gains registered by the more flexible regimes must come from the targeting mechanism.

In an another addition to KP's work, this paper also estimated the effects of the combined frameworks in the level and variance of a set of real variables. The results here are less strong than the ones for the nominal set, mostly due to data problems, but at least partially the traditional assumption of a smaller real volatility associated with more flexible regimes seems to be confirmed.

Taken together and at face value, the conclusion from the estimations with both sets of nominal and real variables would be that it would be Pareto-improving from an economy to switch from a harder regime to a more flexible one –if that change were coupled with CBI and DIT, given that no losses would be incurred in terms of nominal variability, and gains would be observed in terms of real variability.

[20]A question not addressed here is that smaller, less diversified, more open economies could have a greater GDP variability than larger, more closed ones, regardless of the type of combined framework used. This question arises due to the fact that, in our sample, after the initial widespread use of external anchors, only the smaller economies consistently used harder regimes. Such a hypothesis could be tested with a larger set of countries.

Nevertheless, to derive hard policy conclusions from this set of estimations is a more problematic proposition. To start with general questions, the data is rather limited in terms of time and has several shortcomings, as indicated previously. Also, our sample uses a very specific set of countries in a very particular moment in their histories. Of course, the broader conclusion are strikingly similar to the KP ones, derived from a much larger set of countries with a much longer time sample, so their overall robustness can be assumed. It also assumes that countries can actually choose their exchange rate framework, i.e., that this is not endogenously determined by structural factors like size, productive structure, etc. (for a recent work that supports this "endogeneity" view, see Poirson (2001)). On the other hand, another view of "endogeneity", and one that actually underpins the current EU integration efforts, would see the structure as endogenous to the policy choice, so an arrangement that may not be optimal ex ante becomes optimal ex post (see Frankel and Rose (1997)). Also, some of the observed outcomes may be due to non-considered factors (like labor market institutions, the size and openness of the economy and a worldwide environment of low inflation during most of the 90s). Perhaps more fundamentally, the conclusion about the net Pareto-improving nature of a switch of frameworks do not assume any kind of eventual costs associated with the change-over: it is very easy to conceive that credibility losses could be -under certain circumstances- incurred during the change, preventing the country in question from achieving the expected gains. Of course, any credibility losses leading to eventual speculative attacks would arise *not from the regime switch per se*, but from wrong policy mixes or fundamentals perceived as unsustainable by market agents, *which would have negative effects under any type of combined frameworks*.

Also, on sheer operational terms, the effectiveness of a DIT framework hangs on the stability of the transmission mechanism of monetary policy –i.e., on functioning financial markets, and on the availability of an effective model to forecast inflation in an economy[21], and on the openness and transparency of the whole procedure to economic agents, so that they can understand and anticipate monetary policy actions[22]. Therefore, no economy during the early stages of the transition process would have been able to successfully implement a DIT framework[23], but, after all, "transition" started a full decade ago[24], and the conditions are plainly there in a –growing- subset of the Accession Countries for its effective introduction[25].

[21]Given that monetary policy actions feed into the wider economy with a lag that can be as long as 18-24 months, in practical terms inflation targeting means inflation forecast targeting.

[22]This, of course, also imply that the private agents must "know the model" which is being used by the monetary authority.

[23]For some works on DIT in the Accession Countries, see Christoffersen and Wescott (1999) and Orlowski (2001) and (2000).

[24]And, for some authors, it has effectively ended, at least for the Accession Countries: see Gros and Suhrcke (2000) and Weder (2001). This author actually agrees with this notion, which explains his reluctance to use the term "transition".

[25]Also, arguably the "best performing" monetary authority in the EU –in terms of a inflation *cum* GDP welfare function- since the second half of the 1990s is the that transparent inflation targeter, the Bank of England (the efforts it does towards making even its modeling tools reproducible are truly commendable), and not that old 1980s favorite, the former monetary targeter, the Bundesbank. A comparative study of the Bank of England and the "Buba" -and now the ECB, could yield valuable insights towards policy formulation and implementation for the Euroarea itself.

