

# Croatian Exchange Rate Policy: Nominal Stability and Real Consequences

Thomas E. Schweigert<sup>1</sup>

**Abstract**—After its dissociation from former Yugoslavia and emergence as an independent country, Croatia initially experienced macroeconomic instability—inflation, currency depreciation—together with collapsing real output, a typical combination for “transition” economies. Since the mid-1990s, the highly stable exchange rate of the newly introduced currency (kuna) against the mark and subsequently the euro has brought overall nominal stability, with inflation rates comparable to those in the EU. Employing the exchange rate as a nominal anchor, however, may have had negative consequences for the real economy. Current account deficits, growing foreign indebtedness, and stubbornly high unemployment have been blamed on an overvalued currency. Exchange rate correction is complicated by currency mismatch exacerbated in the recent foreign-liability fueled credit expansion.

Among the transition economies of Central and Eastern Europe, Croatia has displayed the highest level of price stability over the last ten years. In the early 1990s, Croatia experienced both falling output and rapid inflation, but successful stabilization was begun in the last quarter of 1993, followed by the introduction of a new currency, the *kuna*, in 1994. Price stability since that time has been based on using the exchange rate of the *kuna*, initially against the *mark* and now the *euro*, as a “nominal anchor”. Although exchange rate policy is officially one of managed floating, the exchange rate has fluctuated within a plus or minus four percent band of 7.5 kuna per euro for more than five years. The stable exchange rate has been associated with price stability, the primary remit of the Croatian National Bank (CNB), but critics argue that CNB policy has enshrined an overvalued real exchange rate that hampers Croatian international competitiveness, promotes consumption and imports, and underlies excessive current account deficits and an unsustainably growing foreign debt. The paper is organized as follows. Part I presents an overview of macroeconomic developments in Croatia. Part II examines the exchange rate and monetary policy of the CNB, the behavior of the real exchange rate, and the dynamic relation between prices, wages and the exchange rate. Part III examines the nature of the recovery since the 1999 recession with special emphasis on the role of credit expansion and the resulting currency mismatch.

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<sup>1</sup>Associate Professor, Department of Economics, 800 W. Main St., University of Wisconsin–Whitewater, Whitewater WI, USA, [schweigert@uww.edu](mailto:schweigert@uww.edu)

## I.

Croatia's "transition" can usefully be compared with seven other countries of Central and Eastern Europe. Poland, Hungary, and the Czech and Slovak Republics have recently joined the European Union (EU), as has Croatia's former Yugoslav sister republic, Slovenia. Bulgaria and Romania hope to join the EU as early as 2007, as does Croatia.<sup>2</sup> Whereas 1989 is often taken as a benchmark year in discussions of transition for former Soviet bloc countries, that year is of less significance for the former Yugoslavia. In Croatia, multi-party elections first occurred in 1990, while independence from Yugoslavia was internationally recognized only in 1992. Unlike the other countries mentioned (including Slovenia), Croatia was directly involved in armed conflicts that characterized the "collapse of communism" in its Yugoslav variant, with hostilities in Croatia only ending in 1995. While the 1989 benchmark is occasionally used here, 1994, the first post-stabilization year, is more often taken as the baseline.

As shown in Graph 1, Croatian output declined steadily from 1989, reaching bottom in 1993 and then gradually rising, except for the recession year of 1999.<sup>3</sup> With the exception of Bulgaria, a "J-curve" for output characterizes the other seven transition economies, but Croatian real GDP has yet to fully recover, standing in 2002 at 84% of the 1989 level. Also typical of initial transition processes is rapid inflation, captured in graph 1 by the GDP deflator, which shows explosive inflation in 1993-94. On this measure, inflation in 1993 was 1,500 percent. Also apparent in the graph is the rapid deceleration of inflation associated with a successful stabilization program begun in the fourth quarter of 1993. The general tendency to disinflation that has been the case ever since is indicated in Graph 2. According to the most

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<sup>2</sup>In contrast to the other seven transition countries, Croatia began its integration process with the EU only after a political regime change in 2000. A Stabilization and Association Agreement was signed in 2001, and recent cooperation with the International Criminal Tribunal for former Yugoslavia was rewarded with official candidate status in June, 2004. Whether or not Croatia can catch up with Bulgaria and Romania to accede in 2007 remains to be seen.

<sup>3</sup>The data on which the graphs are based comes from the International Monetary Fund, the Croatian National Bank, and the European Central Bank.

recent data, inflation in Croatia is running at about 2% per annum (CNB, 2004), by far the lowest rate of inflation among the eight transition economies.

Monetary policy has achieved price stability indirectly, being focused primarily on the exchange rate. Exchange rate stability is indicated in Graph 3, showing the monthly mean kuna price of the euro.<sup>4</sup> While the official exchange rate policy is one of managed floating, the CNB intervenes regularly in the foreign exchange market. For example, the most recent CNB bulletin notes that “due to an upsurge in appreciation pressures, the central bank intervened four times in March and purchased a total of 162.7 million euros from banks (CNB, 2004).” Ever since the mean monthly exchange rate rose above the seven kuna per euro level in April 1998, it has averaged almost exactly 7.5. Since 1999, the deviations of the monthly mean exchange rate from 7.5, as a percentage of that value, have all been within plus or minus 4%. To find a more stable exchange rate among transition economies, one would have to look to a country like Latvia which has adopted a “hard fix” in the form of a currency board arrangement.

Croatia’s success at achieving exceptional price and exchange rate stability have not been matched in the real economy. As already noted, total output has yet to recover to Yugoslav era levels. Depressed output, privatization and restructuring of enterprises, and structural changes have been associated with job losses. Indices of total employment and industrial production (Graph 4) illustrate the job losses and structural changes of the past 15 years. Total employment in 2003 was 16% below its 1989 level, while industrial production was down 33.7%. Registered unemployment peaked in 2001 at 23% and has not been brought much below 20%, giving Croatia “one of the highest rates [of unemployment] among the more advanced transition countries (Vidovic and Gligorov, 2004, p. 5)”. High rates of measured unemployment tell only part of the story, however, as they mask the “discouraged worker” effect. Vidovic and Gligorov (2004) report that only slightly more than half of the total working age population are actually employed, while in the Czech Republic and Slovenia the proportion is nearly two thirds. When

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<sup>4</sup>The pre-2000 “euro” is the European Currency Unit (ECU).

compared to the other seven transition economies, Croatia's 37.2% share of manufacturing employment in total employment in 1990 was second only to Slovenia's. While there was a tendency for the share of manufacturing employment to fall in all of these countries, reflecting the structural changes of the transition process, it fell the most in Croatia. By 2002, Croatia's manufacturing employment share of 23.3% exceeded that of only Bulgaria, Romania and Poland (Vidovic and Gligorov, 2004, p. 17). The decline of the first half of the 1990s is not unexpected: in addition to the "J-curve" of output experienced by all transition economies, Croatia lost traditional Yugoslav markets for industrial products, there was significant war damage and disruption, and the important tourism industry practically vanished in some years. The subsequent failure of output and employment to recover, however, is in stark contrast with the success at price and exchange rate stabilization.

By conventional measures of openness, Croatia's is a highly open economy, with exports of goods and services as a percentage of GDP standing at 47% in 2002, although in comparison with the other transition economies, this exceeds the same figure only for Poland and Romania (at 19.5% and 35.5%, respectively). Since 1994 there has been a major change in the relative importance of goods versus services exports, where services exports are denominated by tourism receipts (Graph 5). While Croatia had a thriving tourism industry even under Yugoslavia's particular brand of communism, after the end of hostilities tourism has expanded dramatically to the point where services exports in 2003 are 200% higher than in 1994, and substantially exceed goods exports, which are higher by just 43%. The seasonal nature of the tourism industry is dramatically captured by Graph 6, which shows goods and services exports on a quarterly basis (the third quarter of July, August and September largely overlapping the peak season). The average 3.6% annual increase in goods exports since 1994 has been far exceeded by the 9.1% annual average growth in imports, with the value of goods imports in recent years being more than double the value of exports. As a result, Croatia has experienced increasingly large deficits in goods trade, these have not been offset by the surpluses in services trade, and the current account has been in persistent, and large, deficit (see Graph 7). In only one of the past seven

years has the current account deficit been less than three percent of GDP, and it has averaged 6.7%. The counterpart to current account deficits has been a growing external debt that in relative terms is approaching 80% of GDP (see Graph 8).

Critics of Croatian macroeconomic policy such as Nikić (2003a, 2003b) contend that the means for achieving price stability, i.e. use of the exchange rate as a nominal anchor, has been a major factor in the poor performance of the real economy. According to this critique, this has resulted in an overvalued real exchange rate, creating a disincentive to export, stimulus to import, and having an overall depressive effect on output and employment. The counterpoints to this critique include at least the following: the exchange rate is determined in the foreign exchange market, hence is in equilibrium, so there is no mistaken policy to correct, lest laissez faire be a mistaken policy; real exchange rate appreciation can be an equilibrium phenomenon reflecting a market-driven decrease in the relative price of traded to non-traded goods via the Balassa–Samuelson effect; forward looking capital inflows underpin the strength of the kuna, and these are based on rational expectations of future growth; the problems of the Croatian economy are at a deeper and more fundamental level and cannot be corrected by macroeconomic policies anyway; and, finally, even if the current level of the exchange rate is out of balance, the cure could be worse than the disease. The role of the CNB in exchange rate determination, the extent of any resulting “overvaluation”, the Balassa–Samuelson effect, and the issue of exchange rate pass-through are considered in the next section.

## II.

The official description of the exchange rate system of Croatia is “managed floating”. The actual behavior of the exchange rate, however, betrays “fear of floating” (Calvo and Reinhart, 2000). Since its introduction in May of 1994, the mean monthly kuna price of the “euro”<sup>5</sup> has been between 6.618 and 7.733 (see Graph 3 above). Over the period from 1999:1 to 2004:2, the

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<sup>5</sup>The benchmark bilateral rate initially was with respect to the mark. The key exchange rate became the kuna/euro rate after the euro’s launch. Pre-2000 kuna per “euro” exchange rates are kuna per European Currency Unit (ECU), the currency basket that metamorphosed into the euro.

average of the monthly mean exchange rate is virtually 7.5, with a very small coefficient of variation of 1.6% , while the maximum deviation as a percent of 7.5 is 4% (see Graph 9). Given the experience with floating exchange rates, it would be an unusual case indeed if market forces alone (“floating”) had engineered such stability. As the CNB acknowledges, of course, any “floating” is “managed”. The nature of CNB intervention in the foreign exchange market is examined with a focus on the period since 1999:1.

### **CNB Foreign Exchange Market Intervention and Sterilization**

The CNB has one feature in common with a currency board, in that its assets consist overwhelmingly of international reserves (see Graph 10).<sup>6</sup> Increases in the monetary base, and hence money supply, have thus overwhelmingly come from CNB purchases of foreign exchange. International reserves, at current exchange rates, not only “back” the monetary base, they actually exceed the M1 money supply (see Graph 11).<sup>7</sup> While international reserves provide “backing” for the money supply, they are also the stuff of central bank foreign exchange market intervention. Intervention in the period 1999:1–2004:2 is represented in the scatter plot in Graph 12, whose axes mimic the textbook foreign exchange market supply–demand graph. The vertical, “exchange rate”, axis plots standardized deviations from mean of the stationary monthly exchange rate series. The horizontal, “foreign exchange”, axis plots standardized residuals from a regression of the trending international reserves series on a constant and time trend. There is a strong negative correlation between these resulting series of  $-0.611$ . Thinking in terms of the textbook supply–demand graph, a leftward shift of the foreign exchange supply curve from an initial intersection at the “average” level of the exchange rate would lead to domestic currency depreciation (an increase in the exchange rate) which can be mitigated by central bank

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<sup>6</sup>CNB lending to commercial banks during the banking crisis of 1998-99 accounts for the widening gap between international reserves and total assets during that time.

<sup>7</sup> In the highly “euroized” Croatian economy, this is meant to provide confidence in the domestic currency to diminish the incentive for sudden, massive “currency substitution”.

intervention in the form of selling foreign exchange (a reduction in international reserves).

Unlike a “pure” currency board arrangement, CNB foreign exchange market interventions have not totally eliminated any change in the exchange rate (the “floating” part), but rather have kept such changes within a narrow four percent band (the “managed” part). Also unlike a “pure” currency board arrangement, the CNB has not given up on attempting to control the domestic money supply. The central bank can control both the exchange rate and the money supply only through sterilized intervention, typically an offsetting “open market” sale of government bonds for any purchase of foreign exchange. While the CNB is hoping to introduce “open market operations” in domestic government bonds in the near future (Rohatinski, 2004), currently, as already noted, its assets consist almost exclusively of foreign exchange. Sterilization is thus carried out through the issuance of the bank’s own CNB bills. Evidence of sterilization operations is depicted in the scatter plot in Graph 13, which is constructed similarly to Graph 12. Since both the CNB bill and international reserves series are trending over this period, each is regressed on a constant and time trend, then the standardized residuals from these regressions are plotted against each other. There is a strong positive correlation of .751 between these series, indicating a clear effort to sterilize the effects on the money supply of foreign exchange purchases (sales) with CNB bill sales (purchases).<sup>8</sup> The ability of the CNB to control both the exchange rate and the domestic money supply in a setting of relatively free capital mobility might appear surprising.<sup>9</sup> Even more surprising would be the ability to also control domestic credit, but, alas, here there are no more surprises. As shown in Graph 14, domestic credit (overwhelmingly commercial bank lending) has been able to expand independently of the domestic money supply, fueled by increasing foreign currency liabilities of commercial banks.

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<sup>8</sup>The positive, rather than negative, sign of the sterilization correlation is because CNB bills are central bank liabilities, unlike government bonds which would be assets.

<sup>9</sup>In traditional open economy macroeconomic models with perfect capital mobility and a fixed exchange rate, the money supply is endogenous, and it becomes impossible for the central bank to target both the money supply and the exchange rate.

