THE IMPACT OF THE CHOICE OF MONETARY POLICY
ON HOUSEHOLDS

UTJECAJ ODABIRA MONETARNE POLITIKE NA KUĆANSTVA

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Abstract: *This paper looks at the impact a choice of monetary policy regime in a small open economy has on households. The choice of monetary policy in a small open economy analyzed in this paper is the choice between the fixed and variable exchange rate. The paper creates a dynamic model conditioned on the real exchange rate. In the end paper looks the data for the confirmation of theoretical assumptions. The data used is from Slovenia and Croatia which have experience both fixed and floating monetary regimes in last 15 years.*
Key Words: *Households, Debt, Choice of Monetary Policy.*

Apstract: *Rad analizira da li odabir monetarne politike utječe na ponašanje kućanstava. U ovome radu pod odabirom monetarne politike razmatramo fiksni i varijabilni tečaj. Rad razvija dinamični model ponašanja kućanstava i na kraju traži potvrdu u ekonomskim podacima. Rad analizira ekonomske podatke Slovenije i Hrvatske koje su imale i fiksni i varijabilni monetarni režim u zadnjim 15 godina.*
Ključne riječi: *kućanstva, dug, odabir monetarne politike.*

1. Introduction

The household has been the workhorse of the modern micro and macro economic research. It is the foundation of the economic research and it serves as the starting point for most economic models[1]. This paper focuses on the behaviour and choices of a household in a small open economy, facing alternative monetary regimes. While in most economic papers we have the analysis how micro factors affect macro economy in this paper we shall take the opposite route. We are going to analyse how macro economic factors impact the behaviour of micro economic participants. In particular we are going to analyse how monetary exchange rate regime impacts the behaviour of households.

The behaviour of the household is governed by preferences and constrains the household faces. The time preferences are based on the premise the household might have difference choices of consumption in any time period. Faced with alternate set ups household might want to consume more today and less in the future or vice versa. This is a well known theory proposed by Friedman (1969); the theory is based on the assumptions the household tris to minimize the volatility of consumption over time and smooth out the consumption path give the funding constraints it is facing. The household is also facing risks over time. There are a variety of risks, however we shall focus on the exchange rate risks in this paper. Given the adverse conditions the household is facing there is a large variety of models that try to explain the behaviour of households under alternate set ups. Most notably Kimball (1990) and Kimball (1993) analyse the households

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preferences for savings, under adverse conditions the households will try to save (and consequently consume less) today in order to avoid adverse affects in the future.

In most models the household has a standard set up of maximizing utility under constraint. Most research is focused on the behaviour of households under different taxation or the portfolio choice depending on the taxation policies imposed by the government. Uribe and Schmitt-Groh´e (2006) and Attanasio and Paiella (2006) look at the households behaviour under alternate price stickiness and how does it change the behaviour of the households. The model we develop does not have a fiscal side and it is only focused on how does monetary policy influence the behaviour of the households. We shall focus on the monetary policy in a small open economy under two alternate monetary regimes: fixed exchange rate and variable exchange rate. The focus of the analysis will be on the choice of consumption, savings and debt depending on the monetary policy chosen by the central bank. The choice of monetary policy is exogenous to household.

1.1 Small Open Economy

A small economy is not self-sufficient, as such it has to import goods. Since imports create trade deficit small open economy will try to make up this deficit by exporting sufficiently. This lack of self sufficiency and necessity to import makes the trade with the rest of the world for a small open economy not just an economic activity but also a survival imperative. However, large trade deficits in small open economy, if uncontrolled, can present large problems for the capital structure of the economy and development of that economy as well.

In the global world like the one in which we live today it is paramount for a small open economy to have free flow of goods and services. Openness to the free flow of goods and services also leads to the free flow of capital.

Small economy does not have the ability to control and restrict the flow of goods and services[2], however it does have some limited ability to control the flow of capital in and out of the country through monetary policy. Some countries have restrictions of inflow, some on outflow, some of both. Croatia has marginal reserve requirement, a special reserve requirement for non resident funding the banks obtain. Croatia has limitations on the outflow of capital for its citizens as well. There are limits to how much money can be taken across the border and how much money can be sent through bank wires outside of the country.

