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Substitution in the Emerging Markets

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Monetary Policy under Dollarization: the Case of Croatia

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I. Introduction

The development of monetary policy in Croatia has taken place under a relatively unusual set of circumstances. War and establishment of a new country combined with transition created dramatic changes in many phases of life. However, Croatia did succeed in stabilizing inflation in October 1993, and has evolved a monetary policy that has maintained single digit inflation since then.

This paper will focus on one particularly interesting aspect of Croatia's monetary history: the implications of high levels of dollarization on monetary policy. Rather than trying to break new ground in terms of theory, the paper serves mainly as a case study. In particular, the paper provides evidence that the level of dollarization, which was high when Croatia became an independent country, has not significantly decreased since, despite successful stabilization and rapid development of the banking system. Furthermore, thanks to the Euro conversion process, we now have very clear evidence that large amounts of foreign currency banknotes circulate in Croatia, and that the quantity of such banknotes is far greater than the quantity of domestic currency.

This high level of dollarization complicates monetary policy in various ways. First, due to balance sheet mismatches in the banking sector, exchange rate fluctuations have the potential to create credit quality shocks. The implications of such shocks on bank soundness and real activity could potentially be severe in the case of a substantial currency depreciation.

Second, exchange rate fluctuations cause changes in the composition of total savings. Depreciation causes an increase in dollarization. Third, exchange rate changes can pass-through to prices, although here I provide evidence that the pass-through is strongest between exchange rates and producer prices, and is actually softened by greater exchange rate volatility.

With all this in mind, I consider three monetary policy options in light of the dollarization phenomenon: inflation targeting, early adoption of the Euro, and the status quo. While dollarization limits the range of exchange rate flexibility that can be safely tolerated, the choice between regimes is unclear.

The paper is structured as follows. Section II provides background on Croatia's monetary history. Section III analyzes empirical aspects of dollarization and its expression in monetary policy. Section IV discusses policy alternatives.

II. Background

In the early 1990's, Croatia faced a situation of war and inherited macroeconomic instability. Output fell 36% percent from 1990 to 1993, and inflation reached as high as 1616% in 1993 (monthly inflation rates over 35% were common). Importantly, Croatia started with essentially zero international reserves, since the National Bank of Yugoslavia held all of the former country's international reserves and imposed surrender requirements on commercial banks receiving household fx deposits.

Croatia introduced its own currency, the Croatian dinar, in December 1991. This move was a first step in distancing Croatia from the monetary instability generated by the National Bank of Yugoslavia. However, throughout 1992 and most of 1993, inflation remained very high and the exchange rate depreciated rapidly in nominal terms, as the central bank took first steps to overhaul the monetary policy setup. Direct credits from the central bank to agriculture were abolished, and interest rates were liberalized. The international reserves of the CNB grew rapidly, as low economic activity and considerable trade restrictions carried over from the former Yugoslavia limited imports.

These changes in the monetary policy framework, along with some fiscal consolidation including pricing of public services and energy to end the losses of large state enterprises, prepared the way for the stabilization program in October 1993. The stabilization program could be loosely characterized as exchange rate based. The key to success was the introduction of current account convertibility, which gave citizens confidence that if they converted their foreign exchange into local currency, they could convert it back to fx later. In addition, the foreign exchange market was liberalized, allowing banks to freely set their exchange rates. These moves led to a sharp nominal appreciation that squelched inflationary expectations, since households had significant holdings of foreign exchange and were willing to purchase local currency when the exchange rate firmed. Inflationary expectations, it is important to note, had been closely tied to exchange rate depreciation. This was true for a number of reasons: first, most citizens held their wealth as much as possible in foreign currency; second, contracts became widely indexed to fx in the high inflation period; third, data on exchange rates were of course more widely available, more timely and more reliable than data on inflation.

The stabilization program contained some mild heterodox elements such as wage controls in public enterprises. But, for the later evolution of monetary policy, the key part of the story is the role of the fx market and the exchange rate in the stabilization.

In the years 1994-97, inflation remained quite low (no more than 3.5%) and output grew rapidly. At the same time, monetary aggregates grew very rapidly, not only in the first year after stabilization, but throughout the whole period. Capital inflows built up, in the 1995-97 period largely due to Croatian citizens bringing money deposited abroad back to Croatia ("repatriation of deposits") and in 1997 in particular due to increased foreign borrowing by Croatian banks. (Croatia received an investment grade credit rating from two of the main ratings agencies in January 1997.)

However, during the end of this period pressures built up which would later lead to substantial problems. Driven by growing incomes and rapidly growing lending, consumption boomed and imports rose sharply. At the same time, exports failed to keep pace, in part due to slow restructuring and problems with the privatization model along with political barriers to the EU accession process and regional and multilateral free trade arrangements. The current account deficit reached 11.6% of GDP in 1997. Even though one-time effects were partly to blame, such a deficit was clearly unsustainable.

At the same time, rapid credit expansion was accompanied by excessive risk taking and insider lending. (Kraft 1999, Jankov 2000, Škreb and Kraft 2002) This would lead

to a wave of bank failures in 1998 and 1999. In combination with measures to combat the current account deficit, in particular Chilean-style capital controls, the banking crisis led to a recession that began in the fourth quarter of 1998 and continued through the third quarter of 1999.

An important phenomenon during the banking crisis and early phases of the recession was a slow but steady nominal depreciation of the kuna vis-a-vis the deutschmark. When confidence in the banking system fell, Croatian savers moved to foreign currency (see below). The National Bank intervened extensively to limit the depreciation, but generally was unable to prevent it. The steady depreciation extended from April 1998 through February 1999, with a break for the summer months, when tourist revenues buoyed the exchange rate.

Economic growth returned in the fourth quarter of 1999. Political changes in the first quarter of 2000 led to a new environment for monetary policy, as the new government embarked on a program of fiscal consolidation. This allowed more maneuvering room for monetary policy. In addition, the new government systematically identified and repaid the very large amount of arrears (about 9.6 billion HRK) left by their predecessors.[1] This step greatly increased financial discipline throughout the economy, and provided a one-off boost to enterprise liquidity.

Real GDP grew 3.0% in 2000 and 4.1% in 2001. Monetary aggregates again began to grow rapidly, even before the Euro effect. Headline inflation grew substantially in 2000, in part due to increases in indirect taxes and government controlled prices. It remained high in the first half of 2001, and then dropped substantially as oil prices fell and administrative price shocks decreased. Throughout the whole period, core inflation was significantly lower than headline inflation, suggesting that demand pressures were not the main cause of price increases.

III. Some stylized facts about monetary policy and monetary developments in Croatia
II.2.1. Dollarization/Euroization

The level of dollarization in Croatia was very high under former Yugoslavia, and has not decreased very much in recent years, despite successful stabilization. Graph 1 shows two definitions of deposit dollarization. One takes into account the stock of fx deposits in existence in mid-1991, when the National Bank of Yugoslavia expelled Croatia from the Yugoslav monetary system and effectively removed the fx cover for Croatian banks' fx deposits. The Croatian government froze the deposits, and began to repay them in mid-1995.

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[1] To be precise, the arrears were cleared by a combination of cash payment, netting of claims and issuance of bonds.

Graph 1: share of fx deposits in total

The other line looks only at "new" deposits (those made after mid-1991). What is somewhat remarkable is that the share of fx deposits in new deposits actually increases noticeably after stabilization, rising from a low of 56.3% in August 1994 to a high of 78.1% in February 1999.

In addition to deposit dollarization, it would be logical to look at a measure of overall dollarization that included foreign currency in circulation as proposed by Feige, Faulend, Šonje and Šošić (2002a). Of course, data on foreign currency in circulation are not generally available. However, we have two sources: first the estimates of Feige et al and second estimates made possible by the Euro effect. I will focus on the latter.
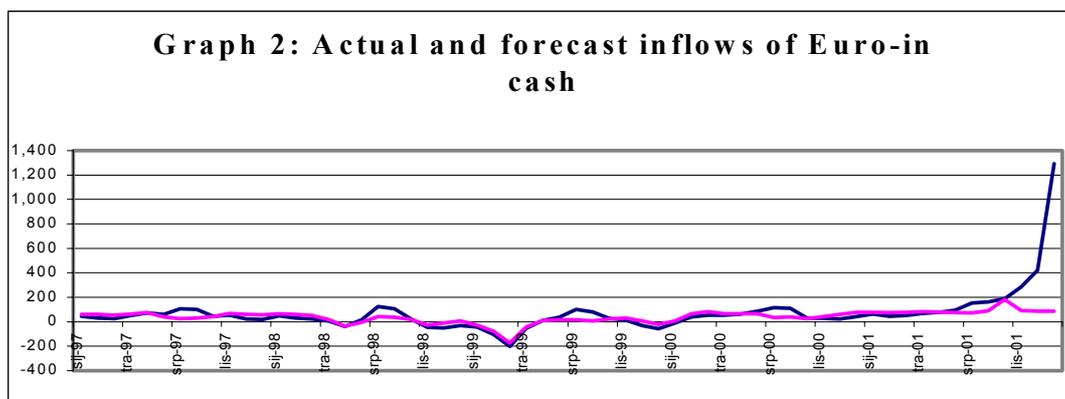
During the Euro conversion process, the Croatian National Bank monitored flows of foreign currency cash into and out of the banking system. These data were used to estimate the "Euro effect" in the following manner. A simple trend model was estimated using TRAMOSEATS to pick up seasonality. This model was used to

forecast "normal" flows for the three months when "Euro-in" deposits were especially high. The difference between the actual values observed and the model estimates were ascribed to the Euro Effect.