We return to this topic below. Given that the exchange rate regime in Croatia has been one in which the level of the exchange rate appears to be very much policy, rather than purely market, determined, the question of the appropriateness of its current level is now examined.

### **Is the Kuna “Overvalued”?**

It is a truism that the exchange rate is asked to do “too much”. From a macroeconomic perspective, it is the “relative price of two national monies” whose expected rate of change is a major component of the relative rates of return between two countries’ assets. But to the extent that the exchange rate can also contribute to the determination of the price of one country’s output relative to that of another, it has a fundamental microeconomic dimension. It is the latter aspect that critics of Croatian exchange rate policy point to in alleging “overvaluation” of the kuna. The question of the “equilibrium” level of the exchange rate in terms of its “fundamental” determinants necessarily focuses on the “real” exchange rate. Letting  $e$  be the nominal exchange rate, and  $P$  and  $P^*$  be domestic and foreign price levels, the real exchange rate,  $rer$ , is defined as

$$1.) \quad rer = eP^*/P.$$

There is no single, unambiguous answer to the question of the “correct” level of the real exchange rate; indeed, there are numerous operational definitions of the real exchange rate itself, depending upon how one interprets the price levels,  $P$  and  $P^*$ . Rather than attempt to estimate a “correct” real exchange rate for Croatia, this section examines the actual behaviour of a variety of real exchange rate measures over the past ten or so years. The different real exchange rate measures to be examined are: 1)  $P$  and  $P^*$  are both consumer price indices; 2)  $P$  is a consumer price index, and  $P^*$  is a producer or wholesale price index; 3)  $P$  and  $P^*$  are both GDP deflators; and 4)  $P$  and  $P^*$  are wage, rather than price, levels. In all cases  $e$  is the bilateral kuna/euro exchange rate and the “foreign country” is the eurozone. Depending on data availability, monthly, quarterly and annual data are all used, with initial starting dates ranging from 1992 to 1995.<sup>10</sup> The rationale for each definition is briefly considered.

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<sup>10</sup>The kuna/euro exchange rate series from the CNB goes back to 1992, before there was either a kuna or a euro! Before the euro, however, there was its precursor, the European Currency Unit

Letting  $P$  and  $P^*$  be consumer price indices, as in definition one, forms the basis of purchasing power parity (PPP) theory, which asserts that over time this measure of the real exchange rate should be constant. Since the purchasing power of a country's money is the inverse of its consumer price index, if two countries' monies are to have equal purchasing power both at home and abroad,  $eP^*/P$  should not only be constant, but equal to one, for a correct choice of base year. There is overwhelming empirical evidence that PPP in this simple form does not hold in the short run, but that it can provide an explanation for the long run behaviour of at least some exchange rates (Hallwood and MacDonald, 2000). In the case of the bilateral exchange rate between a developed and a developing country, the Balassa–Samuelson effect provides a theoretical basis for not expecting PPP to hold even in the long run (Balassa, 1964, Samuelson, 1964). The Balassa–Samuelson effect is based on the distinction between (internationally) traded and non-traded goods and their relative price. While no data are routinely collected based on the traded/non-traded distinction, it is argued that by letting  $P^*$  be the wholesale or producer price index of, say, the USA (here the eurozone) and  $P$  be a small, developing country's consumer price index, the resulting real exchange rate approximates the relative price of internationally traded to domestic non-traded goods. This results in definition two. Williamson (1994) has argued that if the nominal exchange rate is the relative price of two national monies, then the real exchange rate should be the relative price of two national outputs. Since the GDP deflator measures the average price of a county's output, or value added, we have definition three. Finally, definition four substitutes wage for price levels, where wage levels can also be adjusted for productivity differences.<sup>11</sup> This definition perhaps more directly than the

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(ECU), which was if anything even more dominated by the German mark, which was always the reference point for Croatian currencies. The kuna had an exchange value at its introduction with the Croatian dinar, allowing for retroactive conversion of dinar into kuna.

<sup>11</sup>A motivation for definition (4) is that the classic example of a non-traded good is a haircut, and haircut prices largely comprise barber's earnings, which in turn are a reflection of general wage levels. Hence, version (4) captures both the relative price of foreign to home non-traded goods, as well as relative living standards for the "average" wage earner.

others gets at the question of a country's international (price) competitiveness.

Graph 15 displays the monthly series of the traditional PPP version of the real exchange rate. Unfortunately, it only begins in 1995:1, since that is the initial period for the eurozone's harmonized index of consumer prices. A "naive"<sup>12</sup> test of PPP applies regression analysis to equation 1 in logarithmic form. Using the same data as Graph 15, the resulting estimated regression is:

$$\text{R1.) } \ln e_t = 2.965 + .803 \ln P_t - 1.04 \ln P_t^* \quad 1995:1 \text{ to } 2004:1, R^2 = .806$$

(.074)            (.173)            (standard error)

$\ln e$  = logarithm of monthly mean kuna per euro exchange rate

$\ln P$  = logarithm of index of Croatian retail prices (excludes administered prices)

$\ln P^*$  = logarithm of Eurozone harmonized index of consumer prices

The joint hypothesis that the coefficients on  $P$  and  $P^*$  are  $+1$  and  $-1$ , respectively, as implied by PPP, is rejected for any conventional significance level. This is because the coefficient on  $\ln P$  is individually significantly below 1, while the coefficient on  $P^*$  virtually equals negative one.<sup>13</sup> In words, the elasticity of the exchange rate with respect to the domestic price level is less than unity, and there has been real appreciation with respect to the PPP benchmark. The amount of this "overvaluation", however, is small. The last four months' average real exchange rate is 6.3% below the 1995:1 starting value.

Those who contend that the kuna is overvalued, however, make the case that the overvaluation has been a consistent feature of the economy since the stabilization episode of late 1993. Using as the real exchange rate the ratio of the product of the nominal exchange rate and the eurozone producer price index to Croatian consumer prices allows us to extend the period of

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<sup>12</sup>"Naive" in the sense that it doesn't explicitly take into account the time series properties of the variables in the regression, e.g. "unit roots", "co-integration", as surveyed in Boucher Bruer (1994).

<sup>13</sup>An F-test of the null hypothesis that the coefficients on  $\ln P$  and  $\ln P^*$  are  $+1$  and  $-1$  has an F statistic of 65.08 with  $p$ -value 0.000000. A  $t$ -test of the null hypothesis that the coefficient on  $\ln P$  is  $+1$  has  $t$  statistic of 2.655 with  $p$ -value .0092.

analysis back to 1992:1 (Graph 16). By this measure there has been substantial real appreciation relative to the earlier initial period. Taking as a benchmark the third quarter of 1993, the period immediately preceding the stabilization program (shaded in the graph), the current value of this measure of the real exchange implies a 28% real appreciation. Taking an even earlier period as the benchmark, of course, would result in even higher current real appreciation.

A graphic depiction of how the real appreciation occurred is shown in Graph 17 of the index of Croatian consumer prices and an index of the nominal exchange rate, both equal to 1 in 1992:1. After the hyperinflation *cum* currency depreciation of 1992 and much of 1993, stabilization sought to use the nominal exchange rate to influence inflationary expectations. This is reflected in the graph, as the exchange rate stabilizes first, while prices continue to rise for a time, with the noted consequences for the real exchange rate.

Using annual GDP deflators also permits calculating a real exchange rate index beginning in 1992 (Graph 18). Qualitatively, this graph behaves similarly to graph 16. Depending on whether 1993 or 1994 is taken as the base year, the real exchange rate in 2002 exhibited 20 to 30 percent real appreciation.

The last measure of the real exchange rate uses quarterly wage data, rather than price levels (Graph 19). While the graph is qualitatively similar to those above, this measure displays by far the greatest quantitative amount of real appreciation. Depending on whether the base period is taken to be the quarter prior to stabilization (1993:Q3) or the one of kuna introduction (1994:Q2), the current real exchange rate is 50 to 65 percent below its initial level.

### **Is There a Balassa–Samuelson Effect in Croatia?**

Introducing wages in the measurement of the real exchange rate naturally raises the Balassa–Samuelson issue. In a nutshell, if: 1) there are labor productivity increases, relative to the foreign country, in the home country's traded goods sector; 2) prices of traded goods obey the law of one price; 3) wages equal marginal productivity in traded goods; 4) labor market arbitrage equalizes wages in the traded and non-traded sectors; 5) then there will be an increase in the relative price of traded to non-traded goods. The equilibrium relative price change is reflected in

an appreciation of the real exchange rate. If increases in Croatian relative to Eurozone wages reflect such productivity increases, then real appreciation could reflect an equilibrium relative price adjustment, rather than disequilibrium exchange rate “overvaluation”.

Interest in the Balassa–Samuelson effect in Central and Eastern Europe has been mostly motivated by macroeconomic considerations regarding EU accession. With a fixed exchange rate and downwardly inflexible nominal values, relative price adjustment can only occur through a rise in the general level of prices–inflation. Countries in the EU or wishing to join the EU, however, are allowed only a limited amount of inflation and, hence, could face a possible dilemma. If the allowed amount of inflation is inadequate to achieve the relative price adjustment, then countries will either have “too much” inflation or incomplete relative price adjustment. Evidence for the existence of a Balassa–Samuelson effect for Central and Eastern Europe has been presented by Balázs et al. (2003). Mihaljek and Klau (2004), however, find no significant such effect in the case of Croatia.

For there to be a Balassa–Samuelson effect, the home country’s labor productivity must increase relative to the foreign country, with wage increases following along. Lacking direct productivity data for Croatia, real GDP is taken as a measure of labor productivity, as in Mihaljek and Klau (2004)<sup>14</sup>. Using 1991 as a benchmark, Croatian real GDP had only recovered to its relative initial position with respect to the Eurozone in 2002 (Graph 20). Graph 21 plots Croatian relative to Eurozone real wages along with Croatian relative to Eurozone real GDP. From the graph, Croatia’s relative real wage increases would appear unrelated to any relative productivity (GDP) gains, as there haven’t been any of the latter. Thus, it does not seem plausible that real exchange rate appreciation could be attributable to any Balassa–Samuelson type of equilibrium relative price adjustment. The Balassa–Samuelson effect assumes that the origin of wage increases is in the traded goods sector, where productivity is increasing, but that

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<sup>14</sup>Real per capita GDP should be used, but given the relatively short time period, the generally slow EU population growth and the fluid nature of Croatia’s population due to the political situation, real GDP is used for simplicity.

these increases are transmitted to the non-traded goods sector by competitive labor market or other mechanisms. Anecdotal evidence in Croatia turns this argument on its head, suggesting that wage increases in the non-traded goods sector (i.e. public sector employment) are transmitted to the tradeable goods sector, whose profitability and/or international competitiveness are thereby reduced.

### **Wage, Price and the Exchange Rate Interactions**

Those who argue the case for kuna overvaluation advocate a policy of discrete devaluation or at least a gradual managed depreciation of the BBC–“basket, band and crawl”–variety (Williamson 1996, 2000). But any such policy places at risk the price stability that has been the biggest success of Croatia’s transition, and to which the CNB is legally committed. Here Granger causality tests are used to assess the relation between the nominal exchange rate and wages and prices. For two variables, X and Y, X Granger causes Y if in a regression of Y on lagged Y and lagged X, the hypothesis that the coefficients on the lags of X are all equal to zero is rejected. Y Granger causes X if in a regression of X on lagged X and lagged Y, the hypothesis that the coefficients on the lags of Y are all equal to zero is rejected.

The nature of the recent relation between Croatian consumer prices, wages and the exchange rate is shown in Graph 22. Nominal wages and prices have increased, wages more so than prices, while the exchange rate has been relatively stationary. The results of Granger causality tests formally confirm what the picture illustrates. From Table 1, there is “causality” running in both directions between consumer prices and the average monthly wage. There is no evidence of a bivariate relationship, however, between either consumer prices and the exchange rate, or the average monthly wage and the exchange rate.

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Table 1  
Tests for Granger Causality

From OLS Estimation of  $LHS_t = \beta_0 + \sum_{i=1}^j \gamma_i Y_{t-i} + \sum_{i=1}^j \alpha_i X_{t-i} + u_t$

- (1)  $X \Psi Y$  when  $LHS = Y_t$ , and  $H_0: \forall_1 = \forall_2 = \dots = \forall_j = 0$  is rejected;  
 (2)  $Y \Psi X$  when  $LHS = X_t$ , and  $H_0: \alpha_1 = \alpha_2 = \dots = \alpha_j = 0$  is rejected.

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(1) P $\Psi$ W as (1) has $p$ -value = .033	(2) W $\Psi$ P as (2) has $p$ -value = .011
(1) W $\Psi$ E as (1) has $p$ -value = .117	(2) E $\Psi$ W as (2) has $p$ -value = .499
(1) P $\Psi$ E as (1) has $p$ -value = .176	(2) E $\Psi$ P as (2) has $p$ -value = .528

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P is consumer prices, W is average monthly wage, E is exchange rate

Including an available producer price index into this analysis only seems to muddy the waters, and the precise results are omitted from Table 1. Oddly, there is no evidence of any bivariate relationship between the producer price index and either the average monthly wage or the consumer price index! Producer prices fail to Granger cause the exchange rate, and while the exchange rate series can Granger cause producer prices, this result is sensitive to the lag length used in the regression. Somewhat qualitatively similar results to these are found by Billmeier and Bonata (2002). They use both recursive VAR and cointegration techniques to examine exchange rate pass through to producer as well as consumer prices. In the VAR analysis the producer price index responds to exchange rate movements but not the retail price index. In the cointegration analysis the situation is reversed, as the “pass-through from the exchange rate to the intermediate price index cannot be captured, but a pass through coefficient of roughly 0.3 is obtained for the retail price index (2002, p. 24).” They conclude, however, that this “can hardly be regarded as proof of diffuse exchange rate indexation of prices and wages.” Since the nominal exchange rate variable has barely varied in recent years, empirical analysis based on it is of questionable validity on statistical grounds. As for arriving at policy conclusions, it is questionable how one could predict what effect a future substantial exchange rate movement would have on prices and wages based on past data from a period when the exchange rate didn’t

really move.