## Annex I: Euroisation

An alternative regime is the so-called (unilateral) Euroisation, the regional variation of a process through which a country abandons its legal currency and fully switches to a foreign legal tender. Several authors have defended it as an option for the Accession Countries (see Schoors (2001), van Foreest and de Vries (2001), Ibiden, Gros and Schobert (2001) and Nuti (2000)). Many examples exist of such a process involving the USD, specifically in Latin America: recently, both El Salvador and Ecuador decided for this arrangement. Panama is an early example, but this is linked to its status as a territory which gained independence with American support during the construction of the Panama Channel, at the beginning of the XX$^{th.}$ Century, and that until the end of the last century had a sizeable chunk of its territory under American administration (peculiarly, the US dollar is again legal tender also in Cuba –a former American colony, from the 1898 "Spanish American War" until 1910, when the US Congress granted it partial autonomy- since 1993, a measure taken to alleviate the scarcity of hard currency, since the collapse of the Soviet Union deprived Cuba from its main external supporter[26], by legalizing the hidden stocks of US currency sent to Cuban relatives by Cuban immigrants in the US).

The key distinguishing feature of this arrangement is that the costs of exiting it are greater even than the ones related to scrapping of a currency board (but, obviously, the exit probability is still non zero: as any former member of the Soviet Union knows, no monetary arrangement is forever), therefore increasing the credibility of the commitment.

Amongst its benefits we may include:

-Elimination of currency risk and associated speculative attacks;
-Full "credibility import";
-Elimination of liquidity risk;
-Reduction in financing spreads.

Some of those benefits are realized under other types of exchange rate arrangements (namely, hard pegs or CBAs, as they are fundamentally similar systems), but not to the degree assumed possible under Euroisation.

Some of its' expected costs are:

-Loss of the adjustment tool of exchange rates;
-Loss of "Lender of Last Resort" capabilities[27];

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[26]In an unpublished work done by this author during his "United Nations" days, it was estimated that explicit and implicit Soviet transfers and subsides amounted, at its peak during the early 1980's, to roughly *half* of the whole Cuban GDP.

[27]As 97% of the banking system in Estonia is foreign owned –56% of the sector belongs to Hansapank, which is owned by Swedebank, 28% of the sector to Uhisbank –"The Union Bank"- which is owned by another Swedish financial conglomerate, S.E. Banken, the Finish bank Sampo has 7% of the market to its Estonian subsidiary and a further 6% of the market is controlled by another Finish entity, Merita Nordbanken- the LLR problem there has been, effectively, "externalized" to ESCB monetary authorities and their respective fiscal ones. Anyway, given that the total reserves of the Bank of Estonia totaled 620 Million Euros in 2000, while only demand deposits in the banking systems reached around 1.4 Billion Euros (total liabilities to customers surpassed 2.2 Billion Euro) for the same period, and the limited fiscal capacity of the Estonian Treasury, any domestic LLR facilities, regardless of the CBA nature of its arrangement, would be rather limited indeed.

-Loss of seigniorage.

Again, under a pure CBA structure, the first two items already happen, therefore, in principle, Euroisation should dominate alternatives like hard pegs and CBAs.

It may be assumed that the smaller Accession Countries with harder regimes would be the ones most likely to find such an option actually attractive[28]. This work will use a cursory estimation for Estonia of potential gains and losses as a benchmark for this set of countries.

In terms of gains from a convergence to EU lending rates, from 1999 onwards, the short run nominal EU lending rates were actually above the level for Estonia (marginally in 1999, but by over 2 p.p in 2000), as short-run rates were determined by the liquidity conditions of short-run assets denominated in Estonian Kroons. On the other hand, the long run rates implied by the EEK-EUR swap curve indicate that the long-run rates domestic Estonian rates were above comparable EU ones by almost a full percentage point (which maybe explained by the lack of liquid domestic long term assets). Assuming that at short run maturities, the rates would be still determined by domestic liquidity conditions even after Euroisation, but that the long run ones would converge to the EU level, Euroisation would imply a reduction of almost a full percentage point[29], yielding potential gains of 20 Million Euros annually. Other gains would arise from the elimination of the currency conversion costs (estimated at 0.25% of the GDP for 2000, or 12 Million Euros yearly)[30].