This method yielded an estimate that Croatian households converted some 2.10 billion € of "pre-existing" foreign currency in circulation (FCC).[2] However, the inflow of "Euro-in" (mainly DEM) notes actually continued in the first three months of the New Year, with another 760 million € entering the banking system. Since "Euro-in" currencies were basically not in use during this period, it seems probable that the Euro-in cash that was deposited during the first three months of 2002 actually should be considered part of the stock of foreign currency held by the population at year-end. Thus, we simply add 760 million to the earlier estimate of 2.10 billion to generate a total estimate of the stock of Euro-in FCC of 2.86 billion €.

We can use this to get an estimate of total FCC, which is greater than just holdings of Euro-in currencies. The Oesterreiches Nationalbank has performed surveys that suggest that 80% of foreign currency cash holdings were in Euro-in currencies, with the remainder mainly in US dollars and to a lesser extent in Swiss Francs. When we apply this ratio to the Euro effect estimate above, we come up with a grand total of 3.22 billion USD (3.58 billion Euro) of FCC.

This implies that the ratio of FCC to local currency in circulation was 73.1%, and that the overall ratio of FCC and foreign exchange deposits to total currency in circulation and deposits was 73.7%. Intuitively, it is plausible that the ratio of foreign currency in currency in circulation is roughly equal to the ratio of foreign currency deposits in total deposits.

A further interesting finding from the Euro-conversion process is that about 1 billion Euro flowed out of the banking system in the first three months of the new year. A run at Riječka Banka in mid-March, prompted by losses incurred by a foreign exchange dealer, probably account for about 200 million Euro this total. However, it seems likely that the majority of the total outflow, which occurred without major public attention, represents a rebuilding of desired stocks of foreign currency in circulation. If so, this testifies to the persistence of preferences for holding foreign currency cash.

It is obvious from the data that Croatians continue to prefer foreign exchange as a store of value. Anecdotal evidence suggests that foreign exchange is in use as transactions money as well, but mainly in an unofficial way. One cannot make payments in a store or through a bank account in foreign exchange. But cash transactions, particularly private transactions such as used car and apartment sales, are sometimes made in foreign exchange.

From a monetary policy perspective, it is especially interesting to ask why the level of dollarization has remained so high in the face of successful stabilization. Usually, high dollarization is considered to be related to lack of credible monetary policy.

Several observations are in order. First, the burden of history is heavy. Older Croatian citizens have experienced numerous incidents of currency instability and even

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[2] See Croatian National Bank (2002), p. 34, Box 2 for more details on our preliminary estimates.

expropriation. Even if we forget such incidents after World War I and World War II, we have the long period of high inflation in from the mid 1970's to 1993 and the freezing of foreign exchange deposits in 1991. Croatians have developed the habit of saving in fx as a way to avoid repetition of such problems.

Second, the increase in the fx composition of new savings appears to be linked to deposit repatriation. If we go back to graph 1, we see that there is a substantial upward shift in the ratio of fx deposits to total deposits starting in mid 1995. This coincides with the beginning of substantial deposit repatriation, which in turn seems to have been related to improved prospects for peace in the region. Those people repatriating deposits may have wanted to be in a position to return their deposits abroad if necessary, and thus would have been unlikely to hold local currency in the light of the risk of suspension of convertibility.

Third, it is noteworthy that, even though dollarization remains high, demand for kuna has grown. In particular, growth rates of all kinds of kuna deposits, even time and savings deposits, have been high. The point is that growth rates of fx deposits have generally been equally high, and at times higher.

Fourth, since many Croatians have relatives living or working abroad, both in European countries such as Germany and Switzerland and in former Yugoslav states such as Bosnia, there are considerable intra-family transfers. It is understandable that such transfers would be made in a common currency.

Fifth, cross-border shopping has been a major phenomenon, with Croatians consistently spending large amounts in neighboring countries (Italy, Hungary, Austria and Slovenia). While estimates suggest that such shopping has substantially decreased with the entry of foreign retail chains into several cities in Croatia since late 1999, this remains a motivation for holding foreign currency cash.

Sixth, there seems to be a major distinction between confidence in the currency and confidence in the banking system. Total deposits grew strongly in the post-stabilization period, indicating that the public regained confidence in the domestic banking system. This confidence was shaken in 1999, and total deposits actually fell slightly at the height of the banking crisis (February-May 1999). But confidence returned and deposit growth continued after that.[3]

Confidence in the banking system means confidence that banks have adequate foreign exchange reserves to redeem fx deposits on demand. We could say that depositors estimate the risk of a bank defaulting on fx and the risk of a bank defaulting on all its obligations. Behind the bank's fx liquidity stand the international reserves of the central bank as well.

This confidence in the banking system is clearly something different than confidence in the currency. Confidence in the currency implies confidence that inflation will remain low, the exchange rate reasonably stable (since Croatians' consumption basket includes a significant proportion of imports, people implicitly measure their living

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[3] Both Oomes (2001) and Feige, Faulend, Šonje and Šošić (2002b) propose ratchet models to account for this influence of historical factors.

standards to a great extent by their command over foreign goods) and that convertibility will not be revoked. Despite more than 8 years in which these conditions have been met, it seems that the Croatian public does not yet have confidence that these conditions will be met in the future.

A different explanation for the persistence of dollarization is the presence of network externalities that create multiple equilibria. In this view, the fact that others use foreign exchange decreases transactions costs for any individual. When a certain threshold is passed, the majority of actors switch to foreign exchange.[4]

One question about the applicability of such a model to Croatia is whether transactions costs are really the main issue for Croatians. If the main use of foreign currency is a store of value, then it would seem that people would be willing to hold fx even if there are high transactions costs of converting the fx into local currency for payments. More precisely, it might turn out that:

$$E(L(d))= f(E(\Pi), E(\Delta e),E(CON)), > E(L(fx)= f(TC, E(\Delta e))$$

where the left hand side is the expected loss on holding domestic currency due to expected inflation, exchange rate depreciation and convertibility risk, while the right hand side is the transaction cost of converting from foreign currency to domestic currency. If this is the explanation of continued dollarization, what we would need to explain is why Croatians continue to expect high inflation and exchange rate depreciation after such a long period of stability. Most likely, the best explanation would be the historical factors mentioned above. Also, it seems possible that Croatians continue to place a positive although perhaps small probability on a large scale depreciation or increase in inflation. Even if the probability of this "nightmare is low, if it is sufficiently bad, it could keep $E(L(d))$.

A little bit of further evidence on this point can be gleaned from looking at the share of time deposits in total fx deposits. As graph 2 below shows, this share rose steadily from late 1993 to late 1998, and since then has remained flat at a value of about 70%. This suggests the importance of fx as a store of value. Of course, this says nothing about the uses of foreign currency banknotes, which are more likely to serve as a means of payment. However, even in this segment, there is some evidence of store of value, since anecdotal evidence suggests that many Croatians who deposited large amounts of DEM in the Euro conversion were actually depositing their life savings.

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[4] See Feige, Faulend, Šonje and Šošić (2002b) for an elaboration of a formal network externalities model and an application to Argentina. Also, Oomes (2001) finds that the network externalities model fits the data for Russia better than a ratchet/hysterises model.

Graph 3: Share of time deposits in total fx deposits
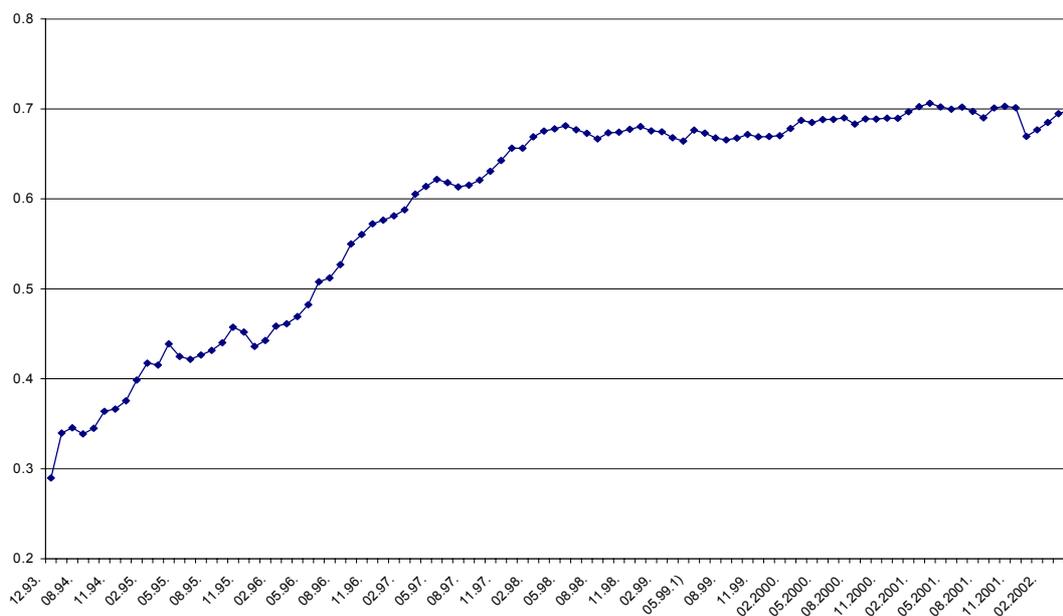
To summarize, at this point, we do not have clear evidence to distinguish between the network externalities model and the expected returns model. In either case, there is good reason to believe that dollarization is not easily reversible and must be considered a fact of life for monetary policy makers.

III.2 Exchange rate flexibility under dollarization

The high level of dollarization in Croatia has immediate implications for exchange rate flexibility. There are three main aspects to consider: balance sheet effects, currency substitution and pass-through.