The current exchange rate regime is one in which the CNB has intervened in the foreign exchange market, limiting exchange rate fluctuations over the last several years to within typically one or two percent of the 7.5 kuna per euro level. While targeting the exchange rate, the CNB has also attempted to sterilize any unwanted domestic monetary consequences of its foreign exchange market intervention. While this has been successful, it has not prevented a foreign liability based expansion of domestic credit by commercial banks well in excess of M1 money supply growth. The real exchange rate has experienced mild appreciation over this period of exchange rate stability. When compared to its level at the beginning of the stabilization program of late 1993, however, there has been substantial real appreciation. Balassa–Samuelson based arguments that this could reflect equilibrium relative price adjustments are implausible. The relationship between the nominal exchange rate and prices and wages since stabilization suggests that domestic prices and wages have evolved together unrelated to the exchange rate. This in no way proves, however, that large future exchange rate changes, perhaps deliberately meant to depreciate the real exchange rate, would not be offset by corresponding changes in domestic prices and wages. Any substantial change (i.e. depreciation) in the exchange rate, however, could have potentially serious financial consequences because of unhedged currency mismatches of the Croatian government, households and banks, a phenomenon whose importance has grown with the recent expansion in credit, particularly to the household sector. This is the topic of the final section.

### **III.**

Recently the Croatian economy has seen a return to growth after the recession associated with the banking crisis of 1998-99. The sustainable nature of this growth, however, has been questioned. A typical criticism is that recent growth has been led by import-intensive consumption not only enabled by an overvalued exchange rate, but also fueled by an explosion in bank credit, particularly to households. The reflection of this at the aggregate level, along with respectable GDP growth numbers, are ballooning current account deficits and a rising external

debt (see Table 2). The recent current account deficits do not have as their “identical twins” government budget deficits; while the current account deficit as a percentage of GDP averaged 5.8 percent between 1999 and 2003, the consolidated central government budget deficit averaged 2.9 percent, exactly half, over the same period. As noted above, domestic money supply growth has to a degree remained under the control of the CNB, despite foreign exchange market intervention, due to sterilization. Domestic credit expansion by banks has still occurred, however, with the source of funds an increase in foreign liabilities which have increased by 60% per year over the past three years (see Graph 26). As illustrated in Graph 23, the banking sector would appear to be rapidly overtaking government as the largest (gross) external debtor. Much of the increase in bank liabilities to foreign entities has involved foreign banks (see Graph 24). The CNB president has taken the unusual step of defending in a popular magazine the recent attempts by the CNB to reign in this credit expansion, also raising alarm bells in the same article about the increasing level of external indebtedness (Rohatinski, 2004).

Table 2  
Real GDP Growth, Current Account and External Debt as % of GDP

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>GDP</b>										
% Change	5.9	6.8	5.9	6.8	2.5	10.9	2.9	4.4	5.2	4.3
<b>Current account</b>										
% GDP	4.9	17.5	14.8	112.5	16.7	17.0	12.5	13.7	18.5	17.2
<b>Debt as</b>										
% GDP	20.7	20.2	26.7	37.1	44.8	50.1	60.0	57.0	68.7	83.2

Source: CNB

Bank lending to households has undergone a dramatic increase, as the household sector has overtaken the government and enterprise sectors to become the largest recipient of bank credit (see Graph 25). Over the past four years, bank lending to households increased at an annual average rate of some 30%. Bank lending to households as a percentage of total lending in Croatia is truly atypical when compared to other transition economies, being well over twice the level of the average of the other seven (see Table 3). The recent dramatic increase in lending to

households has not primarily been for housing credit, as the gap between total lending to households and housing credit has widened (Graph 27).

Table 3  
Bank Lending to Households as Percent of Total Lending (1);  
Spread Between Loan and Interbank Deposit Interest Rates (2)

	1.	2.
Bulgaria	19.2	6.6
<b>Croatia</b>	<b>45.2</b>	<b>7.9</b>
Czech Rep.	18.7	1.1
Hungary	18.1	0.7
Poland	29.9	2.3
Romania	17.4	---
Slovak Rep.	11.0	1.4
Slovenia	23.5	7.2

Source: Adapted from Mihaljek (2004)

The supply side incentive for the credit expansion is suggested by the fact that the loan-interbank deposit interest rate spread in Croatia in 2002 was the highest in the transition economies (Table 3), and is much higher than in the countries of the parent banks of Croatia's overwhelmingly foreign owned banks.<sup>15</sup>

Clearly there is a question as to the long run sustainability of this type of credit-based, consumption-led growth. The annual increase in total bank lending as a percentage of GDP went from 4% in 2000 to record figures of 8%, 14% and 9% in the most recent three years when, as a rule of thumb, 5% or more could be considered "excessive" (Mihaljek, 2004, p. 109). As problematic as the credit expansion itself is the serious "currency mismatch" that it apparently has created on bank balance sheets (Goldstein and Turner, 2004). The currency mismatch problem is distinct from but related to what is often described as the high degree of "euroization" of the Croatian economy (Vujčić, 2004). For example, deposits held by domestic entities denominated in foreign currency (predominantly euro) in Croatian banks greatly exceed kuna

<sup>15</sup>By comparison, the spreads for Austria and Italy that correspond to the ones reported in Table 3 are 2.7 and 2.9, respectively, a difference which Mihaljek (2004) attributes to the "greater efficiency" of banks in Western Europe.

denominated deposits (see Graph 31 ). If banks have borrowed from foreign entities in foreign currency to expand lending in kuna, then a devaluation, or sustained depreciation, of the kuna could increase the kuna value of liabilities while leaving asset values in kuna unaffected, a recipe for insolvency. There has been a steady increase in the ratio of foreign currency denominated liabilities to total bank liabilities, while at the same time lending in foreign currency as a proportion of total bank lending has steadily declined (Graphs 29 and 30).

The apparent resulting currency mismatch on bank balance sheets, however, is mitigated by the fact that much lending in kuna is indexed to foreign currency, largely to the euro, via the “currency clause” in loan contracts. A graph from Vujčić (2004, p. 163) implies that foreign currency indexed, kuna denominated loans are currently between 70 and 75 percent of total loans, although this percentage has been decreasing since the end of 2000 when it stood at around 85 percent.<sup>16</sup> There has been a general downward trend in both indexed loan and deposit interest rates, with the spread between them becoming more stable and somewhat smaller, although still averaging 5.3% over the past four years (Graph 28). The spread between interest rates on non-indexed relative to indexed loans has recently increased, however, and also widened during the previous 1998 credit expansion (graph 32).

Two distinct, though not mutually exclusive, standard theoretical explanations for the increased spread between non-indexed and indexed loan rates are: 1) expectation of future kuna depreciation; and 2) a risk premium. Letting  $i$  be the non-indexed and  $i^*$  the foreign-currency indexed interest rate,  $e^\wedge$  the proportional change in the exchange rate,  $E(X)$  the expectations operator, and  $N$  a risk premium, we have

$$2.) \quad i - i^* = E(e^\wedge) + N$$

The left hand side has averaged 4 percent since the spike up in the non-indexed loan rate in early 2002. The right hand side is the sum of two non-observable variables. In the “uncovered

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<sup>16</sup>If 75 percent of total loans are indexed (including kuna and foreign currency denominated), this implies that some 94% of kuna loans themselves are indexed.

interest rate parity condition” with risk neutrality,  $N$  is equal to zero and the interest differential purely reflects expected depreciation. However, since 2002:1, the annualized percentage changes in the monthly mean exchange rate have averaged only +1.6 percent, an amount that is not statistically significantly different from zero. Of course, the fact that an alleged expectation hasn’t materialized doesn’t prove that it didn’t exist.

Alternatively, with risk aversion ( $N > 0$ ) an interest differential can arise, even with expectations of, say, a 50–50 chance for equal appreciation or depreciation ( $E(e^{\wedge}) = 0$ ). One way this can happen is if there is an increase in exchange rate risk from increasing unhedged currency mismatch. The following regression finds the spread between non-indexed and indexed loan rates to be significantly positively related to increases, relative to trend, in domestic banks’ foreign currency liabilities to foreign banks, and also to the level of the exchange rate. One interpretation of an increase in the non-indexed relative to indexed loan rate associated with increases relative to trend in foreign currency liabilities is that it reflects increased exchange rate risk from the increased currency mismatch associated with greater use of foreign currency liabilities as a source of funds for domestic lending.<sup>17</sup> The positive coefficient on the contemporaneous exchange rate can be given an “interest parity” interpretation, if, say, currency depreciation now creates an expectation of more future depreciation.

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<sup>17</sup>The interest parity and risk aversion theories assume competitive markets. Another interpretation is that the relatively few large banks enjoy some pricing power and have raised the interest rate on non-indexed relative to indexed loans to dissuade borrowers away from the non-indexed alternative.

$$R2.)^{18}Y = 1.32 + 4.30 \cdot X_1 + 1.06 \cdot X_2 \quad 1994:7-2004:2 \quad R^2 = .387$$

(.16)	(.63)	(.16)	(Standard Error)
(6.83)	(6.63)		(t-ratio for $H_0: \exists=0$ )

Y = Interest rate on non-indexed loans ! interest rate on indexed loans

X<sub>1</sub> = Residual from the regression on a constant and time trend of the variable, logarithm of banks' foreign currency liabilities to foreign banks

X<sub>2</sub> = Exchange rate

Foreign currency indexing of loans hasn't necessarily eliminated exchange rate risk, however. It may have simply shifted it from the balance sheets of banks and onto those of the banks' debtors. A measure of this potential exposure is foreign currency deposits in banks minus foreign currency loans to households and enterprises minus 93.75 percent of kuna denominated loans to these sectors (estimated indexed loans). After becoming positive briefly in 2003, there has been a pronounced decline into historic negative territory of this measure (Graph 35).

It has been noted that while banks may have eliminated their exchange rate risk through foreign currency indexed lending, they have transferred it to their borrowers, and it comes back to them in the form of increased default risk. Any substantial kuna depreciation that manages to depreciate the real exchange rate will increase kuna loan principal more than it will increase kuna prices and wages, increasing the loan repayment burden and hence the rate of default.<sup>19</sup> The transfer of exchange rate risk from bank balance sheets to the nonbank sector may have been a politically astute move. In the event that the above scenario would come true and lead to the threat of loan defaults, there needn't be a politically unpopular direct government bailout of banks, but a more palatable bailout of their debtors.

The optimistic view is that Croatia has now become an official candidate for EU status, with hopes of entering along with Bulgaria and Romania in 2007.<sup>20</sup> The admittedly strong kuna

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<sup>18</sup>It is assumed, without formally testing, that the variables in this regression are "stationary" or at least have something like a constant mean over the sample period (X<sub>1</sub> of course has mean zero by construction).

<sup>19</sup>In 2002 Croatian banks' non-performing loans were 6.2 percent of all credit, below the 9.2 percent average for the eight transition countries (Mihaljek, 2004, p.111).

<sup>20</sup>This will require catching up, as the other two began their accession negotiations earlier than

has been supported by strong capital inflows that are a rational response to the promising future held out by the possibility of EU accession. The balance of payments has in fact been positive, with capital account surpluses more than enough to finance current account deficits, and the CNB increasing its foreign exchange reserves (Graph 36). The principal problem for the Croatian economy may be in managing its embarrassment of riches in the form of these capital inflows. The earliest possible date for euro adoption has been argued for as the best way to resolve the exchange rate issue, by in effect doing away with it once and for all.

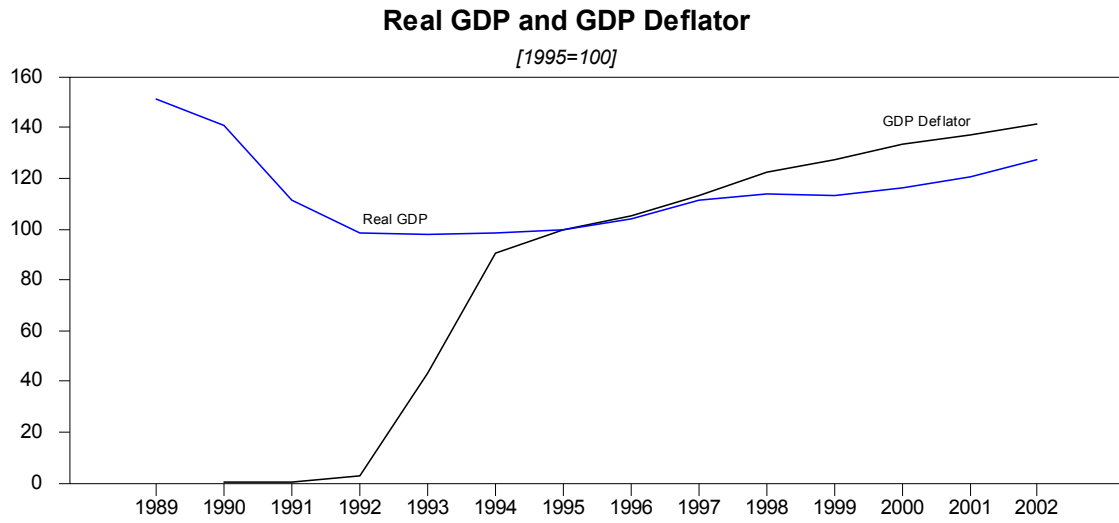
The pessimistic view is that Croatia's admitted success in nominal stabilization has been bought with an overvalued real exchange rate imparting a bias against export and home goods production, and that current growth has been import-intensive, consumption-led and credit-fueled by a run-up in bank intermediated foreign borrowing. Strong domestic constituencies oppose a change in the exchange rate, and devaluation, even were it to occur, could have as its primary consequence a financial crisis due to currency mismatch. Anyway, it has been argued that "stabilization is not enough" (Kraft, 2001) and that Croatia's failure to recover its output and employment levels from Yugoslav days is evidence of a deeper microeconomic malaise that cannot be corrected by macroeconomic policies.