In terms of losses from "seignoriage", the cost of unilateral Euroisation would be the sum of the "stock" loss, which would amount to the one-off cost related to the replacement of the currency in circulation (roughly 9% of the Estonian GDP in 2000, 4.9 Billion Euros, or 440 Million Euros) plus the "flow" losses, arising from the interest income earned from reserves (17 Million Euros yearly[31]). But, of course, obviously the opportunity costs of unilateral Euroisation have to be compared with the costs of "multilateral", official Euroisation, i.e., full Euroarea membership, one of the ultimate goals of the current integration process, so some of the costs above would have to be eventually incurred anyway. The Bank of Estonia would have to "pay" for the privilege of ECB membership, in terms of a contribution to the ECB capital subscription, of currently around 55 Billion Euros, calculated in terms of a weighted average of the Estonian share of population to the EU total population and of the Estonian share of GDP to the total EU GDP[32]. Such one-off "set-up" costs could be estimated at around 120 Million Euros (in turn, the ECB would provide the necessary. amounts for the domestic currency replacement) The subsequent seigniorage sharing through the ECB structure would also compensate the seigniorage loss.

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[28]Wójcik (2001) supplies a good example of a "large" country -with a flexible exchange rate arrangement- *negative* perspective on Euroisation.

[29]Public and private debt stocks are less the 50% of GDP in Estonia, which helps to explain these relatively reduced gains.

[30]See Sulling (2001), for a very interesting work on Estonia and Euroisation.

[31]In macro terms, there would be no effective "stock" loss, as the backing of the currency in circulation already effectively exists in Euros held by the Estonian monetary authority, and even in a unilateral Euroisation scenario, the Bank of Estonia, or any monetary or supervisory organization that would take its role, would still earn income from the obligatory and excess reserves deposited by the financial institutions, so this loss would be only partially realized.

Other related loss would be the lack of representation of Estonia in the Governing Council of the ECB, and, therefore, the lack of consideration of the particular economic conditions of Estonia when interest rate decisions are taken. Nevertheless, given the marginal size of Estonia in relation to the Euroarea, such weight would be truly minor in any case.

[32]Article n° 29 of the ECB Protocol n° 18 (see ECB, 2001).

Of course, these cost of Euroisation are a decreasing function of effective degree of Euroisation: it is only reasonable to assume that, coming January 2002, a substantial degree of effective Euroisation will inevitable happen in Estonia, regardless of the current legal limitations to the use of a foreign currency as a means of exchange in cash transaction, due to its strong trade links with the Euroarea and the substantial inflow of tourists from Euroarea countries, specially Finland.

Therefore, it can be tentatively concluded that, on balance, the net economic gains of Euroisation would not be necessarily very large. The expected gains would only decidedly surpass the ones obtained under the currently used CBA regime, and the opportunity costs of multilateral Euroisation, in a scenario of delayed Euroarea participation.

Considering the political economy dimension of this debate, the EU institutions seems to present, so far, a clear instance against Euroisation[33], seemingly due to an unstated fear of loosing control over the Euroarea monetary aggregates and of the effects that countries that might be perceived to have weaker financial systems and budgetary positions might have on the value of the Euro itself, through an implicit "bail-out" commitment[34]. Also, there are some stated legal objections to Euroisation based on specific readings of the EU treaties, but both the legal and the economic objections seem to be based on very few substantial studies by any of the EU institutions, and, of course, it cannot be a healthy position in a democratic Union to preclude what may amount to a defensible policy choice in an unclear basis: Euroisation may even not be a good or viable option for the Accession Countries, but it should not be *a priori* excluded.

As a final remark, the fear expressed by some of a negative EU reaction that could compromise the Enlargement process for the "offending" nation that would dare to unilaterally "Euroise" do not seem to be credible: it is unlikely that the EU would held such a

[33]"… the ERM II is flexible enough to accommodate the features of a number of existing exchange rate strategies. The only clear incompatibilities with the ERM II that can be identified already at this stage are the *cases of free floating (or managed floats without a mutually agreed central rate), crawling pegs, and pegs against anchors other than the Euro*. … it should be made clear that any unilateral adoption of the single currency by means of "Euroisation" would run counter to the underlying economic reasoning of EMU in the Treaty, which foresees the eventual adoption of the Euro as the endpoint of a structured convergence process within a multilateral framework. Therefore, *unilateral "Euroisation" would not be a way to circumvent the stages foreseen by the Treaty for the adoption of the Euro*". Excerpts from the Ecofin (2000), Ibiden.