Regarding balance sheet effects, the structural issue is that banks have the foreign exchange deposits as the major item on the liability side of their balance sheets. To be precise, foreign exchange liabilities accounted for 67.6% of banking system liabilities at the end of 2001. Only 35% of total assets are in foreign currency. Until 2001, banks were only allowed to make loans in foreign exchange to domestic companies for specific import purposes. This regulation was liberalized in June 2001. However, since domestic payments can only be made in kuna, the level of foreign exchange loans has not grown dramatically.

The only reasonable way for banks to match their currency exposures is to index domestic currency loans to foreign currency. Such indexed loans accounts for 31.9% of total assets. Thanks to indexation, banks open positions are relatively small, and banks can relatively quickly switch from short to long positions.[5] Even a fairly substantial depreciation would not have a massive direct effect on balance sheets. Crude calculations based on the end 2001 data suggest that a one-off instantaneous

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[5] The Croatian National Bank requires that banks' open positions be less than 20% of regulatory capital.

depreciation of 10% would cause losses of only 0.5% of total assets, and would lower system-wide capital adequacy from 18.5% to 17.5%.

While this formally covers the exchange rate risk on the balance sheet problem, it creates credit risk to the extent that borrowers do not themselves have fx income sources. A sharp one-off depreciation of the currency would trigger the indexation clauses, raising loan installments, and certainly raising the level of defaults. In other words, in case of a significant depreciation, the banks would have rather small losses due to revaluation effects on their balance sheets, but potentially very large losses due to deterioration of lending portfolio quality.

It would be interesting to discuss whether there might be ways around this vulnerability to exchange rate shocks. I will postpone this, however, to the policy discussion below.

The second immediate issue emerging from the high level of dollarization is currency substitution. Casual empiricism suggests that exchange rate movements can have effects on agents' choice of the currency composition of their portfolios. In particular, a strong depreciation would be expected to lead to substitution towards foreign currency, just as a strong appreciation would be expected to lead to substitution towards domestic currency. In addition, interest rate differentials should effect agents' allocation as well.

These simple considerations can be expressed in the following equation explaining the share of domestic currency deposits in total deposits:

$$D_{fx}/D_d = f(e, i_{fx}-i_d, \pi, z, L(D_{fx}/D_d) + u$$

where D are deposits, e is again the exchange rate, π is the inflation rate, i represents interest rates, and z is a vector of seasonal and shock variables and L is the lag operator.

Before proceeding to estimate this equation, we should examine unit root tests. In fact, as Table 1 shows the exchange rate of the kuna to the Euro and interest rate differential are non-stationary, and the currency composition ratio is non-stationary at two lags. Given the limited extent of the series, one should be quite cautious in interpreting unit root tests. Therefore, to err on the safe side, I work with first differences. I also tested various lag structures, and experimented with using the nominal effective exchange rate instead of the nominal kuna-euro rate.

Table 1: Augmented Dickey-Fuller test statistics

Variable	2 lags	3 lags	4 lags
Currency composition	-2.50	-3.07*	-3.29*
HRK/EUR	-1.26	-1.10	-1.40
interest differential	-1.96	-2.16	-2.64+
retail price inflation	-4.31**	-3.76**	-3.29*

**significant at 1% * significant at 5% + significant at 10%.

Also, it should be noted that I use a measure of "effective" foreign exchange deposits that converts the foreign exchange to kuna at a fixed exchange rate. Using simple nominal values for deposits would create an automatic (and uninteresting) increase in the kuna countervalue of foreign exchange deposits due to depreciation, and a corresponding decrease due to appreciation.

The results of this regression are shown in Table 2. They strongly suggest that Croatian savers do shift to fx deposits when the exchange rate depreciates. Also, given the parameter values, for historically relevant appreciations of 5%, the shift back to kuna is only 6%, not nearly enough to reverse dollarization.

Table 2: Regressions on currency composition
Independent Variable: dlog (currency composition)
(monthly data, January 1995-March 2002)

Dependent variables		
Constant	-0.008*	-0.007+
	(2.14)	(1.76)
dlog (HRK/DEM)	-1.103**	
	(2.69)	
dlog (NEER)		-0.200
		(0.57)
dlog (interest		
differential)	-0.030+	-0.039*
	(1.78)	(2.16)
dlog(inflation)	-0.037	-0.085
	(0.14)	(0.03)
adjusted R-squared	0.145	0.063
Durbin-Watson	1.93	1.87

absolute values of t-statistics in parentheses. Seasonal dummy variables not reported.
+ significant at 10% * significant at 5% ** significant at 1%

One surprising finding is that the interest rate differential has the wrong sign. The most likely interpretation seems to be reverse causation: when dollarization increases, banks raise the interest rate differential to try to regain kuna savings deposits.

Interestingly, increased domestic inflation does not have any noticeable effect on savings in domestic currency. This is probably due to the low variance of inflation during the sample period.

Before discussing these results further, we can also look at the effects of exchange rate changes on total deposits. Specifically, I look at

total savings= $f(e, i_d, y,) + u$

where i_d is a deposit interest rate and y a measure of national income. To operationalize the equation, I tried both the nominal kuna-euro rate and the nominal effective exchange rate, kuna deposit interest rates (fx deposit rates are highly correlated to the kuna rate so that inclusion of both would cause multicollinearity) and industrial production as the only monthly indicator of output and hence income. In addition, seasonal dummies and lags of total savings were included. Once again, the variables are in logs and first differenced. The results are shown below:

Table 3: Regressions on total savings

Independent variable: dlog (total savings)
(monthly data, January 1995-March 2002)

constant	0.035** (4.84)	0.036** (4.97)
dlog (kuna-euro)	-0.057 (0.21)	
dlog (NEER)		-0.226 (-1.16)
dlog (deposit interest rate)	0.058 (1.38)	0.060 (1.45)
dlog (industrial production)	0.051 (1.23)	0.052 (1.27)
dlog (total savings$_{-1}$)	0.033 (0.35)	0.029 (0.30)
dlog (total savings$_{-2}$)	0.178+ (1.87)	0.178+ (1.89)
dlog (total savings$_{-3}$)	0.256* (2.43)	0.255* (2.44)
banking crisis dummy	-0.140** (2.87)	-0.134** (2.92)
adjusted R-squared	0.59	0.60

+ significant at 10% * significant at 5% ** significant at 1%
seasonal dummies not reported

These two regressions show insignificant response of total savings to exchange rate changes. The coefficient on the nominal effective exchange rate is stronger, but still far from significance. The insignificance of industrial production may be because the

variable is in fact a poor proxy for national income, or it may be because much of savings is linked with inflows such as worker remittances and repatriation of deposits, which cannot be easily captured here.

In any case, the punchline of these regressions on total savings is that exchange rate changes mainly affect the composition of total savings, not the quantity.

Let us now consider what these results say about exchange rate stability. On the one hand, the increase in demand for kuna (reverse currency substitution) attendant upon economically relevant amounts of currency appreciation is not strong enough to substantially unwind dollarization. Note that there are severe limits on nominal appreciation because of its effects on export competitiveness; nominal appreciation could not be allowed to reach levels of, say, 20-30%, that might have a stronger effect on dollarization. Such maxi-appreciation would price Croatia out of world tourism and goods markets very rapidly.[6]

On the other hand, the economic limit of depreciation is less clear. The limit might be given by pass-through, which I will discuss below. But it also might be given by the process of currency substitution itself. The reasoning is this: a rapid depreciation would lead to substitution away from domestic currency. This could reinforce itself, building a cumulative process.[7]

According to the estimated parameters, a 20% depreciation would create approximately a 24% decrease in the share of local currency deposits in total deposits. At the sample mean of 13.2%, this means a decrease to 10.0%. In absolute terms, kuna deposits would fall by 2.6 billion kuna, or roughly 13% of M1 (using March 2002, the regression endpoint).

The regressions use historical data in which expectations have been non-explosive. However, exchange rate shocks have been gradual and small. There is reason to believe that expectations would not react in such a smooth way to a large one-time exchange rate shock, especially in light of the experience of the early 1990's. If for the sake of argument, we assume that the estimated parameters would be relevant under an exchange rate shock, we would still be inclined to believe that such large decreases in demand for kuna quasi-money could have a substantial knock-on effect to an initial exchange rate shock. It is not at all possible to rule out a vicious cycle of increased currency substitution, heightened depreciation expectations and further currency substitution.

In summary, I am arguing that the currency substitution process itself also limits the range of feasible (prudent?) exchange rate flexibility.

The third point that should be considered when discussing the implications of dollarization is pass-through. In general, it is supposed that high levels of dollarization should imply high levels of pass-through. In Croatia, casual empiricism suggests that many prices are informally linked to the kuna-euro exchange rate. People tend to

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[6] In the network externalities model studied by Oomes (2001), a maxi-appreciation followed by gradual depreciation reverses dollarization. While this model may "work" analytically, it is difficult to imagine its use in actual policy.

[7] Although of course, there is a limit (100% dollarization). I owe this point to Maroje Lang.

think of prices in euro terms, and adjust the kuna countervalue accordingly. Particularly in the tourist industry, prices are indeed often quoted directly in foreign exchange for foreign guests.

Such observations would seem to suggest that pass-through of exchange rate changes onto prices should be fairly high. Gattin-Turkalj (2002) estimates pass-through using the modeling strategy initiated by McCarthy (2000). The model uses pricing along the distribution chain to explain inflation at the particular stage, imported inflation, producers price inflation and consumers price inflation. Inflation at the particular stage at time t is explained by several factors. First comes expected inflation using all available information at the time t-1. Second come shocks: supply shocks, proxied by oil prices shocks, demand shocks proxied by output gap shocks and exchange rate shocks. Third come the effects of the inflation shocks at the previous inflation stages, and fourth and last the inflation shock at that particular stage of the distribution chain. The shocks at each stage are that portion of a stage's inflation that cannot be explained using information from period t-1 plus contemporaneous information about shocks and inflation at the previous stage of the distribution cycle. These shocks can be thought of as changes in the pricing power markups of firms at these stages.