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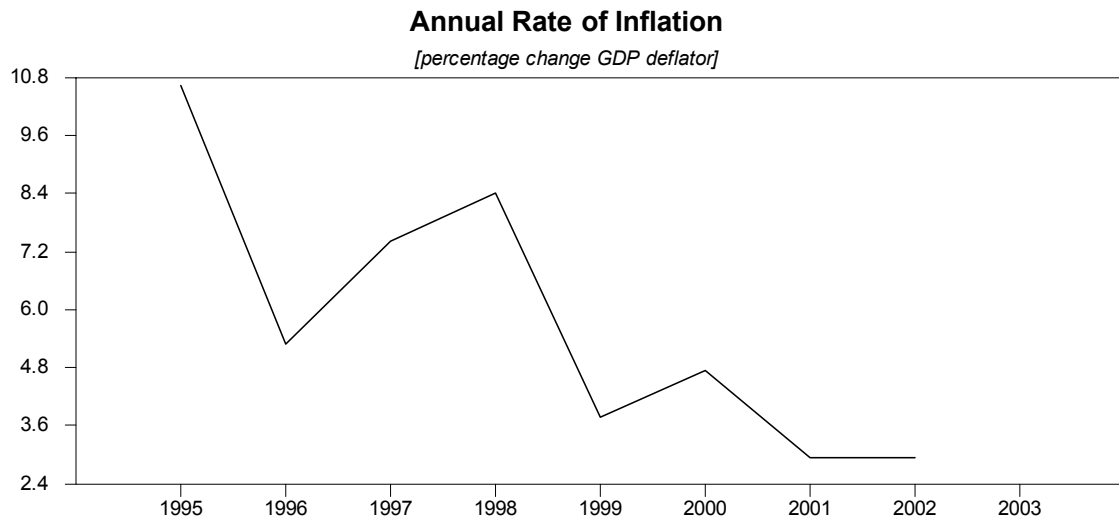
Croatia. There may also be a question as to future enlargement itself, given an apparently increasingly EU-skeptical European public.



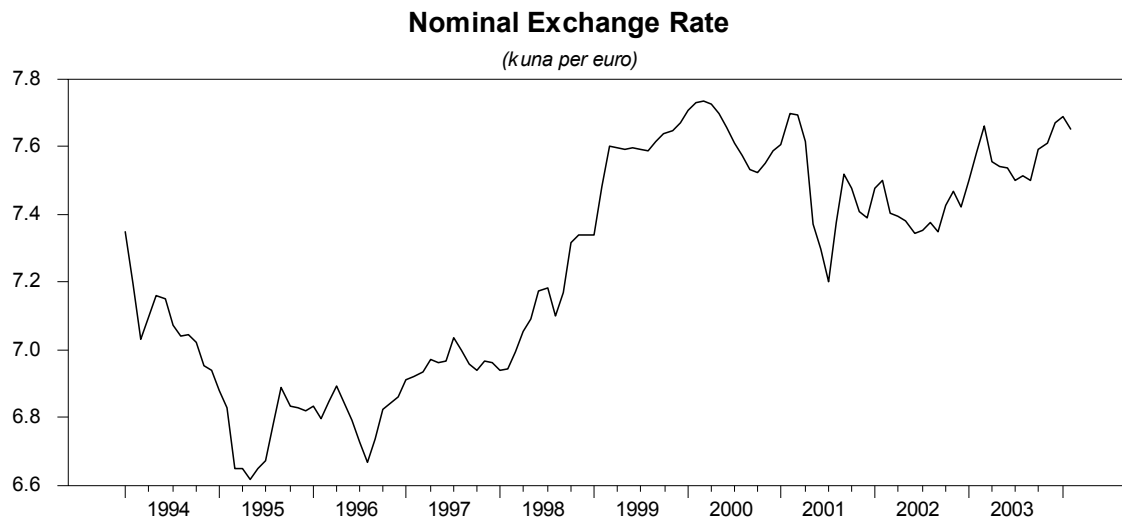
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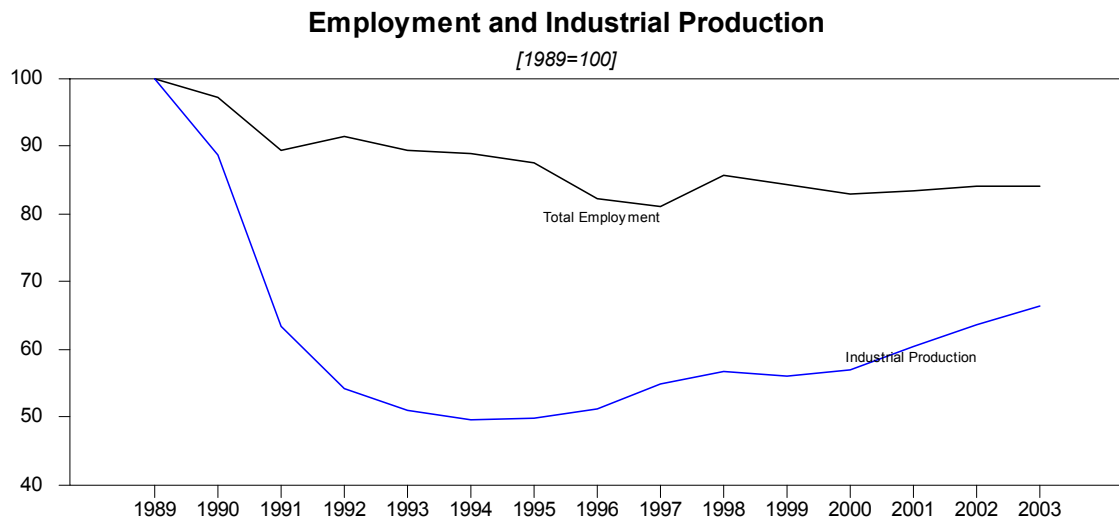
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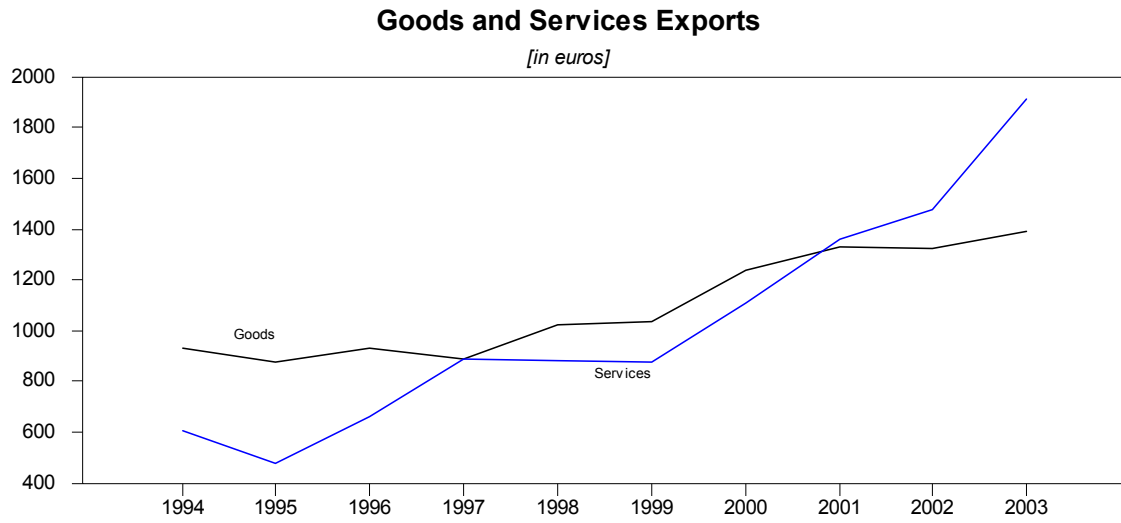
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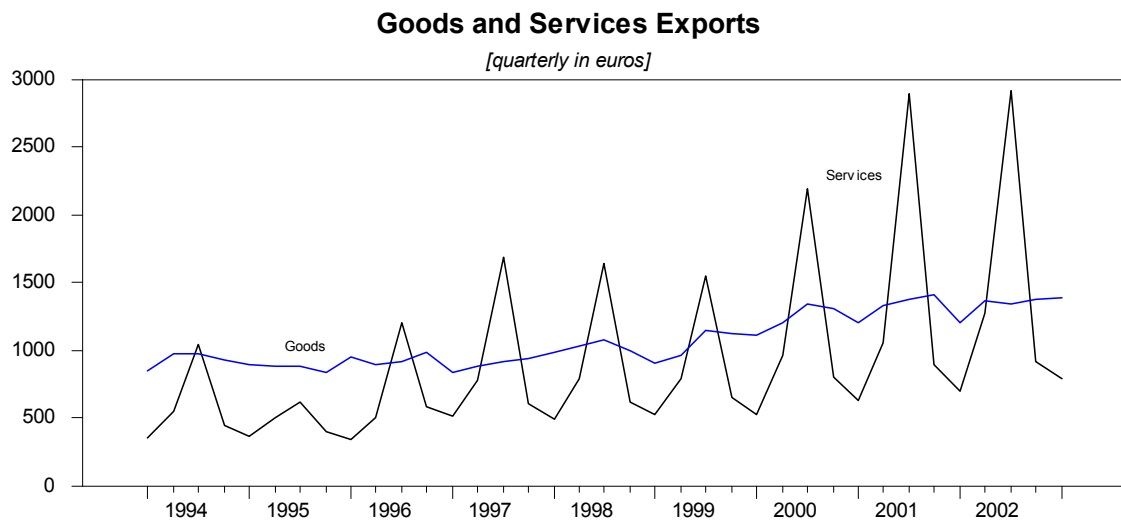
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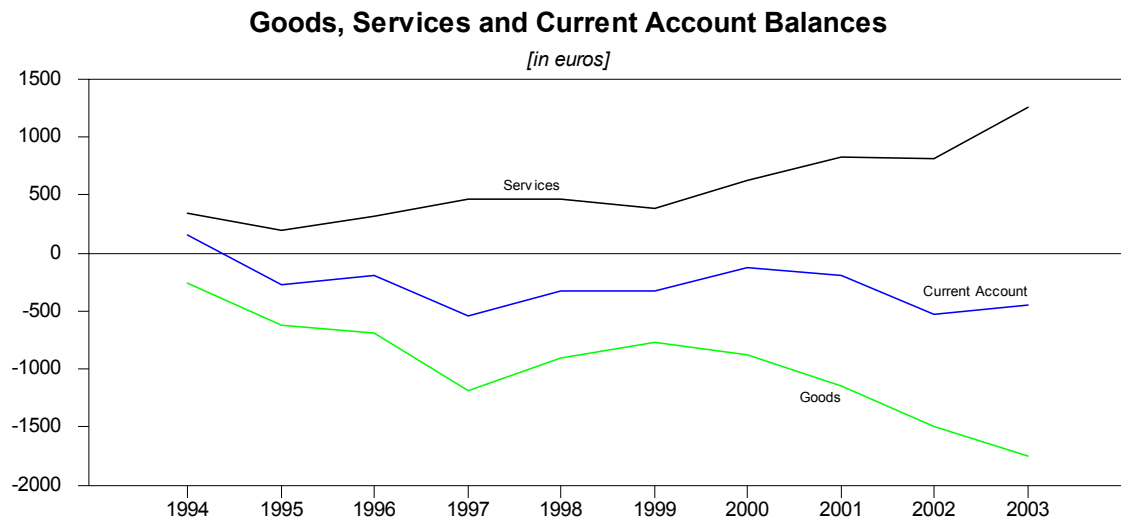
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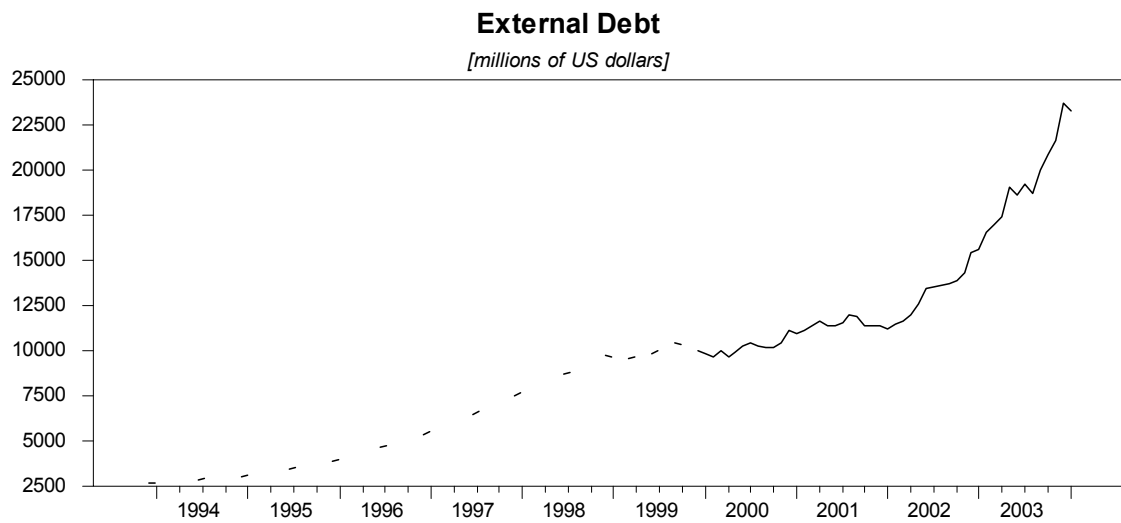
Graph 6