[34]Such fears runs counter the actual experience of the DEM, before its integration into the Euro basket, as it was used, to different degrees, as a parallel currency in several Eastern European economies, and against the ongoing situation of the USD.

politically important process as the Enlargement hostage to the eventual “punishment” of a country that would be taking an action that, to start with, would be fundamentally in accordance with the aims of a deeper European integration, the very objective of the existence of the European Union[35].

[35]This said, most analysts, including this author, agree that such fears will make most likely that the *first* countries to engage in unilateral Euroisation will be the ones of the non-Accession set found in the Balkans: Montenegro, Kosovo, Croatia, Bosnia, eventually even the (remainder of) The Federal Republic of Yugoslavia.

## Annex II- Series "Corrected" for Expectational Effects

### Table-15

| Variable | DEP | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| **Float** | 2.160136* | 11.68103* | 1.861016* | 0.918113* | 3.954147* |
| **CBA** | 0.659742* | -4.079370* | 1.566522* | 1.848242* | 4.543306* |
| **Sliding Peg** | 1.571016* | -5.926581* | 1.476051* | 1.296922* | 3.641103* |
| **Hard Peg** | 1.392953* | -7.816124* | 1.359785* | 1.664140* | 3.935785* |
| **Narrow Money Target** | 2.155235** | 727.9042* | -0.302958 | 0.007708 | -0.127229 |
| **Broad Money Target** | -0.888963* | -0.309842* | -0.128994* | 0.255475* | 0.173466** |
| **Inflation Target** | -1.351407* | -12.23498* | 0.203089 | 0.438431* | -0.343787*** |
| **Total CB Independence** | -0.403477** | 3.730946* | -0.430005*** | -0.815117* | -1.016342* |
| **Part. CB Independence** | -0.246211 | 9.610728* | -0.391514 | -1.365279* | -1.537672* |
| R-squared | 0.000883 | 0.389730 | 0.045088 | 0.255213 | 0.238094 |
| Adjusted R-squared | -0.006085 | 0.385401 | 0.036830 | 0.249826 | 0.232476 |
| S.E. of regression | 22.71337 | 515.3856 | 1.479059 | 0.844649 | 2.091734 |
| Log likelihood | -3557.409 | -4927.808 | -1428.839 | -1241.934 | -1755.349 |
| Durbin-Watson stat | 1.277997 | 0.003217 | 1.626964 | 0.049336 | 0.081573 |

### Table-16

| Variable | DEP | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| FOREXCBA*CBIT | 0.376265* | 0.966470* | 1.459454* | 0.104418* | 2.231511* |
| FOREXCBA*CBIP | 0.205825* | 0.286619* | 0.969259* | 2.135864* | 12.51938* |
| FOREXSPEG*CBIP | 0.785415* | 3.859299* | 1.039421* | 0.108823* | 2.122542* |
| FOREXHPEG*CBIP | 0.956353* | 1.130742* | 1.039127* | -0.004243 | 2.152631* |
| FOREXFLOAT*TARGETMN | 4.343377* | 740.3032* | 1.559561* | 0.912208* | 3.850641* |
| FOREXFLOAT*TARGETMB | 6.289459* | 251.6930* | 2.383606* | 1.485551* | 3.967769* |
| FOREXFLOAT*TARGETMB*CBIP | -5.047882* | -228.8008* | -0.964421*** | -1.771416* | -1.353391* |
| FOREXFLOAT*TARGETMB*CBIT | -6.520772* | -251.5957* | -1.413548** | -1.509445* | -1.989552* |
| FOREXFLOAT*TARGETIT*CBIT | 0.400515* | 2.979740* | 1.589169* | 0.758138* | 2.534213* |
| FOREXFLOAT*TARGETIT*CBIP | -0.387562 | 1.242165* | 1.236076*** | -0.018188* | 1.972425* |
| R-squared | -0.000737 | 0.417460 | 0.021399 | 0.479625 | 0.630154 |
| Adjusted R-squared | -0.008596 | 0.412808 | 0.011868 | 0.475387 | 0.627083 |
| S.E. of regression | 23.23597 | 642.3726 | 1.495081 | 0.824739 | 2.361776 |
| Log likelihood | -3557.283 | -3860.173 | -1454.644 | -1112.485 | -1670.903 |
| Durbin-Watson stat | N.A | 0.005633 | 1.562399 | 0.076425 | 0.131337 |