The openness of the economy puts additional pressure on monetary policy and ads a new dimension to it. While in large economies monetary policy is focused on controlling inflation in small open economies monetary policy also has to pay attention to capital flows and foreign debt. However the only tool monetary policy has is the exchange rate. So the issues of foreign debt, household's credit, inflation rate are all outcomes which have to be taken into consideration when the choice of monetary policy is made. It should be noted we are not going to analyse the behaviour of the households under *conduct* of monetary policy, we are going to analyse how the *choice* of the monetary policy affects the behaviour of households. The theoretical background for this analysis comes from Lucas (1975). In this paper Lucas looks at what implication a change in policy "a policy switch" has on economic variables. We are going to investigate this theoretical assumption. Does a change in monetary policy change the behaviour of households? Does when the monetary policy changes the behaviour of the households change as well?

The implications of this are significant, we will need to have two models for the household's behaviour, one for each monetary policy. We will also have to identify what differentiates the models under alternate monetary policy regimes and indeed are there any differences. In order to be able to analyse the success of the model on empirical level we need to have two sets of empirical data. One set from the economy with a fixed exchange rate regime and another from variable exchange rate regime. Also it is important the economies are similar in size and economic history. In order to meet these requirements we are going to look at data from Slovenia and Croatia. Both of these economies had fixed and flexible exchange rate regimes in last 15 years.

This paper is organized as follows part two creates a model, there are two models depending on the choice of monetary policy the central bank has chosen. Part three looks at the real exchange rate and the impact the real

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[2] If the country is a part of the WTO the flow of goods is controlled by the WTO agreement and services are free to flow, as long as they are legal.

exchange rate makes on the household's consumption preferences, part four looks at the empirical data and part five concludes.

2. The model

2.1 The Macroeconomic Set up

The macro economic set up of the model is as follows. The household is a representative households living in a small open economy. There are no barriers to capital movement and trade. We shall also assume there are banks in the economy and they are all foreign owned. In case the banks can not meet household's demands for loans (ie. the households are not saving enough) the banks can import capital and meet the demand for loans. In this case we are dealing with perfectly elastic supply of credit for a household. There is a central bank in the economy. The central bank has two main monetary policies at hand. The first one is a fixed exchange rate policy. In this case the central bank sets the exchange rate, fixes it with another currency at some exchange rate value and defends it. The second monetary policy is variable exchange rate. In this monetary policy the exchange rate is being depreciated over time. The depreciation rate is exogenous to household and household has to optimize given their expectations of exchange rate in the future. In essence the monetary policy for the household is exogenous, but knows what is the current monetary regime. The household can not affect the choice of the monetary policy, it has to adapt to it.

We are not going to explicitly deal with the behaviour of the monetary policy and the central bank, this is dealt in Vidakovic 2006 and Sargent (1999).

2.2 Households in a Small Open Economy Under Fixed Exchange Rate

We are going to uses standard micro economic foundations to develop our model. The household lives infinitely and provides one unit of labour in every time period. The household tries to maximize expected utility through time. So we have standard Ramsey problem:

1. $\max E\left[\sum_0^\infty \beta^t u(c)dt\right]$; subject to income

The household tries to maximize the expected utility over time, u(c) functions is a continuous, twice differentiable function, β is a discount factor.

However the household has some budget constraint. The budget constraint is derived from income in each time period:

2. $I_t = w_t + \tau * S_t + \phi_t$

The expenditures in time period t we shall define in the following way

3. $E_t = c_t + s_t + \kappa * \Phi_{t-1}$

The household expenditures (E) can be divided into consumption c, savings s and the portion of the existing debt paid from period t-1 paid off in period t. Both debt and savings come from banks. The household can not buy government bonds. The portion of debt paid off is marked with ϰ and it has the value 0<ϰ<1. Income of the household I, comes come wage w, new debt Φ and the portion τ of savings that gets liquidated; τ has the same properties as the ϰ. S is the total savings the household has accumulated over time up to the period t and s is the new savings in time period t.

If we look at the savings and debt we have to note savings and debt accumulate over time and the accumulation can be expressed with the two following equations:

4. $\Phi_t = \sum_0^{t-1} \phi_{t-1}(1+r_i^*)^{t-1-i}$

5. $S_t = \sum_0^{t-1} s_{t-1}(1+r_i)^{t-1-i}$

The debt is increasing and accumulating at the rate r*, this is the rate the bank is offering to the household. We shall assume the rate is the same for each household, exogenous and perfectly inelastic for any

level of demand[3]. We are going to impose no ponzi condition, so the household can hit the upper level of debt as described in Vidakovic (2005a) (2005b). The household gets interest rate on its savings of r. It should be noted in this set up it is possible the households have new debt and new savings at the same time.