The model is as follows:

$$\pi_t^{oil} = E_{t-1}(\pi_t^{oil}) + \varepsilon_t^s$$

$$\widetilde{y}_t = E_{t-1}(\widetilde{y}_t) + a\varepsilon_t^s + \varepsilon_t^d$$

$$\Delta e_t = E_{t-1}(\Delta e_t) + b_1\varepsilon_t^s + b_2\varepsilon_t^d + \varepsilon_t^e$$

$$\pi_t^m = E_{t-1}(\pi_t^m) + \alpha_1\varepsilon_t^s + \alpha_2\varepsilon_t^d + \alpha_3\varepsilon_t^e + \varepsilon_t^m$$

$$\pi_t^p = E_{t-1}(\pi_t^p) + \beta_1\varepsilon_t^s + \beta_2\varepsilon_t^d + \beta_3\varepsilon_t^e + \beta_4\varepsilon_t^m + \varepsilon_t^p$$

$$\pi_t^c = E_{t-1}(\pi_t^c) + \gamma_1\varepsilon_t^s + \gamma_2\varepsilon_t^d + \gamma_3\varepsilon_t^e + \gamma_4\varepsilon_t^m + \gamma_4\varepsilon_t^p + \varepsilon_t^c$$

$$\Delta m_t = E_{t-1}(\Delta m_t) + \delta_1\varepsilon_t^s + \delta_2\varepsilon_t^d + \delta_3\varepsilon_t^e + \delta_4\varepsilon_t^m + \delta_5\varepsilon_t^p + \delta_6\varepsilon_t^c + \varepsilon_t^{MD}$$

$$\varepsilon_t^s \rightarrow \varepsilon_t^d \rightarrow \varepsilon_t^e \rightarrow \varepsilon_t^m \rightarrow \varepsilon_t^p \rightarrow \varepsilon_t^c$$

$\pi_t^{oil}, \widetilde{y}_t, \Delta e_t$ are oil price inflation denominated in local currency, output gap and exchange rate; $\pi_t^m, \pi_t^p, \pi_t^c, \Lambda m_t$ are import price inflation, PPI and RPI inflation and money demand, $\varepsilon_t^m, \varepsilon_t^p, \varepsilon_t^c, \varepsilon_t^{MD}$ are import price, PPI and CPI inflation shocks, and monetary shocks; $\varepsilon_t^s, \varepsilon_t^d, \varepsilon_t^e$ are supply, demand and exchange rate shocks respectively. The model is structured as a recursive VAR. The ordering assumed in the model is such that the shocks are ordered from 1 to 7 i.e. $\varepsilon_t^s \rightarrow \varepsilon_t^d \rightarrow \varepsilon_t^e \rightarrow \varepsilon_t^m \rightarrow \varepsilon_t^p \rightarrow \varepsilon_t^c \rightarrow \varepsilon_t^{MD}$ so that the model can be estimated using Cholesky decomposition. Hence, for instance PPI shocks contemporaneously affect CPI, but not vice versa. CPI affects PPI only with a lag. Impulse responses will allow us to see the effects that the "prior" variables, oil price increases, etc have on PPI and CPI. Variance decomposition can be used to estimate the proportion of variation that can be attributed to external variables relative to shocks endogenous to PPI and RPI.

Before looking at the results of the model, it is interesting to look at Granger causality tests. These show that both the exchange rate and oil prices affect PPI much more than RPI.

Table 4: Granger Causality between Exchange Rate, Oil Prices and Inflation
Lags: 6

Null Hypothesis:	F-Statistic	Probability
ER does not Granger Cause PPI	2.238	0.048*
ER does not Granger Cause CPI	0.446	0.845
OIL does not Granger Cause CPI	1.36644	0.239
OIL does not Granger Cause PPI	3.57104	0.004**

*significant at 5% **significant at 1%

Furthermore, Granger Causality between PPI and CPI does seem to exist, but with longer lags:

Table 5: Granger Causality between PPI and CPI

Null Hypothesis:	F-Statistic	Probability
Lags: 12		
PPI does not Granger Cause CPI	1.94960	0.046*
Lags: 7		
PPI does not Granger Cause CPI	2.42740	0.027*

*significant at 5%

Now, turning to the model results themselves, the impulse responses of PPI show a clear pass-through with the exchange rate and with oil prices. Effects of the output gap and M1 are more muted.

Graph 4: Response of PPI to one-standard deviation shocks in oil prices, output gap, Exchange Rate and
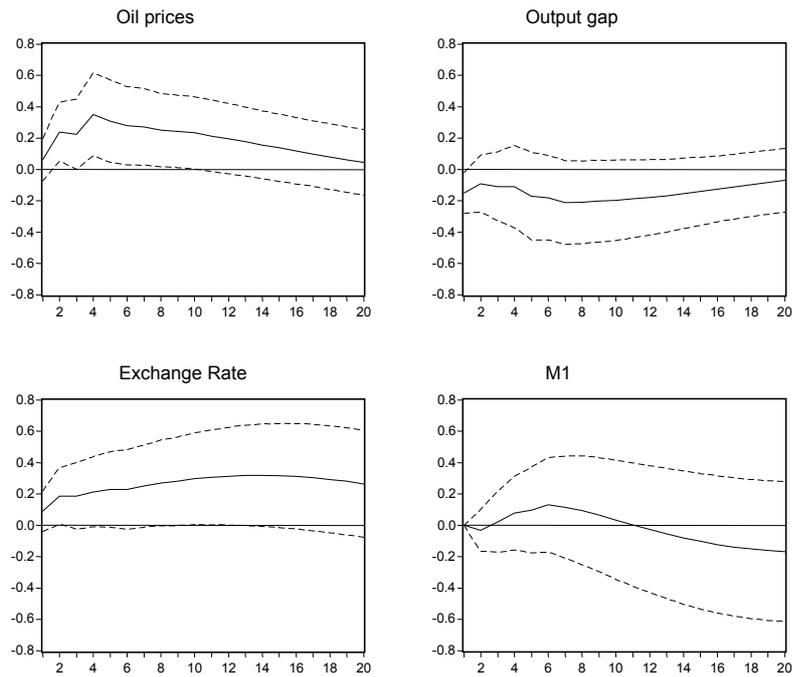
When we look at CPI, the responses to exchange rate changes are minimal. Nor do oil price shocks seem to have much effect. Monetary expansion, in fact, has the largest impact, but this is again limited.

Graph 5: Response of CPI to 1 standard deviation shocks to oil prices, exchange rate, output gap and M1.
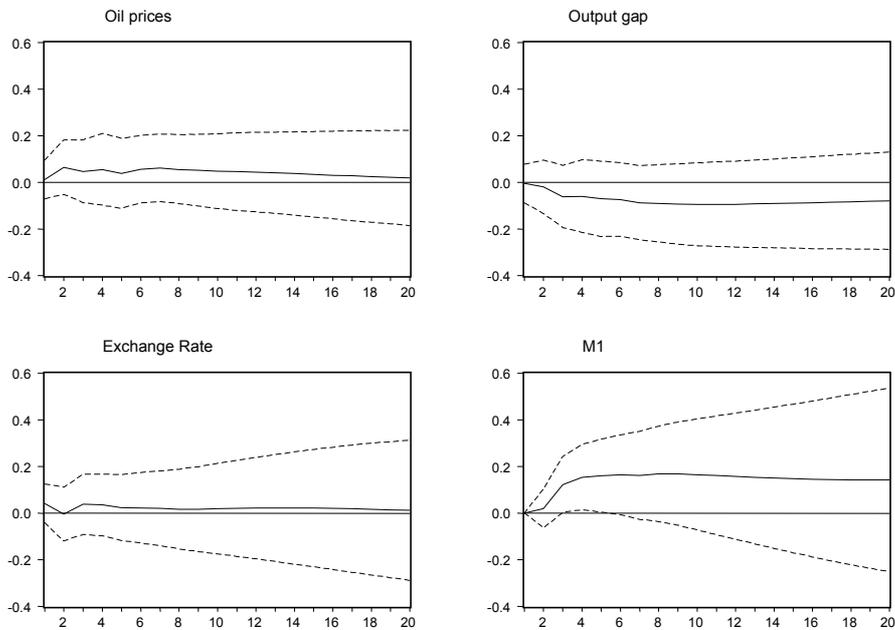
Looking at the estimated coefficients, Gattin-Turkalj finds rather modest levels of pass-through. An instantaneous one-standard deviation (3.6 percentage point) exchange rate shock would increase PPI inflation by about 1 percentage point. However, as we saw, RPI inflation hardly reacts at all, and core inflation also has virtually no reaction when it is placed in the model instead of RPI or PPI.

In a similar effort, Billmeier and Bonato (2002) extend this model using a Vector Error Correction model. They find a long-term cointegration relationship, and estimate that a devaluation of 10 percent would imply a rise of RPI inflation of 0.6 percentage points in the long run. The authors do point out that their estimated coefficients are higher than in other similar economies such as Slovakia. Nonetheless, they do not seem to correspond to the highly indexed economy that is generally expected.

There are several possible explanations for the low level of pass-through found in both studies. First, it is possible that exchange rate changes may have been perceived to be temporary, decreasing the degree of pass-through. Second, related to this, there may be some thresholds, due to menu costs, below which actors do not find it worthwhile to alter prices. Third, the central bank has consciously smoothed exchange rate fluctuations so as to manage inflationary expectations, so that this model may not tell us much about hypothetical situations in which larger exchange rate fluctuations might have destabilizing effects. Fourth, it may be that pass-through is asymmetrical, due to sticky prices: actors increase prices in kuna when the kuna depreciates, but do not lower them when the kuna appreciates.