### Table-17

| Variable | REER | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| **Float** | 80.02396* | 33.51877* | 32.76142* | 0.374941* | 1.334841* |
| **CBA** | 79.64828* | 35.89059* | 35.15368* | 0.337111* | 1.977781* |
| **Sliding Peg** | 80.77218* | 37.76242* | 37.42650* | -0.309685* | 2.236742* |
| **Hard Peg** | 68.79865* | 34.31548* | 34.47823* | 0.427020* | 1.967943* |
| **Narrow Money Target** | 14.19291* | -10.02156* | -8.752268* | -0.037720 | 1.258814* |
| **Broad Money Target** | -3.056223* | -5.398044* | -5.640809* | -0.218934* | 0.324715* |
| **Inflation Target** | 42.77939* | 10.44580* | 9.344042* | 0.069850 | 0.329336*** |
| **Total CB Independence** | -16.16578* | -29.96215* | -28.39284* | -0.816133* | 0.680823* |
| **Part. CB Independence** | 23.13586* | -25.44605* | -24.77379* | -0.345303* | 0.011268 |
| R-squared | 0.971057 | 0.651018 | 0.674584 | 0.524455 | 0.609794 |
| Adjusted R-squared | 0.970824 | 0.648181 | 0.671682 | 0.520517 | 0.606504 |
| S.E. of regression | 25.24861 | 6.145289 | 5.861132 | 0.558917 | 1.175232 |
| Log likelihood | -4198.054 | -2950.188 | -2647.933 | -577.2635 | -1102.603 |
| Durbin-Watson stat | 0.036291 | 0.013896 | 0.007666 | 0.323402 | 0.365581 |

**Table-18**

| Variable | REER | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| FOREXCBA*CBIT | 26.11717* | 2.851488* | 3.232295* | -0.598484* | 2.740091* |
| FOREXCBA*CBIP | 129.8589* | 12.83982* | 12.93805* | 0.227177* | 1.920826* |
| FOREXSPEG*CBIP | 102.8518* | 11.51434* | 11.40898* | -0.688081* | 2.298790* |
| FOREXHPEG*CBIP | 92.24942* | 7.988244* | 8.060075* | -0.043384* | 2.104903* |
| FOREXFLOAT*TARGETMN | 92.89456* | 21.48457* | 21.92852* | 0.359789* | 2.812302* |
| FOREXFLOAT*TARGETMB | 73.68000* | 33.23715* | 32.57126* | 0.239902* | 1.982612* |
| FOREXFLOAT*TARGETMB*CBIP | 23.49595* | -32.43106* | -31.94173* | -0.468448* | -1.168942** |
| FOREXFLOAT*TARGETIT*CBIT | 114.0137* | 13.83208* | 13.67100* | -0.258792* | 2.088938* |
| FOREXFLOAT*TARGETIT*CBIP | 125.5075* | 21.59302* | 21.26855* | -0.731560* | 2.754349* |
| R-squared | 0.972010 | 0.869073 | 0.884940 | 0.536404 | 0.745447 |
| Adjusted R-squared | 0.971784 | 0.868009 | 0.883914 | 0.532564 | 0.743301 |
| S.E. of regression | 25.58107 | 5.945282 | 5.789350 | 0.545697 | 1.189385 |
| Log likelihood | -4141.680 | -2761.964 | -2444.454 | -522.7209 | -1045.295 |
| Durbin-Watson stat | 0.037002 | 0.063260 | 0.032452 | 0.345250 | 0.388068 |