In equilibrium the usual E=I holds, when we solve the equations for the c we get the equation:

6. $c = w + \tau * S + \Phi - s - \kappa\phi$

This equation represents the flow of consumption in every time period. We can now focus on the utility function. The household utility function is homogenous, twice differentiable and it has the following form:

7. $u(c) = \left(\dfrac{c}{1-\gamma}\right)^{1-\gamma}$

Before we move to the formulation of the bellman equation we have to analyse the state function. We are going to use equation 2, but in a modified econometric form. We can now get the difference equation for income in each time period t+n:

8. $I_{t+n} = \alpha_0 + \alpha_1 * w_{t+n-1} + \alpha_2 * \omega^E_{t+n-1} + \alpha_3 * \Phi^E_{t+n-1} + \varepsilon_t$

Where ε is error term with distribution N(0,σ) and it is valid for all three variables and $\omega = \tau * S$, E is the expectations. Note the wage does not have expectations. The reason for this is that we are going to assume the real wages are constant for household. Equation 8 is the expected income the household is going to receive in some future period which is n period from period t. However the equation 8 is expected income only for period t+n, what we are looking for is the solution to the above equation and also for the present value of all future income.

We can solve equation 8 using the Muth's method of undetermined coefficients as used in Muth (1961) which gives us following solutions satisfying both criteria we mentioned:

9. $W = \overline{W} + \sum_{t=0}^{\infty} {}_i \varepsilon_{t-1}$

Parameter W is the present value of all future income the household is going to obtain.

Now we can use the utility function as the control function and consumption function as the state function and we can set up the Bellman equation, the value function. The value function takes the following form:

10. $V(c) = \max_{W' \in [0,W]} u(c) + \beta V(W')$

Where W' is the next period total income left to the household. This is general formulation of the bellman equation. Another thing has to be noted the equation 10 is not a stochastic bellman equation. The lack of the stochastic element will have a major impact on the development of the model as we shall see latter.

2.3 Households in a Small Open Economy, Under Variable Exchange Rate

The model we developed in 2,2 is a closed economy model, where there are no imported goods, no risk of the exchange rate changes and of course no consumption of foreign goods. Theoretically following Lucas (1995) we now have to develop a model that includes all these factors. The problem a household in a small open economy faces is a little more complex due to the ability to choose the source of the goods it is consuming. By the source here I mean whether the goods are imported or domestically manufactured. We shall now reformulate the consumption based on the source of goods. Now we have the consumption in each period as:

11. $c = \lambda c + (1-\lambda)c$

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[3] As we shall latter in the model see the level of credit in the economy is not determined by the supply, but by the demand coming from households.

The consumption of a household is split between two segments, domestic and foreign. The parameter λ has property 0≤λ≤1 and presents what fraction of the goods the household consumes is manufactured domestically and what fraction is imported.

So in a small open economy the goods can be from domestic source λc= c_d or from (1-λ)c= c_f a foreign source. Now the utility function in its parameter form looks like this

12. $u(c) = \left(\dfrac{c_f + c_d}{1-\gamma} \right)^{1-\gamma}$

Again trying so set up a dynamic formulation of the problem the household is trying to solve is

13. $\max E \left[\displaystyle\int_0^\infty \beta^t \left(\dfrac{c_f + c_d}{1-\gamma} \right)^{1-\gamma} dt \right]$, subject to income

The consumers can choose between the consumption of domestic and foreign goods. We assume the foreign and domestic goods and perfect substitutes. Under this assumption the only thing that differentiates products is their current price. In any time period the price shall be determined through exchange rate. The total income spent on consumption in time period will be

14. $\varpi = c_f * p_f * e + c_d * p_d$

Where c is goods consumed, p is price of goods, e is the exchange rate and subscripts f and d present foreign and domestic goods respectively. Under variable exchange rate monetary regime the household has to create expectations about future values of prices and exchange rate. We can rewrite the above equation as:

15. $\varpi_{t+1} = c_f * p_f * E\left[e_{t+1} | \Omega_t \right] + c_d * E\left[p_{d,t+1} | \Omega_t \right]$

The total income spent of consumption of goods in time period t+1 is now conditional of on the expectation of the real exchange rate in next time period based on the information in current period. The questions now arise; what impacts the changes in the expectations of households? Also what is the interplay of nominal exchange rate, domestic prices, foreign prices exhibited through the real exchange rate? How do exogenous shocks affect the price level? The shocks in the end are reflected in the real exchange rate.