Graph 7

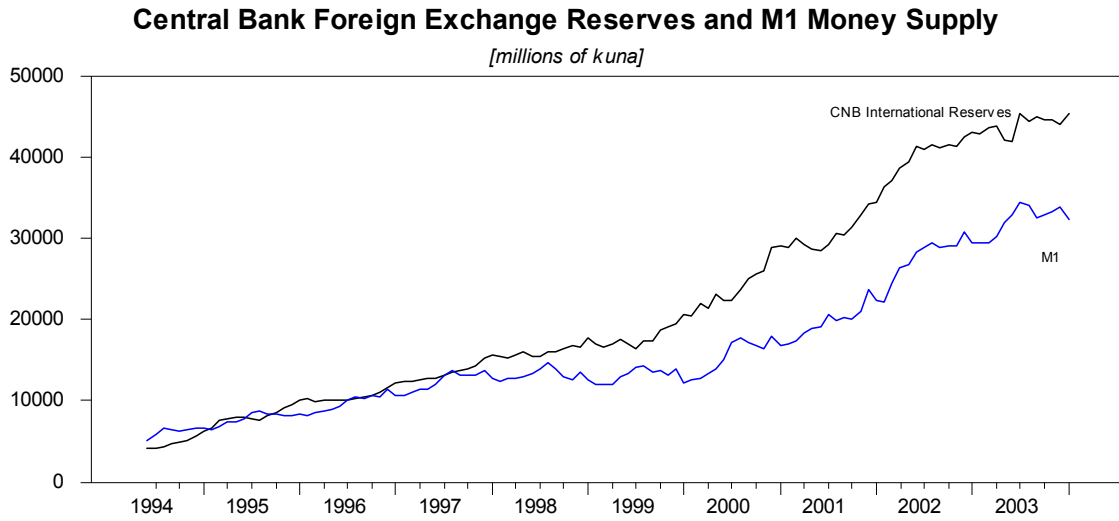


Graph 8

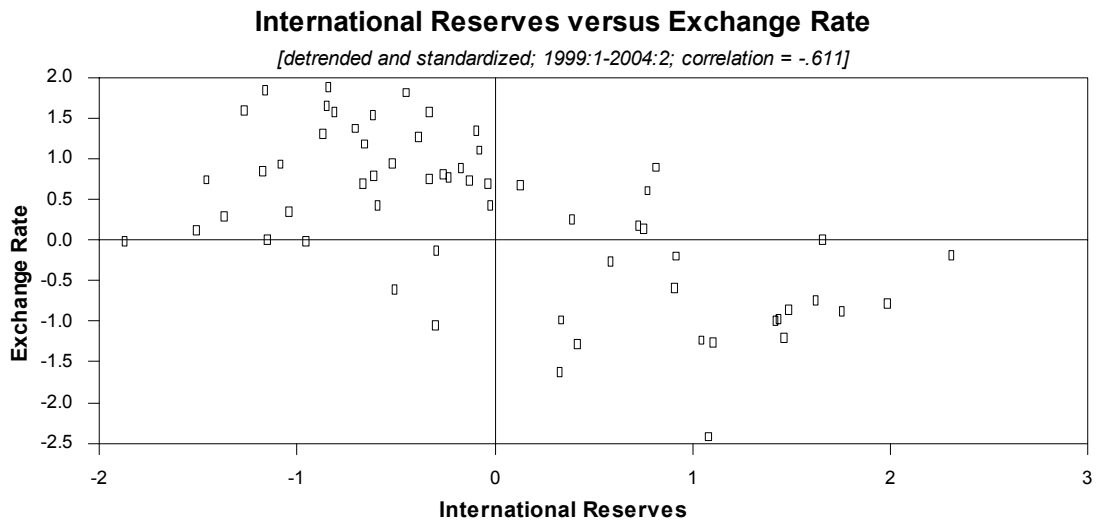




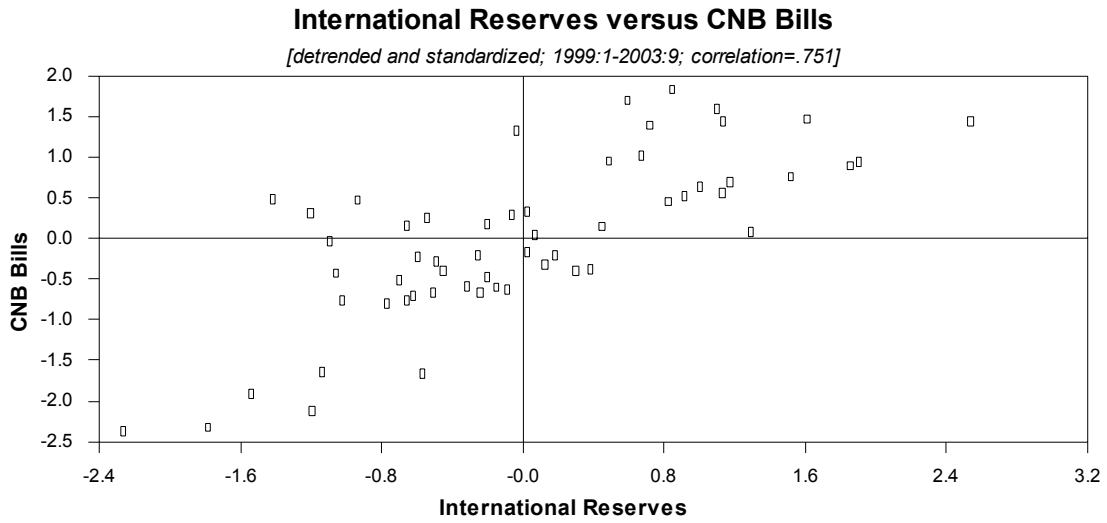
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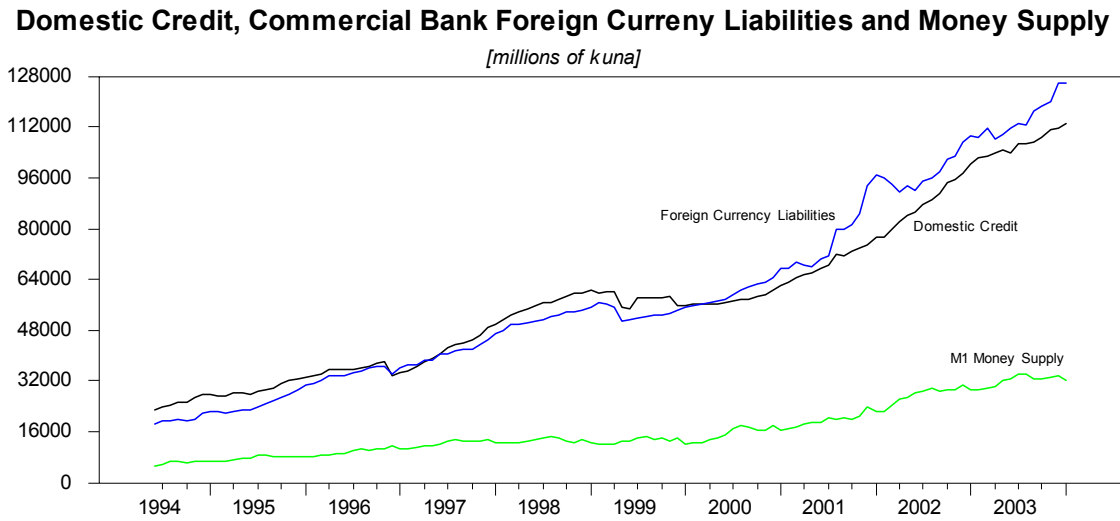
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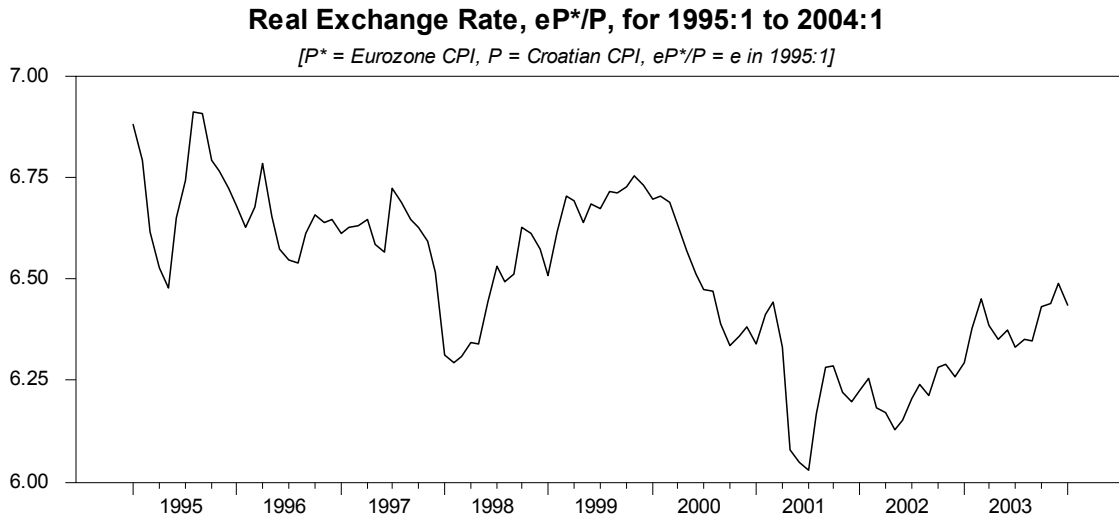
Graph 13