Regarding the possibility that exchange rates are perceived as temporary, one can ask a further question: whether there is any evidence that exchange rate volatility, as opposed to persistent changes in exchange rate levels, has any impact on inflation. In Graph 6, I present a simple measure of exchange rate volatility: the monthly average of the daily percentage change in the exchange rate.[8]

Volatility shows a rather interesting time pattern. It was very high in 1995, during the summer months of war both in Croatia and in neighboring Bosnia. It then shows a downward trend, and becomes very flat through most of 1999 and 2000. However, in 2001, volatility returns with a vengeance. This return of volatility appears to have been partly related to the partial liberalization of the foreign exchange market (enterprises were allowed to hold fx deposits without restrictions starting in June 2001). However, it begins even before that with the unusually large appreciation that started in April.

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[8] Specifically, volatility is measured as the monthly average of $|(e_t - e_{t-1})/e_{t-1}|$.

Graph 6: Monthly average of daily exchange rate volatility
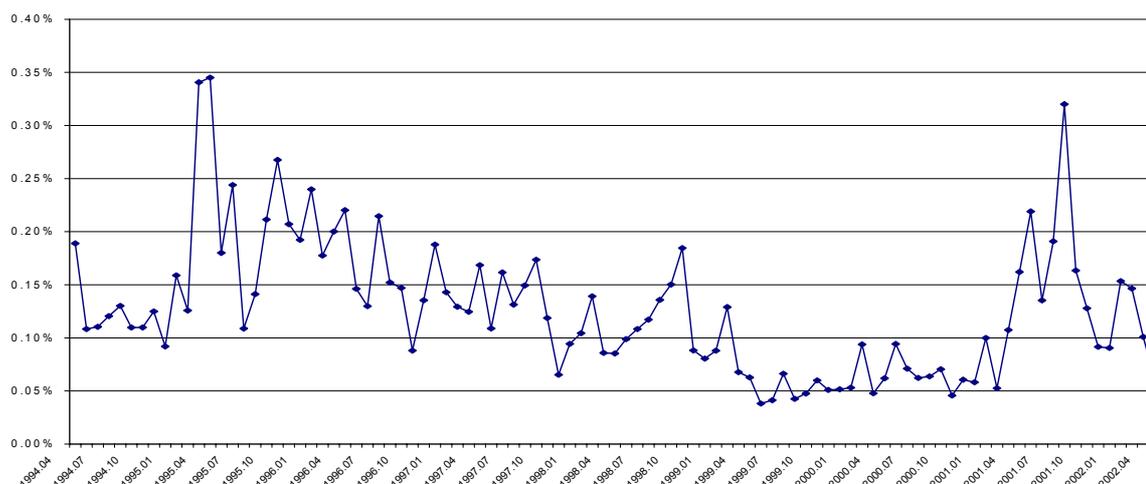
Without entering into a deeper discussion of volatility here, I would like to examine the effects of volatility on pass-through. Our expectation would be that increased volatility would lower pass-through, since it would increase the "noise" in the exchange rate data and make it harder to distinguish temporary from permanent exchange rate changes.

To test this idea, I simply added the volatility variable to the VAR in levels[9] discussed above, slightly changing some of the variables in the original VAR model. The model has 6 equations in this order: oil price > output gap> exchange rate (level)>exchange rate volatility> PPI > money supply.

The impulse response function shows a small but persistent negative effect of volatility on the PPI. This interesting result suggests that there are some benefits to limited exchange rate flexibility; fx market noise mutes pass-through.

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[9] All variables are scaled so that the average for 1995=100.

Graph 7: Response of PPI to One S.D. Innovations in Exchange Rate and Exchange Rate Volatility
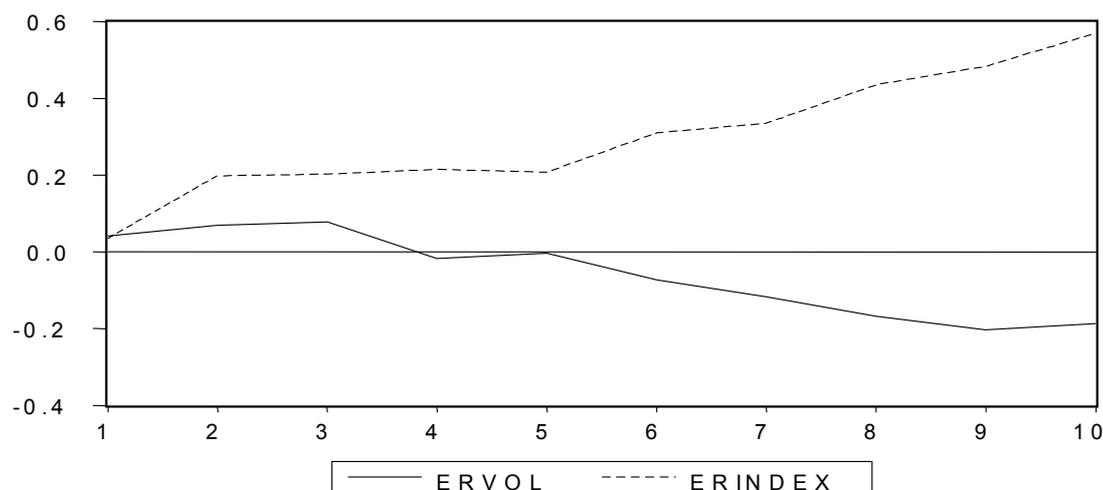
All in all, it would be risky to conclude that pass-through would not be significant if large-scale exchange rate depreciation were in question. At the least, it can be said that the monetary policy regime based on managing exchange rate fluctuations has delivered low inflation. We do not know whether allowing greater fluctuations would increase inflation. I will return to this issue under the policy discussion below.

III. 3. Behavior of monetary aggregates and monetary creation channels

One of the interesting peculiarities of Croatia's monetary history is the very rapid growth of monetary aggregates in a time of low inflation. After very rapid remonetization in 1994, a typical phenomenon in post-high inflation episodes,[10] the narrow M1 aggregate grew between 20 and 35% annually from 1995 to 1997, and in 2000 and 2001. The broad M4 aggregate actually grew between 28.9 and 45.2% in the same years. Both aggregates showed slow growth during the years of banking crisis and recession, 1998-99.

Clearly, there has been a substantial increase in money demand in this period that has allowed such large increases in money to be absorbed without generating inflation. Graph 6 shows the behavior of velocity of M1 and M4 over the period. This sheds further light on the discussion above about confidence: demand for kuna (M1) is increasing. In that respect, monetary policy could be called credible. But, as we have seen, this increased demand is not enough to overcome dollarization.

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[10] Dornbusch and Fischer (1986) note that strong increase in money demand after stabilization often results in a temporary increase in interest rates. Kraft (1996) compares post-stabilization experiences in 5 market economies and 6 transition countries and finds evidence of extraordinarily rapid monetary growth in the immediate post-stabilization period.

Graph 8: Velocity of M1 and M4
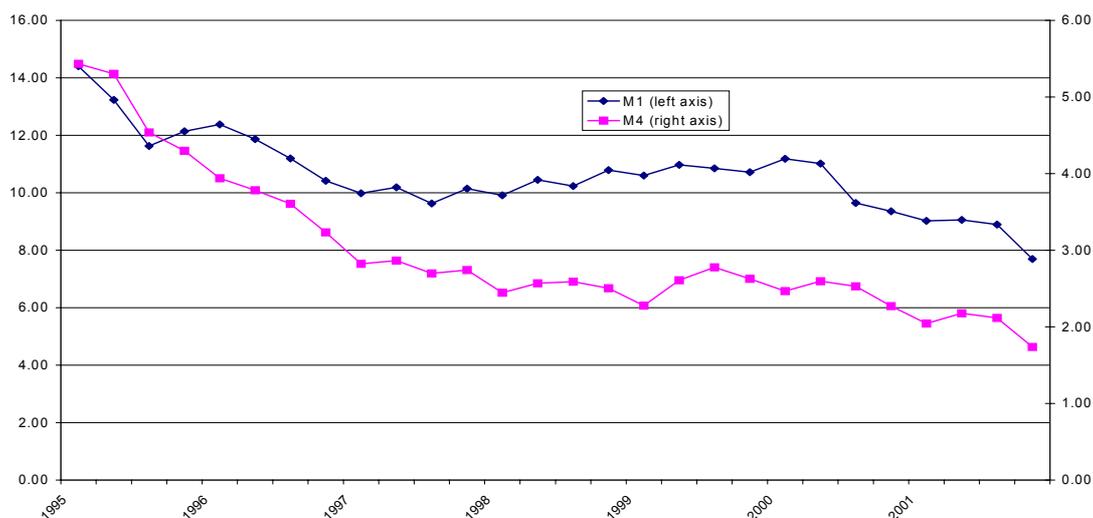
One point of clarification should be made here. Although Croatia has a managed float regime, and not a fix, the monetary creation process revolves around the fx market. The Croatian National Bank's main method of intervention in the markets is to intervene in the fx market. And the main intermediate target is the exchange rate, not any monetary aggregate. In that respect, Croatia's regime resembles an exchange rate fix more than a float of any sort.