The household tries to optimize the behaviour based on the expectations of shocks. If the shocks in reality turn out to be persistently negative we are going to have constant appreciation of the real exchange rate and because of that there will be constant substitution of domestic goods for foreign goods, leading to the constant widening of the trading gap due to the substitution effect.

Here we only see the substitution effect due to the exogenous elements that affect the behaviour of the household. Monetary policy and the real exchange rate are variables that are given to the household; they are imposed onto households, without the household's ability to control them. The household can only behave given the information it possesses and optimize its consumption based on the information it holds. The impact of the real exchange rate still remains to be answered. We shall look at it closely in section 3 of this paper. But now we can look at the behaviour the household can affect and that is the choice of level of debt the households are willing to hold. Using the equation 6 for the consumption can now be augmented for expectations; we can now formulate a differential equation:

16. $c_t = w_t + E\left[\tau \displaystyle\sum_0^{t-1} s_{t-1}(1+r_i)^{t-1-i} \Big| \Omega_{t-1} \right] + E\left[\Phi(t) | \Omega_{t-1} \right] - E\left[s_t | \Omega_{t-1} \right] - \kappa E\left[\displaystyle\sum_0^{t-1} \phi_{t-1}(1+r_i^*)^{t-1-i} \Big| \Omega_{t-1} \right]$

As we can see all of the variables are now augmented for expectations. The expectations operator presents the element of uncertainty the household is facing. The uncertainty comes from the exchange rate, if the household holds savings in foreign currency and/or has debt denominated in foreign currency it is facing a currency risk. The exchange rate behaviour and the expectations of the value of the household debt are only relevant for the flexible exchange rate regime. Under the fixed exchange rate regime we have the nominal exchange rate in period t+1 is equal to the nominal exchange rate in period t. So there is not need for the expectations because the future is known. By introducing the variable exchange rate in the behaviour of the households we have in effect introduced uncertainty.

This has significant implications about the level of debt the household is willing to hold. Under fixed exchange rate, if household's debt is denominated in foreign currency the annuity of such debt is same in

every period. However if exchange rate is variable the value of annuity can change, thus producing uncertainty how much the household will have to pay in the next time period. If the household is risk averse the household will opt to have as little debt as possible, on the other hand risk loving household will be indifferent to the level of debt it holds.

Here we find the very first implication of the monetary regime and the behaviour of the household. Under the fixed exchange rate regime the exchange rate does not play a role in the households' debt level in any period of time, however when we have introduced the element of uncertainty coming from the exchange rate risk the behaviour of the household changes dramatically.

By introducing the uncertainty for the households the households are creating a risk aversion towards debt and the exchange rate serves as a deferent for the households when it comes to getting loans from the banks. Using the same W from equation 9 we can also see that on the value function for the flexible monetary exchange rate regime, which now becomes:

17. $V(c) = \max_{W' \in [0,W]} u(W - W') + \beta E[V(W')]$

The equation 17 in fact is a stochastic bellman equation and the stochastic element is derived from the fact the consumer simply does not know what his value of W in any is given period under the flexible exchange rate, E denotes expectations.

3. The Real Exchange Rate

We are now going to analyse the consumption choices of a household in a small open economy where the households have choice between the domestic and foreign good. Let us take a representative good x, produced both domestically and imported. The domestic good is a perfect substitute for foreign good and vice versa. In the case of determining the price of goods x we have the two different possibilities of price

18. $p_{f,x} = p_x * e$

$p_{d,x} = p_{d,x}$

The price of the domestic goods x expressed in domestic currency $p_{d,x}$, on the other hand the price of the foreign good is the price of the foreign good x, $p_{f,x}$, expressed in foreign currency times the exchange rate noted as e. Under fixed exchange rate regime there is never a change in the nominal price of the exchange rate so e is constant for ever. Under variable exchange rate we have constant changes in the nominal rate, since the basis of the monetary policy is the exchange rate depreciation.