**Table-19**

| Variable | CPI | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| **Float** | 12.17501* | 9.730891* | 1.848778* | 1.422666* | 7.971422* |
| **CBA** | 10.73574* | 11.93938* | 1.679837* | 1.368783* | 7.143723* |
| **Sliding Peg** | 11.68403* | 8.191490* | 1.774339* | 0.848345* | 3.475741* |
| **Hard Peg** | 11.89220* | 8.322232* | 1.825639* | 0.296561* | -0.685466 |
| **Narrow Money Target** | -7.794875* | 0.696416 | -0.545909*** | 0.847067* | 0.584952 |
| **Broad Money Target** | -1.077271* | -2.967084* | -0.298976* | -0.699543* | -4.878856* |
| **Inflation Target** | -2.466911* | -10.14395* | -0.578379* | -1.586891* | -12.06696* |
| **Total CB Independence** | -9.230233* | 2.548851* | -1.021625* | 3.429519* | 21.05508* |
| **Part. CB Independence** | -9.986725* | -4.183798* | -1.213791* | 1.470369* | 7.292437* |
| R-squared | 0.179060 | 0.457533 | 0.021822 | 0.439657 | 0.205853 |
| Adjusted R-squared | 0.173413 | 0.453696 | 0.013398 | 0.435615 | 0.200013 |
| S.E. of regression | 8.810626 | 5.401374 | 0.781956 | 1.238698 | 9.449891 |
| Log likelihood | -3248.158 | -2862.665 | -851.2164 | -1599.195 | -3612.671 |
| Durbin-Watson stat | 0.824007 | 0.034002 | 1.381251 | 0.023445 | 0.014361 |

**Table-20**

| Variable | CPI | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| FOREXCBA*CBIT | 1.239048* | 14.79833* | 0.626707* | 5.442184* | 39.45885* |
| FOREXCBA*CBIP | 0.978934* | 7.872696* | 0.557361* | 1.946080* | 6.067446* |
| FOREXSPEG*TARGETMB | 10.03726* | 7.710270* | 2.787804** | 0.587658* | 1.868655* |
| FOREXSPEG*CBIP | 1.210535* | 6.010050* | 0.501547* | 3.139050* | 14.76983* |
| FOREXSPEG*TARGETMB*CBIP | -10.60034* | -13.26888* | -3.019836* | -2.558403* | -11.80250* |
| FOREXHPEG*TARGETMB | 0.755516* | 8.456572* | 0.431677* | 3.376557* | 16.46454* |
| FOREXHPEG*CBIP | 2.337980* | 4.575204* | 0.703293* | 1.670544* | 6.104064* |
| FOREXHPEG*TARGETMB*CBIP | -2.324221* | -12.61382* | -0.851886* | -4.220759* | -19.54804* |
| FOREXFLOAT*TARGETMN | 4.421947* | 10.51828* | 1.296184* | 2.323471* | 9.049100* |
| FOREXFLOAT*TARGETMB | 8.834892* | 6.333737* | 1.816524* | 1.062481* | 4.037227* |
| FOREXFLOAT*TARGETMB*CBIP | -7.731699* | -3.856753* | -1.493935* | 1.670035* | 9.036535* |
| FOREXFLOAT*TARGETMB*CBIT | -2.134067*** | 6.819080* | 0.025445 | 0.219456* | -0.192424 |
| FOREXFLOAT*TARGETIT*CBIT | 0.471751* | 0.679351* | 0.230681* | 2.489277* | 11.51459* |
| FOREXFLOAT*TARGETIT*CBIP | 0.542794* | 9.178395* | 0.236457* | 5.574789* | 38.50443* |
| R-squared | 0.032024 | 0.845457 | 0.041963 | 0.835971 | 0.888463 |
| Adjusted R-squared | 0.021157 | 0.843673 | 0.028485 | 0.834039 | 0.887124 |
| S.E. of regression | 9.281385 | 6.368041 | 0.784983 | 1.028931 | 8.057073 |
| Log likelihood | -3320.597 | -2723.379 | -846.0048 | -1299.099 | -3231.214 |
| Durbin-Watson stat | 0.779783 | 0.065896 | 1.424818 | 0.076630 | 0.047232 |