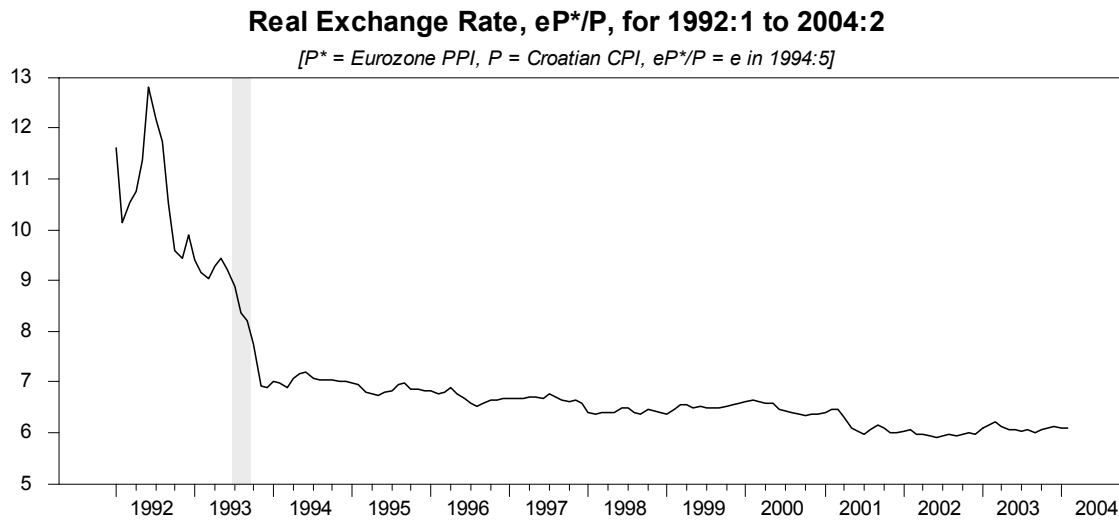
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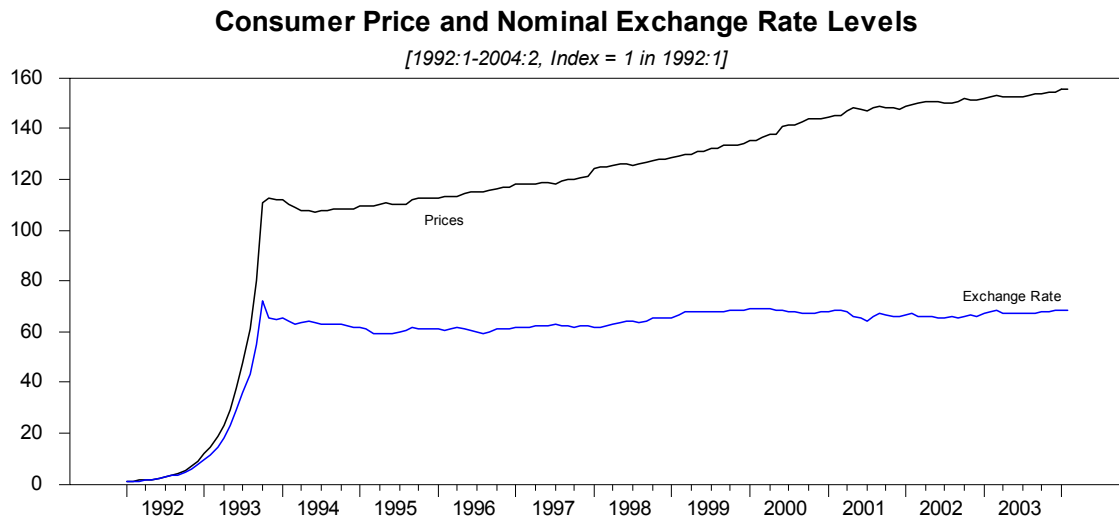
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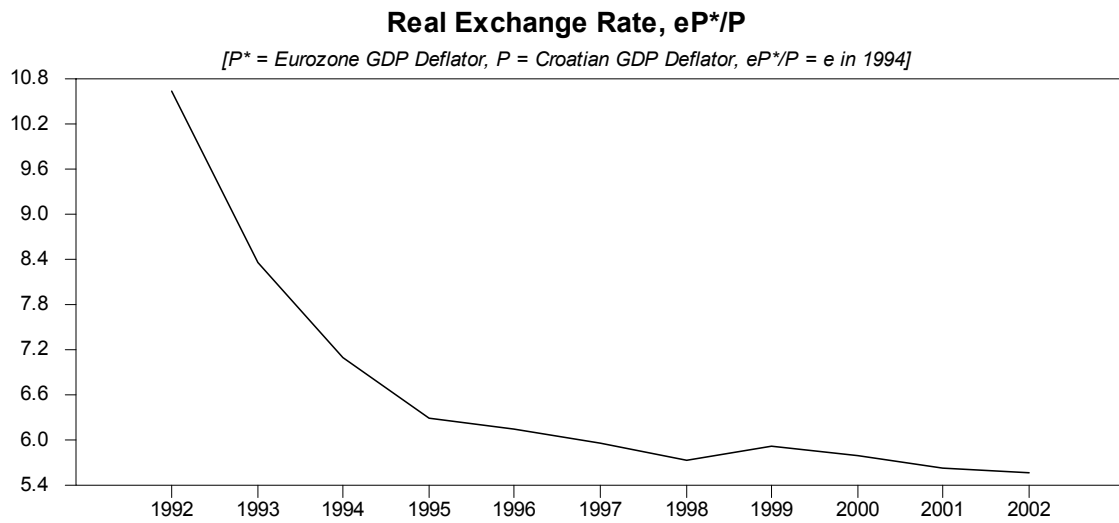
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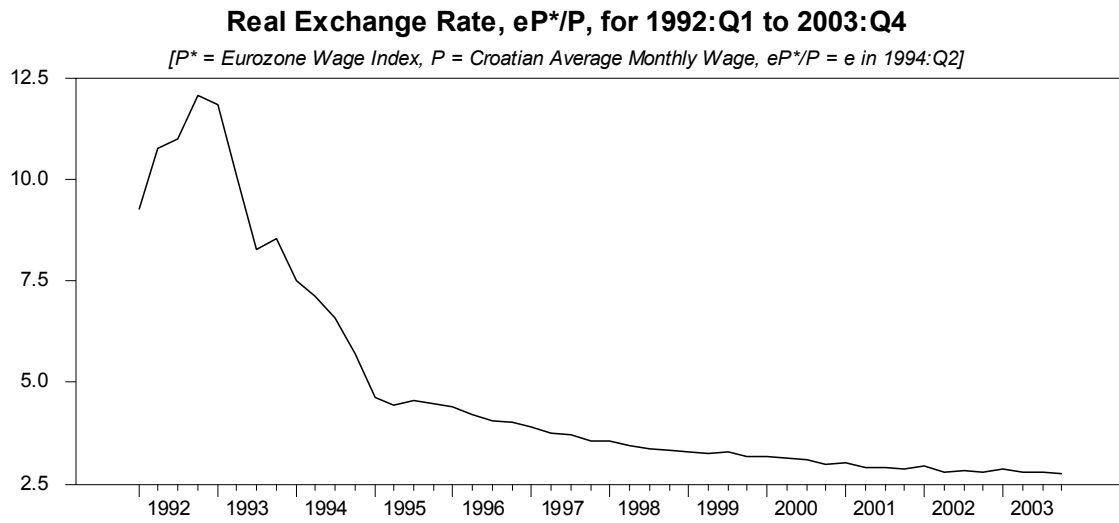
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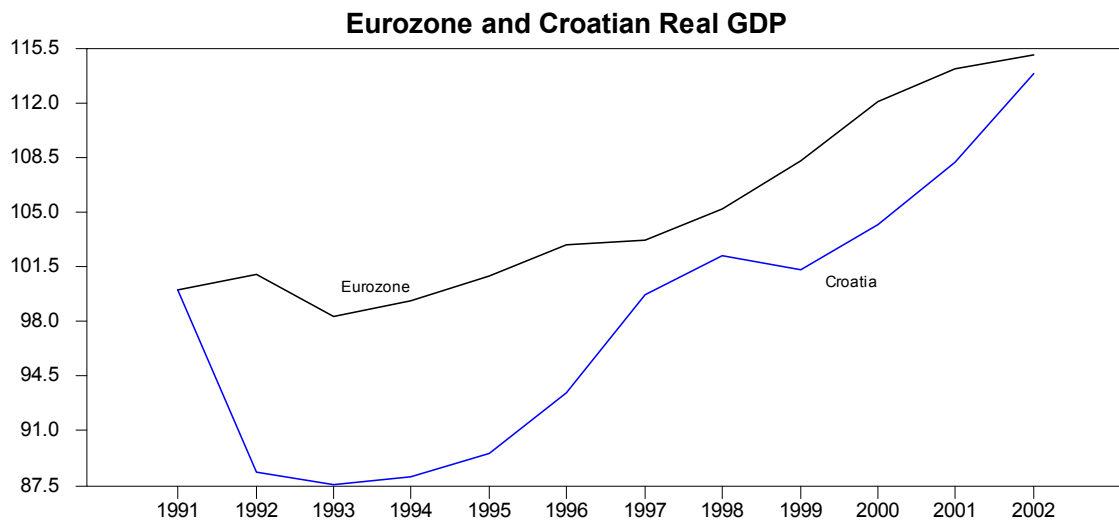
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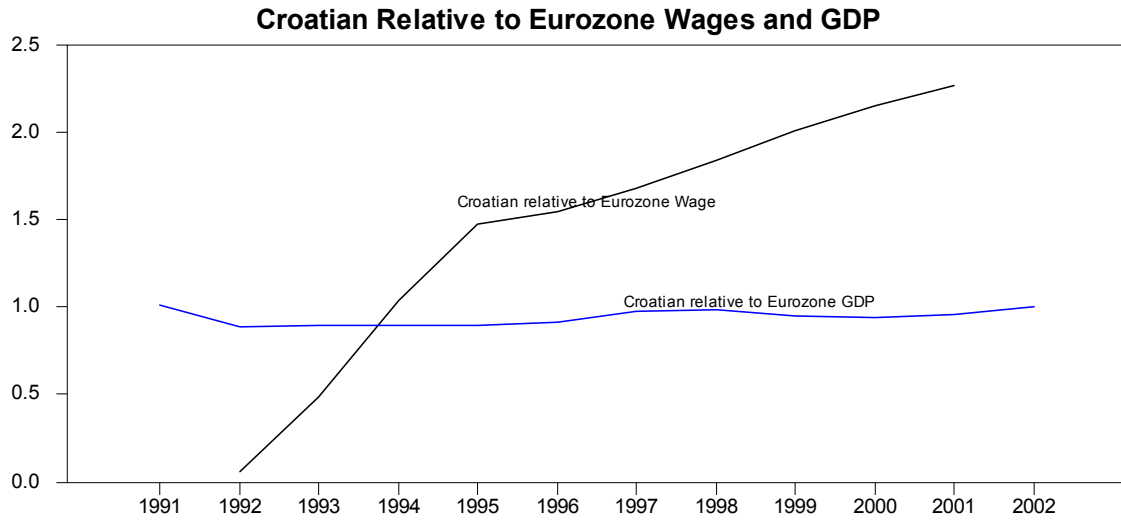
Graph 19



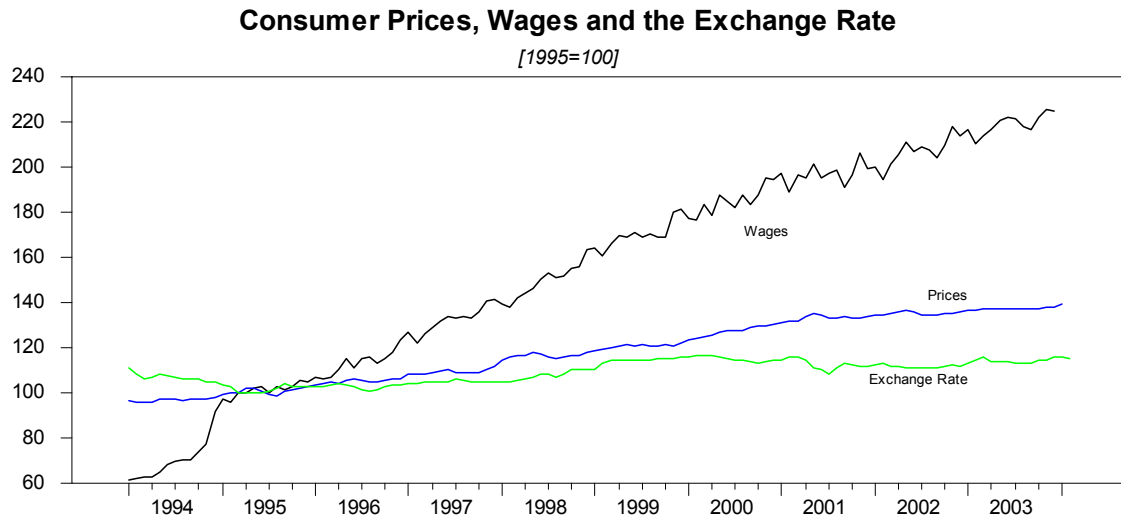
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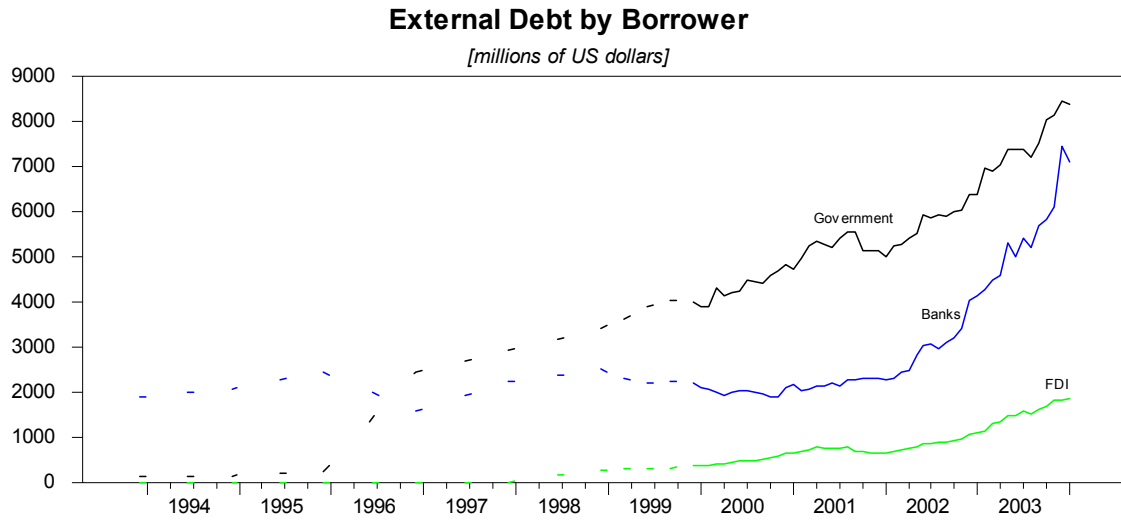
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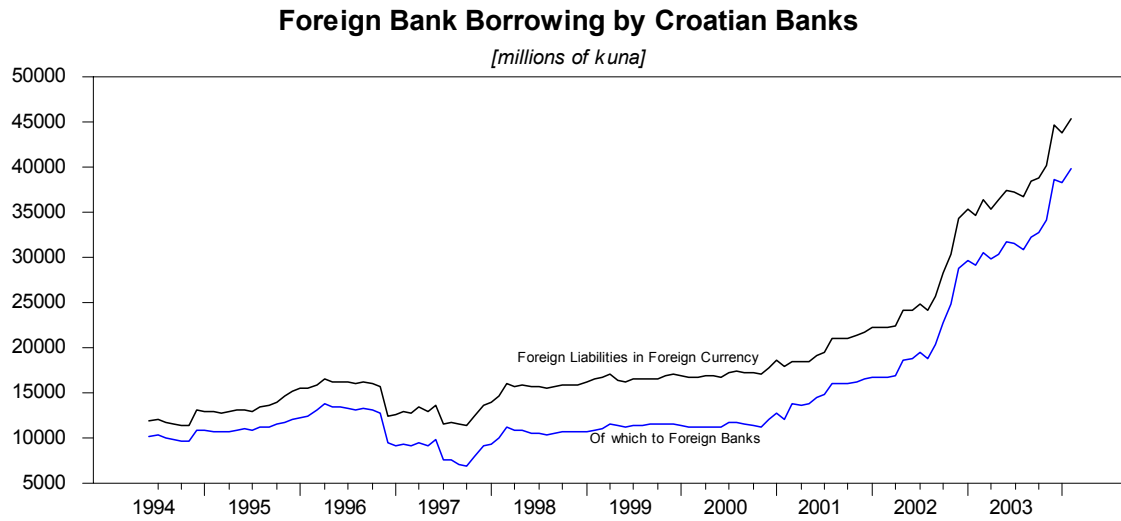
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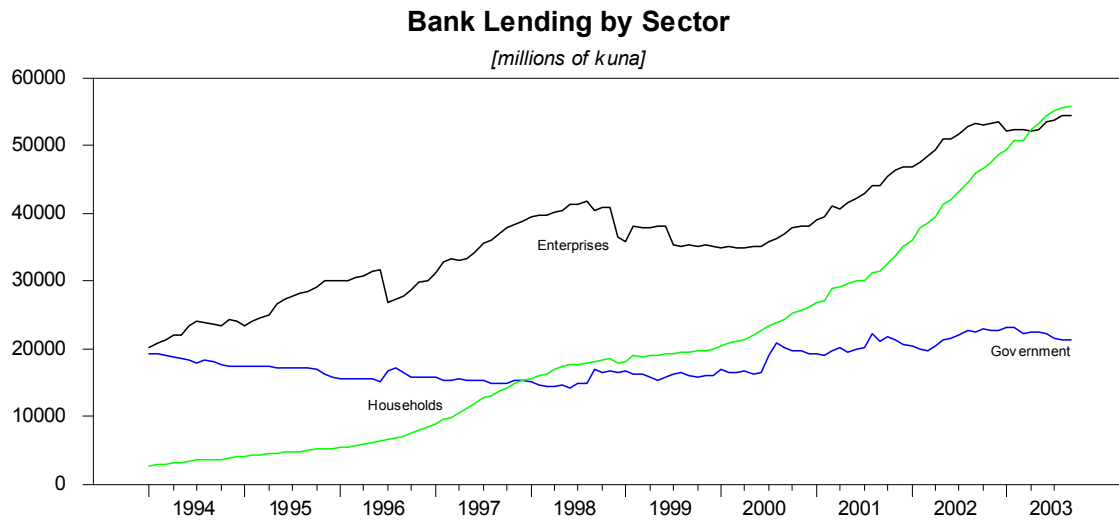
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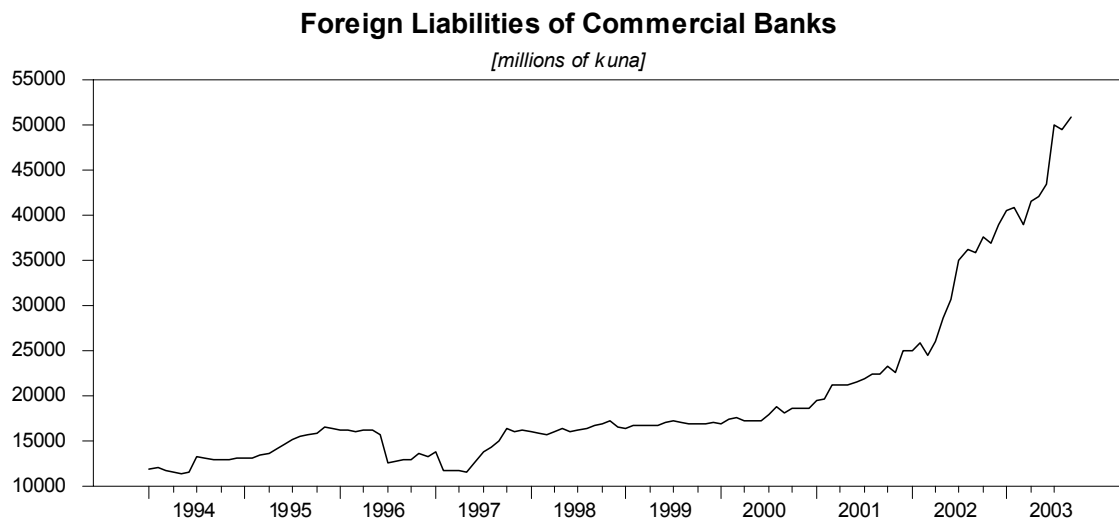
Graph 24