Since the household is trying to maximize the utility and utility comes from consumption the household is trying to consume as much as it can in every time period given constraints. We shall assume the household is indifferent between consuming domestic and foreign goods[4]. We now have tree basic cases of how the household shall choose between the goods:

$p_{d,x} = p_x * e$ the household is indifferent between which good to consume

$p_{d,x} < p_x * e$ the price of the domestic good is less, the household will choose the domestic good

$p_{d,x} > p_x * e$ the price of domestic good is greater the household will choose the foreign good.

Looking at the set up of consumption from the above three consumption cases we see it is much easier to control the preferences of the households in the economy where the monetary policy can control the nominal exchange rate. Just by examining these three cases we have the issue of inflation under fixed and variable exchange rate. It is a common theoretical and empirical fact the exchange rate will "transfer through" into inflation. This is well developed in Coricelli and Jazbec (2004), Rebelo, Burstein, Echenbaum (2005). So the only real determinant of the consumption prices and thus ultimately the preferences will be the real exchange rate. The impact of the real exchange rate on the household's consumption will be developed latter in the paper. However it is evident from the three cases the exchange rate pass through, inflation, nominal depreciation, real exchange rate pose and intricate elements governing the size of the consumption and the

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[4] The author is aware of the fact the this assumption might not absolutely hold in real life, due to the patriotic and brand preferences, but as the model shall show this assumption will hold due to law of large numbers and in the long run.

choice between the imported and domestically produced goods. From this we can easily, although not concussively draw the second policy assumption. As long as the real exchange rate of domestic currency is depreciated from the macroeconomic level thought macroeconomic policies the individual household's consumption can be controlled and stirred towards the consumption of domestic goods.

The household's consumption is determined by the real price of goods. However the price of imports is determined through the real exchange rate. If the policy maker has an object to maximize the consumption of domestic goods, the choice of monetary regime has to be a regime under which the real exchange rate is going to depreciate, thus depressing the consumption of foreign goods and increasing the consumption of domestic goods.

3.1 A Simple Real Exchange Rate Index

The introduction into this paper argued the importance of the choice of the monetary regime. The importance of monetary policy is not just the control of inflation, but the impact the choice of monetary policy has on the whole economy. In part two we have created a model that has a household trying to optimize their behaviour under the rules set by the central bank[5].Since we are dealing with two monetary regimes even before we look at the model some initial observations are in order. The impact of the real exchange rate can be summarized as follows. A consumer tries to maximize utility, through consumption. If domestic good and a foreign good, are perfect substitutes the consumer will opt for the cheaper good, thus maximizing his utility[6]. If over time the real exchange rate is appreciating, the substitution effect will envelop more and more goods, leading to higher imports and lower domestic production. If the real exchange rate is depreciating over time the substitution will move in the course of domestic goods. Naturally this argument is only valid for goods that can be produced in a country.

But before we look at the impact of real exchange rate on consumers and producers we have to have some measure of the real exchange rate.
In this paper we shall develop a very simple real exchange rate index as used in (Vidakovic 2006). Index of the real exchange in the model is going to be:

$$\Phi_t = \Lambda \prod_0^t \frac{1}{\left(e_t^{ex} - e_t^{im}\right)+1}$$

19.

Λ – Constant, the beginning value of index. In the discussion we shall use 1994 = 100.

e^{ex} - price change in Croatia or Slovenia (percentage change or inflation) *plus exchange rate appreciation minus the exchange rate depreciation in the period in percentages.*

e^{im} - world inflation, in this case inflation in EU*, in percentages.*

The index created here is very simple, yet it has powerful implications for the behaviour of economic participants as we shall see. If the index is going down, means the prices in domestic country are going up at higher rate then the prices in the rest of the world[7]. Meaning the real exchange rate is appreciating. The domestic goods are more expensive, foreign goods are cheaper. Under the assumption of perfect substitutability between domestic and foreign goods in this case the domestic consumers will substitute domestic more expensive goods for cheaper foreign goods.