Graph 9: Base money creation flows

*change in CNB bills, fx reserve requirement, gvt deposits, other items net
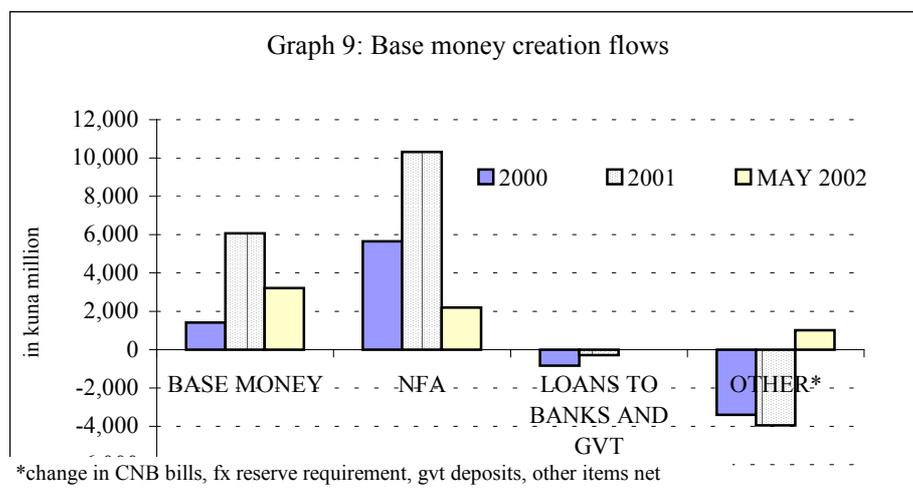
A common question about Croatia's monetary policy framework is why interest rate based instruments are so undeveloped relative to exchange rate based instruments. The key to the answer is simply the extent of capital inflows. Due to its large tourism revenues, transfers from guestworkers and Croatian nationals living abroad, and FDI flows, Croatia has had large balance of payments surpluses almost every year. It makes sense for the central bank to meet expanding money demand by purchasing some of the fx inflows. Other mechanisms would probably be more complicated and less transparent, especially given that the central bank sees the exchange rate as closely linked to inflation management.

The CNB has often attempted to sterilize capital inflows, usually through the sale of its own paper. However, the very size of the capital inflows makes this difficult. Although the Ministry of Finance has begun to borrow domestically by increasing its sales of Treasury bills, even this is often inadequate to prevent appreciation pressures. Similar problems confront many central banks in the more advanced transition countries. As one CNB official jestingly says, "we spend more time defending the Euro than defending the Kuna!"

Graph 10: International reserves/m1

With all this in mind, we can now turn to policy alternatives.

IV. MONETARY POLICY OPTIONS

IV.1. Inflation targeting

Inflation targeting has many attractions in general, and in particular for Croatia. In general, inflation targeting is often praised for transparency, for allowing the possibility of democratic control (Mishkin 1999), and for stabilizing expectations. In particular for Croatia, inflation targeting has the following positive features

- it is the monetary policy framework of the ECB[11]
- it is the framework adopted by most of the first wave of EU accession transition countries (Czech Republic, Hungary, Poland)

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[11] To be precise, the ECB's policy has two pillars, an inflation target and monetary aggregate targets.

- Croatia already has achieved low inflation, so that a long period of disinflation would not be required at the start
- it might work to decrease agents' focus on exchange rate changes, and ultimately delink exchange rate and inflationary expectations[12]
- the new Law on the Croatian National Bank, passed in 2001, makes price stability the main goal of the CNB.

However, there are a few difficulties in the way of the implementation of inflation targeting in Croatia.

1) *What to target:* First is the question of which measure of inflation should be targeted. This is a problem that faces all inflation targeters. The dilemma is the following: energy and food prices are usually substantially more volatile than the rest of the CPI. A core price index, which removes their influence, is often considered to give the best representation of the medium-term trend of inflation.[13] Furthermore, when tax systems are rapidly changing, a net price index, which eliminates the influence of direct taxes from the core index, can be argued to be the optimal target.[14]

However, a key goal of inflation targeting is transparency. The public may consider use of core or net inflation as non-transparent, in part because they do not understand the indices and in part because they suspect that the adjustments to the price index leave something important out.[15]

This is a dilemma that does not have a theoretical answer. But in practice, most countries have opted to target headline inflation, while closely monitoring core inflation and sometimes net inflation as well. The ECB does this, as do the transition country inflation targeters (Poland, Czech Republic, Hungary).[16]

2) *Band vs. point target* Let us suppose that Croatia chooses to target headline inflation as a way to ensure transparency of the inflation targeting regime. The next question is whether to target a band or a point. The trade-off here is that, while a band is easier to hit, a point target gives more focus to expectations. Obviously, the wider the band, the less credible (and transparent) the policy.[17]

Poland, the Czech Republic and Hungary all have target bands. This seems to be reasonable, given the limited time series available for modeling, the limited monetary policy instruments available due to relatively less-developed financial markets, and the continued occurrence of large shocks related to the structural changes required by convergence and EU accession.

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[12] An interesting discussion based of this issue based on the Israeli experience is found in Frankel (1999).
[13] For example, the Bank of Canada (1991) justifies focusing on core inflation with the argument that it is less volatile than the CPI as a whole, and therefore provides more insight into inflationary trends.
[14] Net inflation indexes are used in Canada, the UK and the Czech Republic.
[15] IMF (2000) notes that most non-industrial countries target headline inflation for transparency reasons.
[16] The Czech Republic began targeting core inflation, but switched to headline inflation in April 2001.
[17] This issue and other practical issues of inflation target implementation are discussed in Blejer et al (2000).

3) *Can the target be met?* Here, Croatia will have the luxury of looking at the experience of the more advanced transition countries. The question is not only whether the target can be met, but also whether "small" deviations from the target band will have major impacts on credibility.

For Croatia, the problem with meeting the target might be quite serious. The pass-through analysis above indicated that producer prices are strongly impacted by world market prices for oil and energy. PPI changes do pass-through to the CPI. So far, the Croatian National Bank has not been able to completely offset this imported inflation through other policy instruments. Indeed, a monetary policy response would seem inappropriate, given that supply shocks are in question.

Furthermore, as I have already argued above, the room for exchange rate flexibility is limited. Frankel (1999) points out that Israel increased the width of its bands during its inflation target period. The widening of the bands was also related to a more liberal foreign exchange regime; as Frankel picturesquely put it, if people are driving faster cars, they need a wider road. In Croatia, however, thanks to dollarization, the cars are very hard to steer and perhaps should not be driven fast at all (ie perhaps a widening of the range of acceptable exchange rate flexibility is not wise).

The technical problems of short time series and difficulties in creating adequate forecasting models are particularly acute in Croatia. Due to the war and high inflation, data from before mid-1994 is simply not useful. Also, the fact that very important infrastructure prices were controlled until recently makes it difficult to rely on historical data completely.

IV.2. Euroization

Another option for Croatia would be to introduce the Euro as its currency, or, along similar lines, to adopt a currency board arrangement with the Euro. Of course, the European Commission has thus far taken a position against any unilateral adoption of the Euro by current candidates or possible future candidates. This discussion, therefore, is somewhat theoretical; we will discuss whether adoption of the Euro would be economically justified *if the Commission at some point agreed to allow candidates to adopt the Euro before they became members of the EU and/or before they successfully meet the conditions of ERM 2 for two years.* In other words, the following discussion is purely economic and hypothetical.

Some countries have adopted dollarization and currency boards as solutions to dire economic problems. Countries facing chronic instability such as Ecuador, Argentina, Bosnia and Bulgaria have used "hard fix" policies to anchor expectations and prevent irresponsible policies. The phrase "tying one's hand" and the question "Is monetary policy so bad that it would be better not to have it at all?" come from the experience of such countries.[18]

The main point of such arguments is usually that the central bank is unable to contain inflation. Indeed, many models of dollarization assume that the main benefit would be

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[18] "Tying one's hands" comes from Giavazzi and Pagano (1988), and "Has Monetary Policy Been So Bad That It Is Better To Get Rid of It" is from del Negro and Obiols-Homs (2001)

reducing inflation to the level of the vehicle currency country (the US for Latin America, Euroland for transition countries). However, Croatia's recent record of low inflation makes such arguments rather irrelevant.

Another argument that is mentioned in theoretical studies is the loss of seignorage. (Fischer 1982) As Chang and Velasco (2002) argue, in theory, the existence of seignorage, along with the possibility of employing time-inconsistent monetary policy, make having a national money clearly Pareto-superior in a world without uncertainty. However, in a world with uncertainty and in particular with difficulties in making credible commitments, the case is theoretically indeterminate.

Furthermore, rough calculations suggest that seignorage revenues are relatively small, less than 1% of GDP, and could easily be outweighed by various types of gains. Berg and Borenszstein (2000) suggest two alternative measures of seignorage: the reserve-money method and the central bank profit method. The reserve-money method defines $S=\Delta R/P$, where R is reserve money and P is the price level. The central bank profit method defines $S=i^A A - i^R R$, where i^A is the interest rate the central bank gains on its assets, A is the quantity of central bank assets, i^R is the interest rate the central bank pays on reserve money, and R is the quantity of reserve money. Using these definitions, seignorage in Croatia is as follows:

Table 6: Seignorage estimates

	1999	2000	2001
Reserve money method			
Change in reserve money	355.8	1407.3	6085.9
As % of GDP	0.25	0.89	3.60
Central Bank profit method			
Interest on int. reserves	784.1	1306.7	1524.8
Interest paid on required reserves	380.2	533.9	464.6
Seignorage	403.9	772.8	1060.2
As % of GDP	0.25	0.49	0.63

These numbers are not totally negligible (especially the extraordinarily high reserve money method seignorage in 2001, which is a side-product of the Euro conversion). However, even if the Minister of Finance would like to keep this seignorage in the Treasur's hands, it is easy to imagine that other effects could well be larger, especially if they relate to macroeconomic stability.