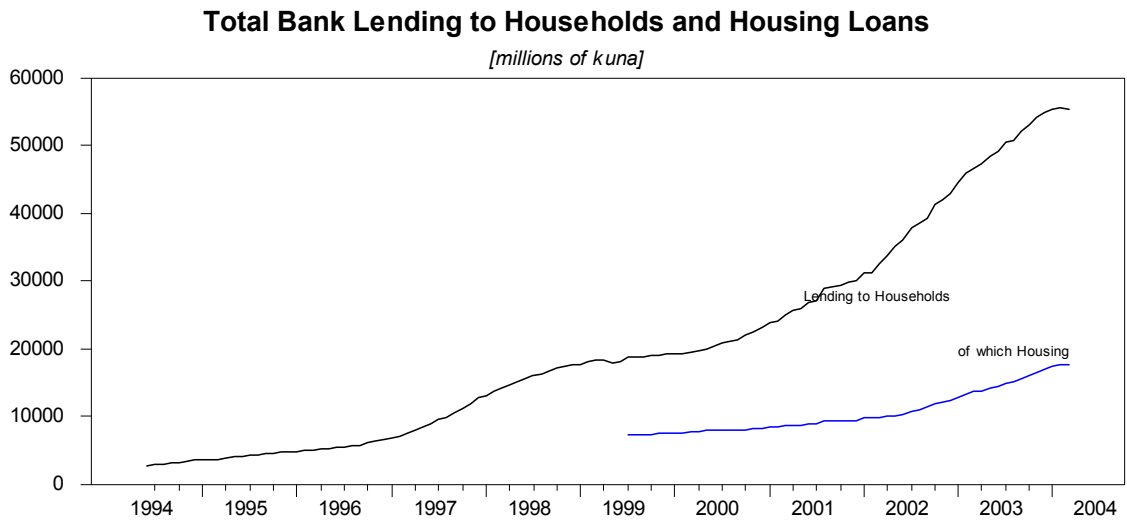
Graph 25



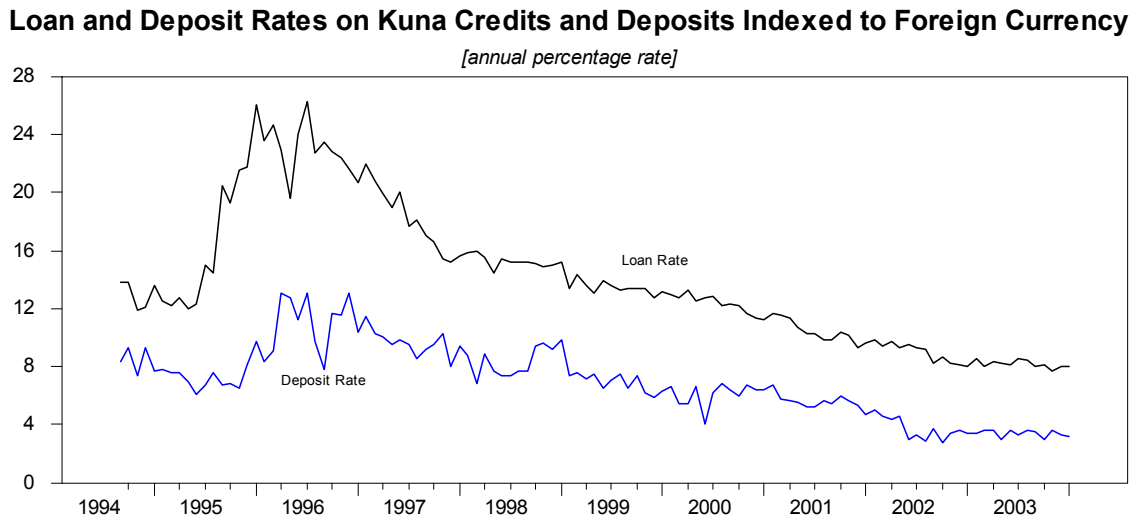
Graph 26



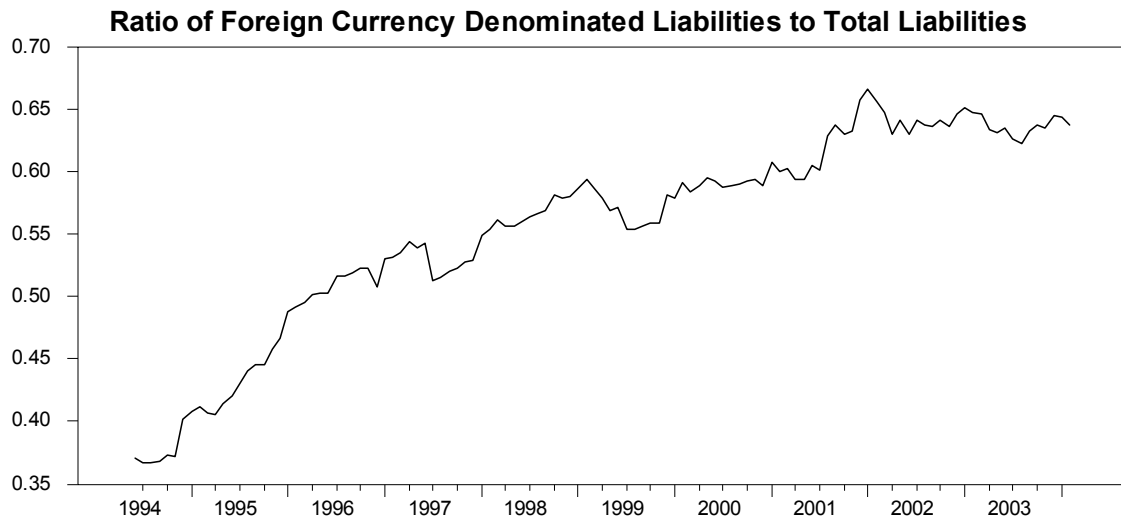
Graph 27



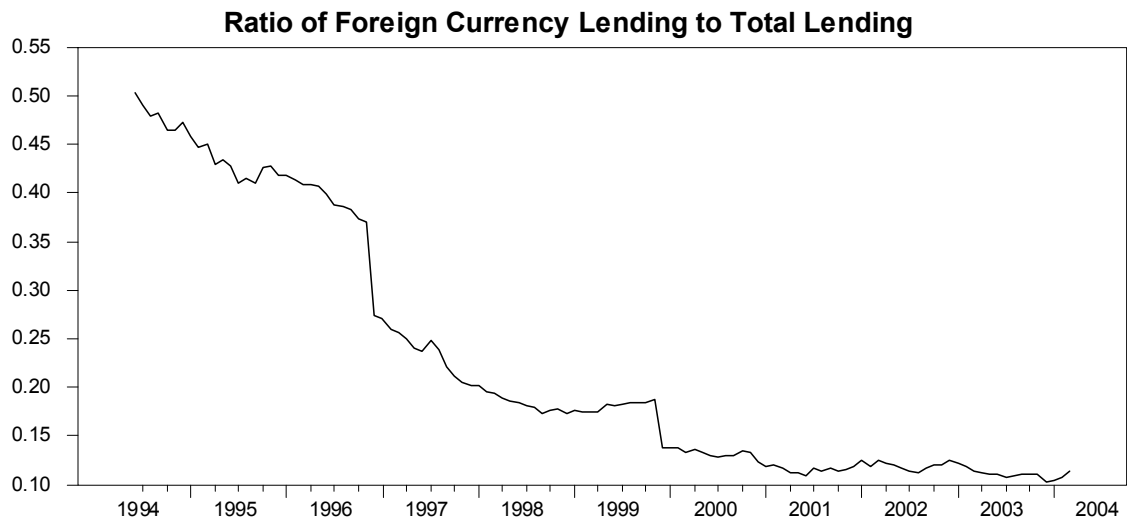
Graph 28



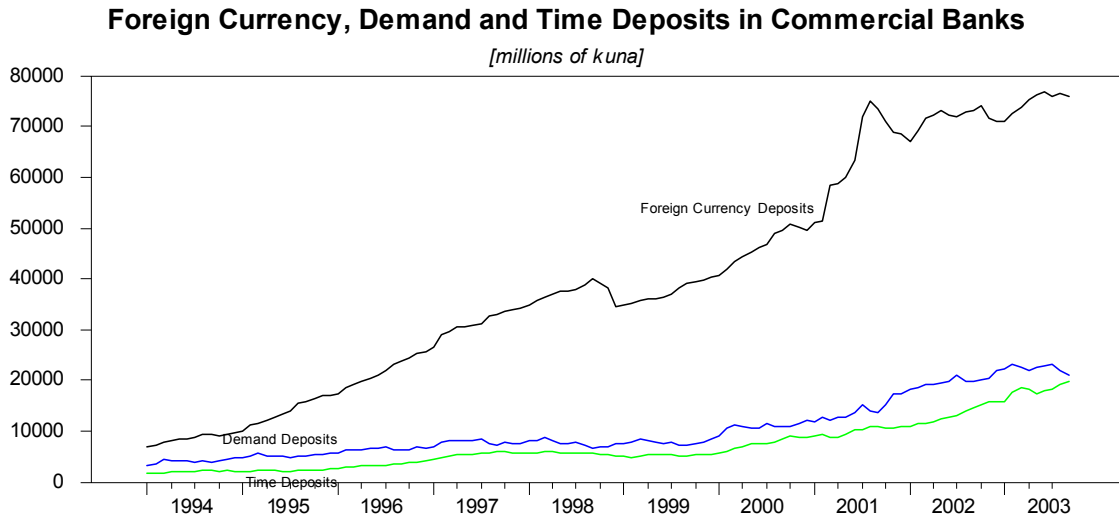
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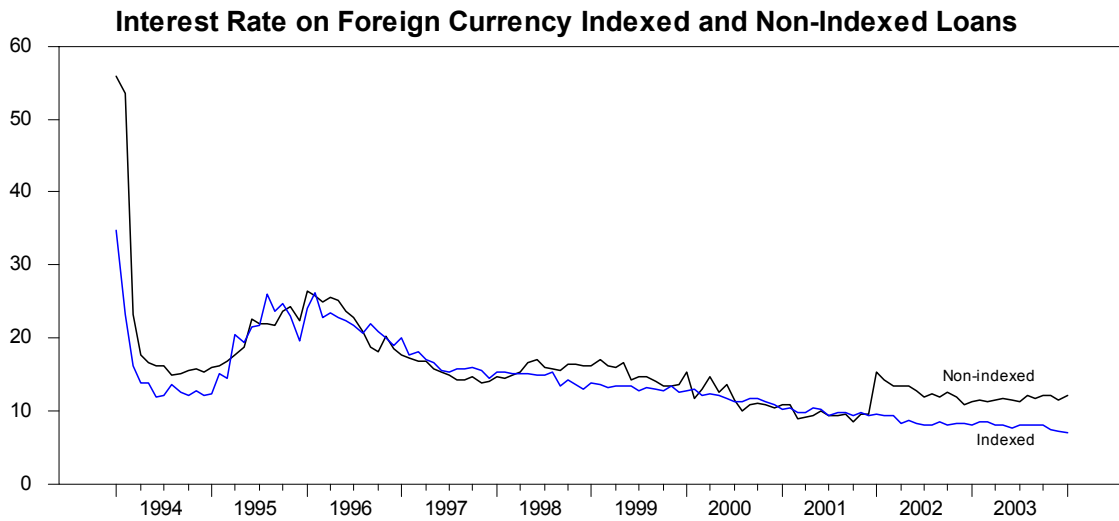
Graph 30