**Table-21**

| Variable | IRR | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| **Float** | 71.64088* | 53.88626* | 6.369153* | 0.730616* | 7.152401* |
| **CBA** | 37.85398* | -20.27452* | 4.918616* | -0.351358* | -0.015645 |
| **Sliding Peg** | 52.23506* | -7.107811 | 4.915649* | -0.017609 | 5.522034* |
| **Hard Peg** | 55.53510* | 9.881587 | 5.347833* | -0.757432* | -0.350141 |
| **Narrow Money Target** | -12.73151* | -26.82966* | -2.631009** | -1.393760* | 2.500603* |
| **Broad Money Target** | -14.62681* | -32.93851* | -0.487263* | 0.161632 | -0.695840 |
| **Inflation Target** | -39.85708* | -81.84711* | -2.130398* | -1.083702*** | 3.548996 |
| **Total CB Independence** | -22.41962* | 38.70347* | -3.715267* | 1.121201* | 3.344958* |
| **Part. CB Independence** | -24.26082* | 58.33692* | -4.101792* | 1.351586* | 4.604476* |
| R-squared | 0.508586 | 0.140743 | 0.068919 | 0.227248 | 0.121971 |
| Adjusted R-squared | 0.504953 | 0.134271 | 0.060642 | 0.221316 | 0.115105 |
| S.E. of regression | 121.0345 | 120.4315 | 3.283319 | 2.262837 | 15.45691 |
| Log likelihood | -4947.862 | -5312.774 | -1924.464 | -1879.391 | -3294.891 |
| Durbin-Watson stat | 0.551308 | 0.025445 | 1.029675 | 0.022941 | 0.004170 |

**Table-22**

| Variable | IRR | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| FOREXCBA*CBIT | 14.63498* | 14.68965* | 1.147929* | 0.792799* | 3.402957* |
| FOREXCBA*CBIP | 19.62860* | 27.22561* | 1.284345* | 0.844627* | 2.938456* |
| FOREXSPEG*CBIP | 19.67237* | 204.8205* | 0.627648* | 4.616886* | 36.85198* |
| FOREXSPEG*TARGETMB*CBIP | -7.062083* | -204.0725* | -0.215606* | -4.309507* | -33.28614* |
| FOREXHPEG*TARGETMB | 21.74984* | 17.83969* | 1.622652* | 0.705185* | 2.582275* |
| FOREXHPEG*CBIP | 27.65122* | 111.6035** | 1.458879* | 0.594910** | 4.409380* |
| FOREXHPEG*TARGETMB*CBIP | -36.89168* | -128.8008** | -2.679490* | -1.402606* | -4.878680* |
| FOREXFLOAT*TARGETMN | 58.87908* | 23.91154* | 3.740872* | -0.716244* | 10.10281* |
| FOREXFLOAT*TARGETMB | 70.23256* | 13.53945* | 2.481267* | -0.092190 | 1.129831* |
| FOREXFLOAT*TARGETMB*CBIP | -51.63251* | 76.95268* | -0.770887* | 2.662784* | 9.035380* |
| FOREXFLOAT*TARGETMB*CBIT | -2.256854*** | -7.964224* | N.A. | -0.134858 | 0.554169* |
| FOREXFLOAT*TARGETIT*CBIT | 9.341161* | 1.481739* | 0.489657* | -0.493940* | 4.016702* |
| FOREXFLOAT*TARGETIT*CBIP | 19.75966* | 386.9713* | 0.417944* | 11.42956* | 134.5204* |
| R-squared | 0.687731 | 0.763898 | -0.002442 | 0.429932 | 0.603661 |
| Adjusted R-squared | 0.684255 | 0.761220 | -0.014735 | 0.423341 | 0.598994 |
| S.E. of regression | 126.2565 | 157.9192 | 3.369196 | 2.156527 | 15.99103 |
| Log likelihood | -4857.718 | -4723.025 | -1942.019 | -1801.335 | -3024.607 |
| Durbin-Watson stat | 0.504094 | 0.035708 | -0.002442 | 0.047038 | 0.040031 |