Let us now look at some other arguments:

1) *Interest rates would fall.* This is conventional wisdom regarding dollarization (see for example Dornbusch (2001)). However, at a theoretical level, Chang and Velasco (2002) develop a model of dollarization which considers the effect of eliminating the lender of last resort facility on the possibility of what they call "international illiquidity" or a run of international creditors. They find that there are conditions under which such runs would not be possible with a flexible exchange rate, but would become possible under dollarization. Under such conditions, dollarization would increase interest rates by increasing default risk. For countries with a history of

Graph 9: Croatian bond spreads vs Germany
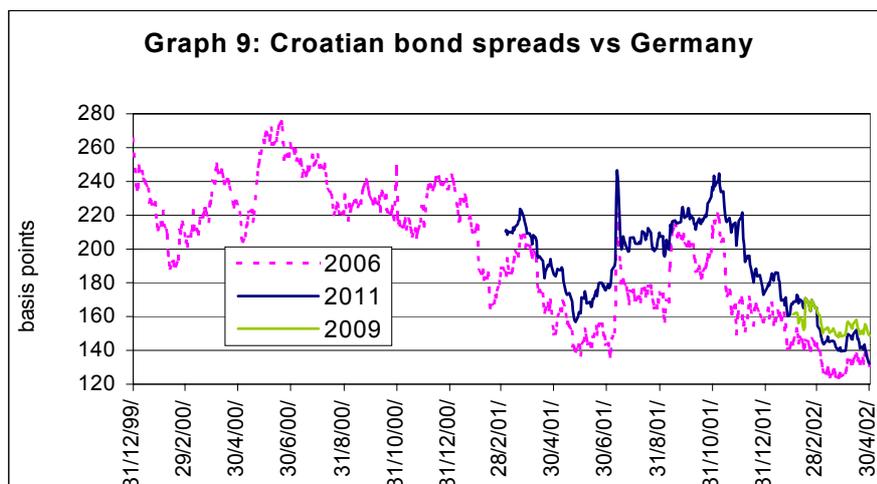
banking sector instability, such as Croatia, this could become relevant, particularly if new stresses emerged in the banking sector.

On a more practical note, the presumption behind arguments that interest rates would fall after dollarization is that a good part of the interest rate spread is actually due to currency risk. However, it is interesting to note that spreads between first-tier accession countries' bonds and German bonds have become extremely small without euroization. In fact, at some points, interest rates on Czech government bonds have fallen below those on corresponding German bonds. This narrowing of spreads is partly driven by "convergence plays" by portfolio investors, and can be expected to manifest itself for other accession countries as they reach the final stages of negotiations with the EU.[19]

This raises some questions about what exactly drives the somewhat higher spreads faced by Croatia: is it the existence of the Kuna, or Croatia's less advanced position in the accession process, or country-risk factors?

Furthermore, the current values of Croatian spreads are only about 120 basis points. The spread has fallen substantially since the new government was elected in 2000 and in particular since a precautionary stand-by arrangement was reached with the IMF. The announcement effect of the agreement in late 2000 was substantial, as can be seen from the graph below. During the subsequent period, spreads fell roughly 100 basis points. If Croatia continues its cooperation with the IMF and advances further in the EU accession process, as expected, the convergence of spreads might continue even further, and the space for further effect of euroization on interest rates might be extremely small.

2) *A hard peg would discipline fiscal and wage policy.* Eichengreen (2002) discusses this issue very carefully, and draws rather pessimistic conclusions. It does not seem that a hard peg is an adequate straitjacket to prevent distributional conflicts.

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[19] In a rather different context, Zamaroczy and Sa (2002) note that Cambodia continues to suffer from very high interest rate spreads despite near complete (unofficial) dollarization. This highlights the need to consider country risk as well as currency risk.

Politicians can blame each other for failure to restrain spending, and unions do not seem to be much impressed by the macro consequences of their actions in many cases. Of course, the argument is that eventually, the negative impact of expansionary fiscal and wage policy will create such unbearable economic burdens that governments and unions will eventually cave in. It seems adequate to refer to the Argentine experience to refute this line of thinking.

In Croatia, fiscal consolidation has made considerable progress since 2000 (see Kraft and Stučka 2002 for details). However, as in most countries, distributional struggles continue, with strong political pressures to increase both public investment (for example road construction) and transfers (especially pensions). It is hard to believe that euroization would substantially soften this distributional struggle.

3) *Euroization would remove the currency mismatch from bank balance sheets, allowing safer and sounder banking.* This argument seems rather strong, for as we have shown, the current practice of indexation does not really solve the mismatch problem. It seems certain that Euroization would remove important risks from the banking system, even if it had little or no effect on interest rates.

At the same time, quite a few observers of the Asian crisis have blamed fixed exchange rates for creating complacency about the currency mismatches involved in foreign borrowing. (See for example Summers 2000 and Fischer 2001) But Arteta (2002) shows that cross-country data implies that greater dollarization and especially greater balance sheet mismatches are associated with greater exchange rate volatility. This result seems logical, because with greater volatility, depositors demand a higher fraction of foreign exchange deposits. Even if greater volatility increases lending in domestic currency, due to greater perceived risks of foreign borrowing by credit recipients, the increase in deposit dollarization actually increases bank balance sheet mismatches. And the empirical evidence on the behavior of deposits in Croatia (see above) also supports this thesis. In other words, there does not seem to be a viable argument based on balance sheet mismatches for greater exchange rate flexibility.

4) *Euroization would make a lender of last resort function difficult or impossible.* In fact, if Euroization were carried out through a purchase of kuna currency in circulation with a portion of the CNB's reserves, the CNB would still have reserves left over. This could be supplemented with standing lines of credit, as in the Argentine case. Thus, some sort of a lender of last resort facility under Euroization seems possible.

Several uncertainties remain, however. One is the actual size of lender of last resort credit needed. In the 1998-99 crisis, CNB lending to banks amounted to a maximum of about 1.2 billion HRK, or a bit over 150 million USD. Such an amount would not strain the reserves of the CNB, even after purchasing all the kuna in circulation. However, a larger crisis might be a different story. And the use of standing facilities has never really been tested, so that it is difficult to be sure whether commercial banks would in fact honor their comments to a country that was faced by systemic banking and/or currency crisis.

5) *Adoption of a common currency would substantially raise trade with Euroland.* Here we have the arguments developed by Rose and van Wincoop (2001). Very

briefly, they find that when a variable representing the adoption of a common currency is included in gravity models of trade, the variable has statistically and economically significant coefficients. His conclusion is that countries that have a common currency trade more with each other, ceteris paribus, than countries that do not have a common currency. For EU accession countries, Rose estimates that the simple adoption of the Euro would raise trade 25-50%.

This work is controversial, and I will not attempt to resolve the controversies here. Certainly, if Rose and van Wincoop's estimates are correct, there would be a big payoff to Euroization (and apparently a greater payoff to Euroization than to adoption of a currency board). But, at the moment, it is difficult to either accept or reject Rose's arguments with any great deal of confidence.

6) *Euroization would eliminate exchange rate risk.* One cost of exchange rate flexibility is the cost of hedging. Euroizing would eliminate this cost. However, so far very few Croatian companies hedge, so that the practical significance of this argument is not clear. Nor is there very firm empirical evidence on the effects of exchange rate risk on trade, for example (see point 5).

7) *Euroization would make control of inflation more difficult.* A very important question is the effect of Euroization on inflation. In cases of large-scale macroeconomic instability, dollarization has been used to decrease inflation. But in the Croatian case, inflation is already low, so this benefit of dollarization would not be significant.

Furthermore, there are several reasons to believe that a real appreciation of the exchange rate is to be expected in the coming period. One reason is the Balassa-Samuelson effect; another is the expected high level of capital inflows. If the extent of the real appreciation is exogenous to the choice of exchange rate regime--a big if-- then fixing the exchange rate (either via dollarization or via a currency board) will result in *higher* inflation.

What is the difference between real appreciation occurring purely through inflation or real appreciation occurring through a combination of inflation and nominal appreciation? One pragmatic answer is that the latter is more likely to be compatible with the Maastricht criteria. Another, perhaps slightly less pragmatic answer is that a combined approach might make inflation easier to control, given that the exchange rate could still be used as an instrument. But, on the other side, if the exchange rate can move, it may overshoot, causing substantial problems.

However, one could ask to what extent inflation should remain a focus once a country adopts the common currency. After all, price convergence within the Eurozone is expected and even welcome. Rogers (2002) finds evidence that inflation rates in the Eurozone are already closely correlated with price level differentials, so that countries with low price levels face higher inflation. It is not obvious whether this kind of higher inflation is something that should be frowned upon.[20]

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[20] In fact, at a recent conference, Jurgen van Hagen pointed out that once a common currency is adopted, the term inflation should be reserved for inflation in the whole zone of operation of the currency, not the individual countries. Inflation, he reminds us, is the change in the value of a money relative to goods.

Of course, Croatia or other accession countries adopting the Euro before membership, would not be members of the Eurozone in the full political sense. They presumably would not be allowed to have representation on the bodies of the ECB. And it is understandable that the European Commission is hesitant to encourage countries to adopt the Euro without the full set of political rights that have so far been associated with it.

Finally, when talking about inflation after Euroization, it is important to look at what instruments would be available to the central bank to manage inflation. If we assume that the central bank would use a portion of its international reserves to buy the Euros to be put into circulation, the level of reserves would be substantially decreased. This would not be important in terms of international liquidity, but would limit the central bank's resources. The central bank would no longer have the stock of money as a liability on its balance sheet, and of course could not create money in the normal sense. Capital inflows and outflows would determine the money supply, although open-market operations would be possible. One could imagine the CNB buying and selling Euro-denominated Croatian t-bills. However, the effectiveness of such operations would tend to be limited, since the scale of the operations would probably be rather small compared to capital flows.