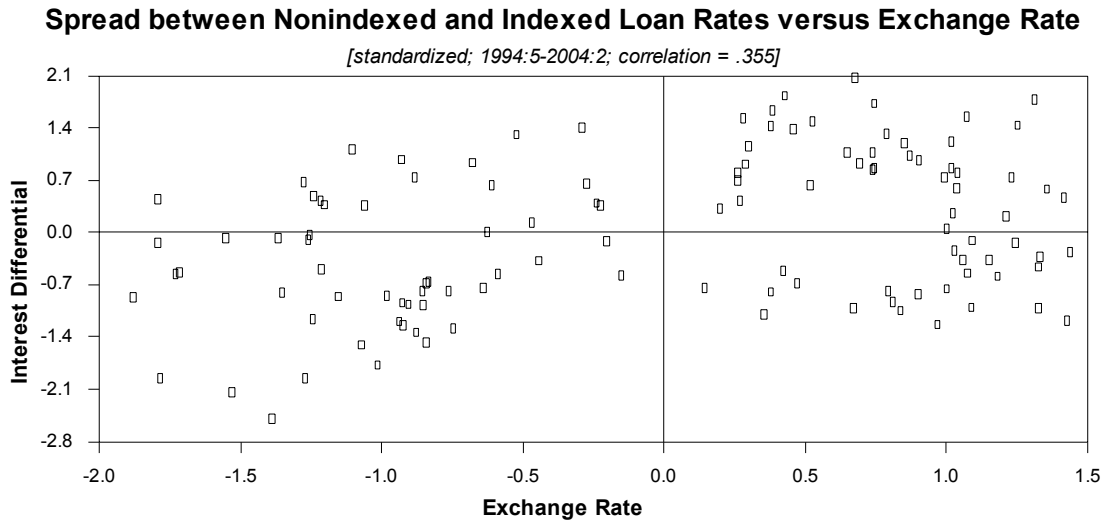
Graph 31



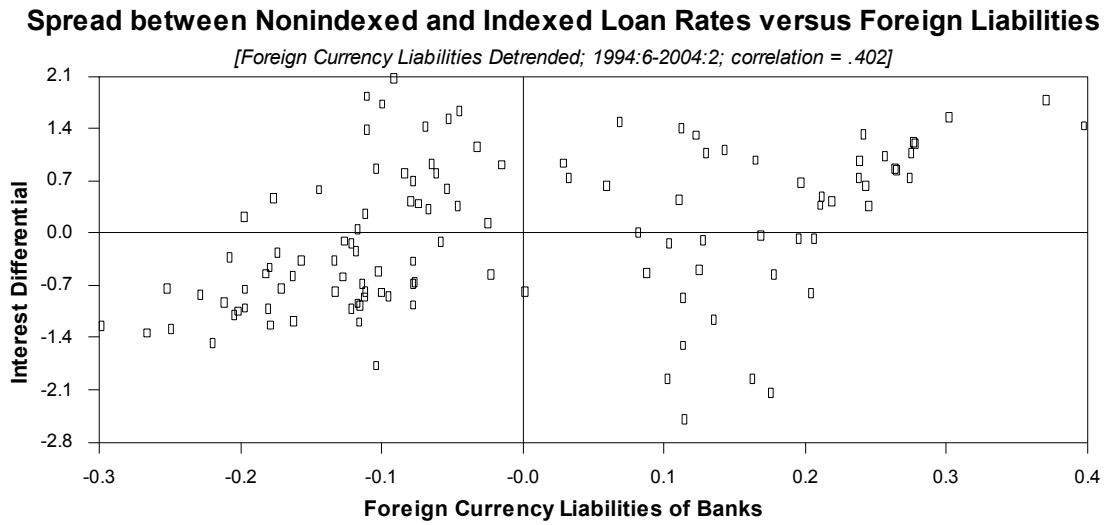
Graph 32



Graph 33

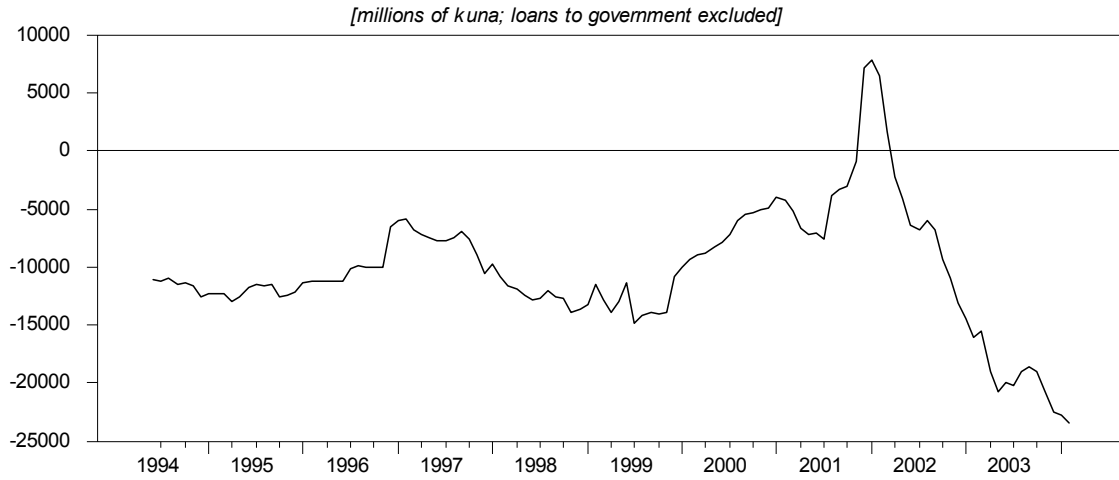


Graph 34



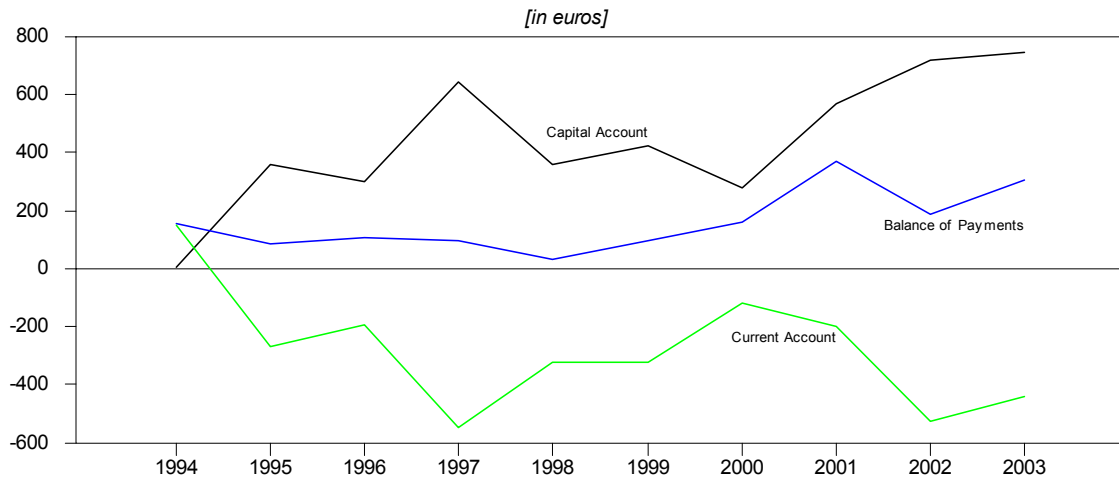
Graph 35

**Foreign Currency Deposits Minus Foreign Currency and Foreign Currency Indexed Loans**



Graph 36

**Balance of Payments**



## Bibliography

- Babić, Ante, "Odabir sustava tečajna za malu otvorenu tranzicijsku zemlju: na primjeru Hrvatske" in *Hrvatsko Gospodarstvo u Tranziciji*, Zvonimir Baletić, ed., Ekonomski Institut, Zagreb, 1999.
- Backé, Peter and Peter Mooslechner, "From transition to monetary integration: Central and Eastern Europe on its way to the Euro", *Comparative Economic Studies*, Vol. 46, No. 1, pp. 177-190, 2004.
- Balassa, Bela. "The purchasing power parity doctrine: a reappraisal." *Journal of Political Economy* 72 (December 1964): 584-96.
- Billmeier, Andreas and Leo Bonato, "Exchange rate pass-through and monetary policy in Croatia", IMF Working Paper, 2002.
- Boucher Breuer, Janice L. "An Assessment of the Evidence on Purchasing Power Parity." In *Estimating Equilibrium Exchange Rates*, edited by John Williamson. Washington DC: Institute for International Economics, 1994.
- Calvo, Guillermo and Carmen Reinhart, Fear of Floating, NBER Working Paper 7993, National Bureau of Economic Research, Cambridge MA, 2000.
- Coricelli, Fabrizio and Boštjan Jazbec, "Exchange rate arrangements in the accession to the EMU", *Comparative Economic Studies*, Vol. 46, No. 1, pp. 4-22, 2004.
- Croatian National Bank, *Bulletin 93*, May, 2004.
- Drušić, Gordan, "Monetarna i tečajna politika" *Ekonomija/Economics*, Vol. 10, No. 2, pp. 281-298, Rifin, Zagreb, 2003.
- Égert, Balázs, Imed Drine, Kirsten Lommatzsch, and Christophe Rault, "The Balassa-Samuelson effect in Central and Eastern Europe: Myth or reality?", *Journal of Comparative Economics*, 31, pp. 552-572, 2003.
- Goldstein, Morris, *Managed Floating Plus*, Institute for International Economics, Washington DC, 2002.
- Goldstein, Morris and Philip Turner, "**Controlling Currency mismatches in Emerging Markets**", Institute for International Economics, Washington, DC, 2004
- Kraft, Evan, "Bankarska kriza u Hrvatskoj – po drugi put" in *Hrvatsko Gospodarstvo u Tranziciji*, Zvonimir Baletić, ed., Ekonomski Institut, Zagreb, 1999.
- Kraft, Evan, "Stabilizacija nije dovoljna" in *Globalizacija i njene refleksije u Hrvatskoj*, Ekonomski Institut, Zagreb, 2001.

- Mihaljek, Dubravko and Marc Klau, "The Balassa-Samuelson effect in Central Europe: A disaggregated analysis", *Comparative Economic Studies*, Vol. 46, No. 1, pp. 63-94, 2004.
- Nikić, Gorazd, "Promjene u strukturi ekonomske razmjene Hrvatske s inozemstvom u razdoblju stabilnosti cijena 1994.-1998. kao indikator promjena izvozne konkurentnosti" in *Hrvatsko Gospodarstvo u Tranziciji*, Zvonimir Baletić, ed., Ekonomski Institut, Zagreb, 1999.
- Nikić, Gorazd, "Kontroverze tečajne politike u Hrvatskoj" in *Tranzicija u Hrvatskoj: Deset godina stabilnosti tečaja i cijena*, Binoza Press, Ekonomski Institut Zagreb, 2003.
- Nikić, Gorazd, "Gospodarski razvitak Hrvatske i konkurentnost na svjetskom tržištu", *Ekonomija/Economics*, Vol. 10, No. 2, pp. 299-318, Rifin, Zagreb, 2003.
- Nikić, Gorazd, "Smijemo li se odreći monetarnog suvereniteta?" in *Tranzicija u Hrvatskoj: Deset godina stabilnosti tečaja i cijena*, Binoza Press, Ekonomski Institut Zagreb, 2003.
- Rohatinski, Jelko, "Hrvatska je sa 23 milijarde dolara inozemnog duga na granici visoko zaduženih zemalja" *Globus*, No. 694, March 26, 2004.
- Samuelson, Paul A. "Theoretical notes on trade problems." *Review of Economics and Statistics* 46 (May 1964): 145-54.
- Santini, Guste, "Utjecaj deficita robne razmjene s inozemstvom na poreznu prsiju neizravnih poreza u Hrvatskoj za razdoblje 1994.-2002. godine" *Ekonomija/Economics*, Vol. 10, No. 2, pp. 373-408, Rifin, Zagreb, 2003.
- Šonje, Velimir and Boris Vujčić, "'Liberalizam" u vođenju ekonomske politike" in *Globalizacija i njene refleksije u Hrvatskoj*, Ekonomski Institut, Zagreb, 2001.
- Švaljek, Sandra, "Kvantitativni pristup razumnoj politici zaduživanja u inozemstvu, s primjenom na Republiku hrvatsku" in *Hrvatsko Gospodarstvo u Tranziciji*, Zvonimir Baletić, ed., Ekonomski Institut, Zagreb, 1999.
- Teodorović, Ivan, "Tranzicijski proces u globalnoj okolini" in *Globalizacija i njene refleksije u Hrvatskoj*, Ekonomski Institut, Zagreb, 2001.
- Veselica, Vladimir and Dragomir Vojnić, "Quo Vadis Croatia: Ekonomska znanost i ekonomska politika tijekom tranzicije" *Ekonomski Pregled*, Vol. 53, Nos. 11-12, pp. 971-1008, Zagreb.
- Vidovic, Hermine and Vladimir Gligorov, *Croatia's Delayed Transition: Competitiveness and Economic Policy Challenges*, WIIW Research Report 304, The Vienna Institute for International Economic Studies, Vienna, 2004.
- Vujčić, Boris, ed., *Euro: Europska Monetarna Unija i Hrvatska*, Masmedia, Zagreb, 2003.

Vujčić, Boris, "Euro adoption: Views from the third row", *Comparative Economic Studies*, Vol. 46, No. 1, pp. 159-176, 2004.

Watson, C. Maxwell, "Adopting the Euro: An introduction to four country studies", *Comparative Economic Studies*, Vol. 46, No. 1, pp. 95-103, 2004.

Williamson, John, *Exchange Rate Regimes for Emerging Markets: Reviving the Intermediate Option*, Institute for International Economics, Washington DC, 2000.

Williamson, John, *The Crawling Band as an Exchange Rate Regime*, Institute for International Economics, Washington DC, 1996.

Williamson, John, ed., *Estimating Equilibrium Exchange Rates*, Institute for International Economics, Washington DC, 1994.