On the other hand if the index is going up, the prices in the rest of the world are increasing faster then the prices in domestic country and the real exchange rate is depreciating, the households will start to substitute foreign goods for the domestic goods. According to the basic theory fall in this index should be negative for the exports in small open economy. Alternatively a rise in index and real depreciation of domestic goods should create a rise in exports and decrease in imports. But in order to analyse the behaviour of economic participants under alternative monetary regime we have to determine for a fact that Croatia and Slovenia had opposite monetary regimes in the period studied.

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[5] The central bank follows its own choice of monetary policy.
[6] Again emphasis is on the assumption the domestic and foreign goods are perfect substitution. So the customer buys cheaper good in order to consume more for the same amount of money.
[7] Naturally there is a reverse interpretation in the case of deflation. The domestic prices are falling at a slower rate then the prices in the rest of the world.

4. Empirical Data

In this section we are going to look at the technical and basis statistical analysis of the movement in prices of HRK and Slovenian Tollar over the period studied. The purpose of this brief analysis is to provide a basic difference between the way exchange rates of HRK and Tollar have moved over time. Slovenia had a flexible exchange rate regime with constant depreciation of the nominal exchange rate in the period of 1994-2005. In the same time period Croatia had two monetary regimes, a flexible exchange rate regime that lasted from 1994 after the end of hyperinflation up to 2000. After this period there was a period of a fixed exchange rate regime, from year 2000 until 2005.

Kuna exchange rate has been in a very narrow range from the period of mid 2000 until today. The mean of the whole period between 1994 and 2004 is 7,28, with the standard deviation of 0,33. Minimum of the series is 6,61 and the maximum is 7,73. The lower band is 0,67 Kuna away from the mean of about 9%. The upper bound is 0,45 Kuna away from the mean or 6%, essentially indicating an upward resistance. The important point in the monetary policy of Croatia comes in 2000, this is the year Croatia experienced a monetary regime switch. The switch occurred in 2000 when the new CNB governor came to power. At the beginning of 2000 exchange rate moved from 7,6 to 7,4. Since then the exchange rate has been between 7,3 and 7,5 without any clear trend. The data shows that since the beginning of 2001, after the initial appreciation from 7.7 to 7.3 Kuna was heavily controlled, the exchange rate was not fixed, but it was been kept in a very narrow band. For the purpose of this paper this tightly controlled banned or "dirty float" shall be considered a fixed exchange rate regime.

The regime switch can be assumed based on the sudden change in the direction and volatility of the exchange rate. The impact of the fixed exchange rate regime should be translated in the real exchange rate data. We should see the impact in the change of the regime on the index of the real exchange rate once the equation 19 is simulated.

The same analysis can be done with the Slovenian Tollar, The data is indicating a constant flexible exchange rate regime of depreciating currency. The mean of the series is 201,783 from 1994 to 2005. The highest point is 239, 99 and the minimum of the series is 150, 78. It should be noted that the minimum value occurs at the beginning of the series and the highest value occurs towards the end of the series. The fact that Slovenian dollar has had a very clear direction indicates the monetary regime was oriented towards depreciation of currency.

When comparing the time series of the exchange rates the first and the most important comparison should be made based on changes in the nominal exchange rates over time. The Kuna is in a very narrow band in period from 2000 until 2005, while Tollar is slowly increasing over time. The depreciation of Tollar ends once Slovenia got into EU and had to stabilize the exchange rate in order to prepare for the EMU, again this kind of change in the monetary policy indicates a change in the monetary regime a move from a flexible exchange rate policy to a fixed exchange rate policy. The implications of this monetary policy should be reflected in the real exchange rate. If Slovenia has managed to create a real depreciation if its currency we should see it in the calculation of the equation 19, if not the real depreciation will not show in the index. The index was calculated using the CPI data for both Slovenia and Croatia and the nominal exchange rates. Let us now look at the real exchange index. Real exchange rate for Croatia and Slovenia.

As the table show there has been a double appreciation. Over time both countries have experienced the downward movement in the real exchange rate. The results along the same line can be found in (Flere 2004) and (Coricelli and Jazbec 2004). Slovenian real exchange rate fell by 14% from its peak while Croatian real exchange rate fell by 25% from their peaks in 1995. Although both countries were not able to avoid real appreciation, the effect of real appreciation is smaller in Slovenia under variable exchange rate regime. What is a characteristic of Slovenian index is small volatility. The index in appreciating over time, but is should be noted rates of depreciation are very small. The difference from high to low are approximately 13 points.