**Table-23**

| Variable | UM | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| **Float** | 8.696509* | 1.700678* | 0.260386* | -0.081784 | 0.821346* |
| **CBA** | 4.824970* | 1.719466* | 0.272180* | 0.232455* | 0.853753* |
| **Sliding Peg** | 6.763825* | 2.383334* | 0.259747* | -0.570025* | 2.136766* |
| **Hard Peg** | 2.972597* | 1.371540* | 0.226278* | 0.237380* | 0.827233* |
| **Narrow Money Target** | 1.433481* | 0.880947* | -0.020119 | -0.757306* | 2.420088* |
| **Broad Money Target** | -0.619404*** | -0.538350* | -0.044927* | -0.267721* | 1.252341* |
| **Inflation Target** | -2.856757* | -0.021563 | -0.014412 | 1.574941* | 0.435331** |
| **Total CB Independence** | 5.201489* | 0.405571* | -0.092473* | -0.928990* | 2.264513* |
| **Part. CB Independence** | 5.532783* | 0.152357 | -0.077782** | -0.580065* | 1.486688* |
| R-squared | 0.876001 | 0.456459 | 0.009968 | 0.576237 | 0.729455 |
| Adjusted R-squared | 0.875075 | 0.452298 | 0.001265 | 0.572923 | 0.727299 |
| S.E. of regression | 3.226972 | 0.737153 | 0.181471 | 0.516320 | 1.118301 |
| Log likelihood | -2672.669 | -1047.160 | 388.3832 | -682.4828 | -1381.494 |
| Durbin-Watson stat | 0.022667 | 0.009907 | 1.561088 | 0.054086 | 0.037190 |

**Table-24**

| Variable | UM | SD | SD90 | SK | KU |
|---|---|---|---|---|---|
| FOREXCBA*CBIT | 11.38538* | 2.390549* | 0.179080* | -0.785275* | 3.256533* |
| FOREXCBA*CBIP | 7.407059* | 1.440467* | 0.202311* | 0.025439 | 2.309550* |
| FOREXSPEG*CBIP | 12.01768* | 2.460845* | 0.169051* | -1.013499* | 3.667441* |
| FOREXSPEG*TARGETMB*CBIP | 0.210171 | 0.133704 | -0.008260 | -0.352997* | 1.257301* |
| FOREXHPEG*TARGETMB | 7.595349* | 1.196279* | 0.089995* | -0.984235* | 4.506374* |
| FOREXHPEG*CBIP | 10.40279* | 2.293890* | 0.281519* | -0.365876* | 2.027977* |
| FOREXHPEG*TARGETMB*CBIP | -14.91030* | -2.787701* | -0.291057* | 0.959398* | -2.952365* |
| FOREXFLOAT*TARGETMN | 10.26329* | 2.602572* | 0.240314* | -0.831895* | 3.242304* |
| FOREXFLOAT*TARGETMB | 8.632432* | 1.878383* | 0.221885* | -0.374079* | 2.024261* |
| FOREXFLOAT*TARGETMB*CBIP | 5.317317* | -0.524107* | -0.083659* | -0.640738* | 1.811199* |
| FOREXFLOAT*TARGETMB*CBIT | -3.761004* | -1.056180* | -0.100667* | 0.084404 | -0.321601* |
| FOREXFLOAT*TARGETIT*CBIT | 7.592766* | 1.592673* | 0.153010* | 0.990334* | 3.663128* |
| FOREXFLOAT*TARGETIT*CBIP | 14.60000* | 2.410960* | 0.160706* | -0.476515* | 2.589245* |
| R-squared | 0.806354 | 0.542427 | 0.027938 | 0.623953 | 0.760636 |
| Adjusted R-squared | 0.804176 | 0.537152 | 0.015063 | 0.619525 | 0.757763 |
| S.E. of regression | 2.634054 | 0.664091 | 0.182348 | 0.460920 | 1.101492 |
| Log likelihood | -2467.538 | -904.9352 | 393.3456 | -575.0933 | -1372.497 |
| Durbin-Watson stat | 0.032640 | 0.014289 | 1.573251 | 0.048619 | 0.034414 |

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