All in all, a central bank under Euroization would have rather limited instruments and might have a very difficult time actively managing money supply. (In fact, it probably would not even be able to measure the money supply at all!) While the ECB would provide a stable monetary framework for the Eurozone as a whole, the CNB probably would have a very hard time maintaining low inflation in Croatia. Again, one can ask whether this matters, if higher inflation is merely a form of catch-up to Euroland price levels.

8) *Financial Crisis and ERM 2* With exchange rate flexibility comes at least the possibility of currency crisis. Eichengreen, Halpern and Wyplosz (2001) argue that accession countries entering the ERM 2 may be highly exposed to currency fluctuations and thus run serious risks of currency crisis. Their recommendation is that the European Commission actually allow early adoption of the Euro, mainly to prevent currency crises.

This is a version of the "corner solutions" thesis, which of course has been subject to substantial debate. However, we do have some past experience, in particular the ERM crisis of 1992-3, to look back at. Can we exclude the possibility of a shock occurring in Euroland, like German reunification, that changes the fundamentals and puts exchange rates for ERM 2 members under stress? Might it be better to find a mutually agreeable way to "crisis-proof" ERM 2? I leave these questions for discussion.

Since these arguments are rather complex, it may be helpful to the reader to see a summary. Table 7 provides such a scorecard. But I must say *caveat emptor:* one certainly cannot simply add up these arguments.

Table 7: Summary of arguments on Euroization

Seignorage	-
Interest rates	+/0
Discipline fiscal policy	0
Banking system currency mismatches	+
Lender of last resort	-/0
Trade promotion with EU	+/0 (?)
Exchange rate risk and hedging costs	+/0
Inflation management/monetary policy instruments	-
Possibility of currency crisis	+

+ argument for Euroization 0 argument not relevant/convincing - argument against Euroization

IV.3 *If it ain't broke, don't fix it*
There is of course, another possibility: simply to continue with the present monetary policy framework. For the moment, the policy of the Croatian National Bank is to maintain the status quo. However, four years after the ratification of the Stabilization and Association Agreement, Croatia will have to eliminate all capital account restrictions. Realistically speaking, this will not come about until at least 2007.

Are there substantial gains to adopting an alternative policy? Can the current framework be equally effective under fully liberalized capital movements? I hope that I have provided the reader with enough food for thought on these questions.

BIBLIOGRAPHY

Alesina, Alberto and Robert Barro (2000) "Dollarization" *American Economic Reveiw* Volume 90, Number 2, p. 381-385.

Arteta, Carlos (2001) "Exchange Rate Regimes and Financial Dollarization: Does Flexibility Reduce Bank Currency Mismatches?" University of California at Berkeley, mimeo.

Bank of Canada (1991) "Press release: Targets for reducing inflation" Bank of Canada Review, March, p. 5-6.

Begg, David (2002) "Growth, integration and macroeconomic policy design: Some Lessons for Latin America" paper presented at the conference "Monetary Unions: Theory, EMU Experience and Prospects for Latin America" Vienna, April.

Begg, David, Barry Eichengreen, Laszlo Halpern, Jurgen von Hagen and Charles Wyplosz, (2001) "Sustainable Regimes of Capital Movements in Accession Countries," CEPR

Berg, Andrew and Eduardo Borenzstein (2000) "The Choice of Exchange Rate Regime and Monetary Targets in Highly Dollarized Economies" IMF Occasional Paper, No. 171 (Washington, International Monetary Fund).

Billmeier, Andreas and Leo Bonato (2002) "Exchange Rate Pass-Through and Monetary Policy for Croatia" mimeo

Blejer, Mario, Alain Ize, Alfredo Leone and Sergio Werlang (2000) *Inflation Targeting in Practice* IMF, Washington.

Chang, Roberto and Andres Velasco (2000) "Banks, Debt Maturity and Financial Crisis" *Journal of International Economics* Volume 51, p. 169-194.

Chang, Roberto and Andres Velasco (2002) "Dollarization: Analytical Issues" NBER Working Paper 8838, March.

Croatian National Bank (2002) *Bulletin*, Number 69, March.

Del Negro, Marko and Francese Obiols-Homs (2001) "Has Monetary Policy Been So Bad That It Is Better to Get Rid of It?" *Journal of Money, Credit and Banking* Volume 33(2), part 2, p. 404-433.

Dornbusch, Rudiger (2001) "Few Monies, Better Monies" *American Economic Review* Volume 91, Number 2, p. 238-242.

Dornbusch, Rudiger and Stanley Fischer (1986) "Stopping Hyperinflation: Past and Present" *Weltwirschaftes Archiv* p. 1-47.

Edwards, Sebastian and Igal Magendzo (2002) "Dollarization and Economic Performance: What Do We Really Know?" paper presented at the conference "Monetary Unions: Theory, EMU Experience and Prospects for Latin America" Vienna, April.

Eichengreen, Barry (2002) "When to Dollarize" *Journal of Money, Credit and Banking* Volume 34, Number 1, p. 1-24.

Eichengreen, Barry and Carlos Arteta (2002): "Banking Crises in Emerging Markets: Presumptions and Evidence" in Blejer I. Mario and Marko Skreb (editors): *Financial Policies in Emerging Markets*. MIT Press. (forthcoming August).

Feige, Edgar L., Michael Faulend, Velimir Šonje and Vedran Šošić (2002a) "Currency Substitution, Unofficial Dollarization and Estimates of Foreign Currency Held Abroad: The Case of Croatia" in Blejer I. Mario and Marko Skreb (editors): *Financial Policies in Emerging Markets*. MIT Press. (forthcoming August).

Feige, Edgar L., Michael Faulend, Velimir Šonje and Vedran Šošić (2002b) "Unofficial Dollarization in Latin America: Currency Susbstitution, Network Externalities and Irreversibility" in James Dean, Dominick Salvatore and Thomas Willet, eds., *Dollarizing the Americas* New York: Oxford University Press.

Fischer, Stanley (1982) "Seignorage and the Case for a National Money" *Journal of Political Economy* Volume 90, Number 2, p. 295-313.

Fischer, Stanley (2001) "Exchange Rate Regimes: Is the Bipolar View Correct?" *Journal of Economic Perspectives* Volume 15, Number 2, p. 3-24.

Frankel, Jacob (1999) "Balance of Payments, Exchange Rates and Competitiveness: Lessons for Transition Economies from the Israeli Experience" in Mario Blejer and Marko Škreb, eds., *Balance of Payments, Exchange Rates and Competitiveness in Transition Economies* Boston/Dordrecht/London: Kluwer, p. 403-418

Frankel, Jeffrey and Andrew Rose (1998) "The Endogeneity of the Optimum Currency Area Criteria" *The Economic Journal* Volume 108, p. 1009-1025.

Gattin-Turkalj, Katja and Andrea Pufnik (2002) "Koeficijent prijenosa tečaja na cijene" mimeo CNB

Giavazzi, Franceso and Marco Pagano (1988) "The Advantage of Tying One's Hands" *European Economic Review* June, Volume 32, Number 5, p. 1055-1075.

International Monetary Fund (2000) "Practical Issues in the Adoption of Inflation Targeting by Emerging Market Countries" Monetary and Exchange Affairs Department, August.

Jankov, Ljubinko (2000) "Banking Sector Problems: Causes, Solutions and Consequences" Croatian National Bank Survey S-1, March. (available at www.hnb.hr)

Kraft, Evan (1996) "Does Stabilization Work the Same Way in Transition Economies as in Market Economies?" National Bank of Croatia Working Paper Number 3.

Kraft, Evan (1999) "Croatia's Second Banking Crisis" Third Conference on Enterprises in Transition sponsored by the University of Split, Šibenik, Croatia May 1999.

Kraft, Evan and Tihomir Stučka (2002) "Fiscal Consolidation, External Competitivness and Monetary Policy: A Reply to the WIIW" Croatian National Bank Survey S-8.

McCarthy, J. (2000) "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Countries" *Federal Reserve Bank of New York* mimeo.

Mishkin, Frederic (1999) "Central Banking in a Democratic Society: Implications for Transition Countries" in Mario Blejer and Marko Škreb, eds. *Central Banking,*

Monetary Policies and the Implications for Transition Economies,
Boston/Dordrecht/London: Kluwer.

Oomes, N. (2001) "Essays on Network Externalities and Aggregate Persistence"
University of Wisconsin Ph.D Dissertation

Rogers, John (2001) "Price Level Convergence, Relative Prices and Inflation in
Europe" *International Finance Discussion Papers Number 699,* Board of Governors
of the Federal Reserve System.

Rose, Andrew and Eric Van Wincoop (2000) "National Money as a Barrier to
International Trade: the Real Case for Currency Union" *American Economic Reveiw*
Volume 90, Number 2, p. 386-390.

Sims, Christopher, James Stock and Mark Watson (1990) "Inference in Linear Time
Series Models with Some Unit Roots" *Econometrica* Volume 58, Number 1, p. 113-
144.

Škreb, Marko and Evan Kraft (2002) "Systemic Financial Crises. Causes, Features
and Lessons Learned: The Case of South-East European Countries" paper presented at
International Seminar on Comparative Experience in Confronting Banking Sector
Problems in Central/Eastern Europe an Central Asia, April 22-24, 2002, Warsaw,
Poland.

Summers, Lawrence (2000) "International Financial Crises: Causes, Prevention and
Cures" *American Economic Review* Volume 909, Number 2, p. 1-15.

Walsh, Carl (1998) *Monetary Theory and Policy* MIT Press.

Zamaroczy, Mario de and Sopanha Sa (2002), "Macroeconomic Adjustment in a
Highly Dollarized Economy: the Case of Cambodia" IMF Working Paper WP/02/92.