Table 1: Real exchange rate index.

year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Index Sloven.	100	103.61	102.77	100.51	94.90	95.84	97.21	94.28	92.58	90.85	89.90
Index Croat.	100	112.24	112.06	108.37	103.67	95.55	88.46	85.39	86.40	86.74	84.33

Source: Author's calculation

Croatian index in is exhibiting a larger volatility and it has two periods. The first period is the period from 1994 to 1998. in this period the index has dropped, but then in 1998 and 2001 there are two substantial drops. Index moves from 103 in 1998 to 95 in 1999 and to 88 in 2000, a 15 points drop in time span of two years. We have developed two models, one under fixed and one under flexible exchange rate monetary regimes. In this paper we are only looking at the households, not the central bank, not the firms. We have also established that fixed exchange rate leads to stronger depreciation of the real exchange rate. However this is a weak assumption since we are only looking at two counties.

The economic cycle can be described as follows: under fixed exchange rate the real appreciation of the currency is stronger then under variable exchange rate. The direct effect of the real appreciation was the substitution of domestic goods for foreign goods on microeconomic level, as the households noticed the foreign goods are relatively cheaper then the domestically produced goods. Substitution effect has increased the demand for imports, thus increasing the trade gap. Since a country needs to finance the trade gap, it has to obtain the money somehow and the only way to do obtain money was through the foreign debt. The model presented this correlated recursive relationship between the choice of the monetary policy and the behaviour of the participants in the economy.

4.1 Economic data

We have tried to model micro behaviour of economic participants conditioned on the macro set up, however the picture is sum of its parts. In this segment we are going to look at the macro variables. We are going to look at foreign debt and household debt. Foreign debt is a standard measure how much inflow of money there has been over time in the country. The rational behind the second variable lies with the assumptions we have made in the paper about the level of debt the households are willing to hold. If the banks can not meet domestic demand foreign debt in the economy will rise since the banks are trying to meet the demand for loans.

Table 2: Croatian and Slovenian foreign debt (gross)

	12.94.	12.95.	12.96.	12.97	12.98	12.99	12.00	12.01	12.02	12.03	12.04	12.05
CRO	3020	3809	5308	7452	9173	10101	12109	13458	15055	19811	22781	25541
SLO	3706	4275	5380	6166	6459	8012	9491	10403	11484	13256	15271	19565

Source: CNB and Slovenian Statistical Institute in million of Euros

Table 3: Croatian and Slovenian foreign debt as percentage of GDP

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SLO			29,44	34,42	36,58	34,90	40,66	47,13	47,43	49,35	53,97	58,57	71,46
CRO	24,20	20,70	20,20	26,70	37,10	47,60	54,10	60,60	60,70	61,50	75,50	80,20	82,50

Source: CNB and Slovenian Statistical Institute in million of Euros

Now we shall look at Croatian foreign debt in two periods, the first period is from 1994 to 1999. The second period is from 2000 to 2005. As we can see the foreign debt in the first period increased 3,3 times. It should also be noted the main source of the rise in foreign debt was the government which was issuing bonds CNB Bulletin. The second period 2000-2005 however is shorter. In time span of six years the foreign debt has increased about 2,5 times. It should be noted the main source of debt in this time the main source of foreign debt were companies and banks. The same analysis can be done on the Slovenian data. If we look at the Slovenian data the foreign debt is increasing as well thought the period, but what has to be noted is the rate of the rise in the foreign debt.

While Croatian foreign debt has risen from the end of 1994 until the end of 2005 8,45 times. In Slovenia it rose by 5,27 times. If we exclude 2005 since in this year Slovenia was on the fixed exchange rate regime the growth of foreign debt falls to 4,12 times in the time span of 10 years. There are several things that should be noted. In terms of absolute level of debt Croatian foreign debt changed from 3 bln euro at the end of 1994 to 10 bln at the end of 1999, so in terms of absolutes the change was 7 bln. On the other hand

from the end of 1999 to end of 2005 foreign debt increased 2,5 times but 15 bln in terms of absolute values. Or twice as much. In Slovenia we can see a similar story. From end of 1994 to end of 2004 foreign debt increased 11,5 biln Euro, however in 2005 it increased 4,3 bln. This points to the fact the actual inflow of capital under alternate regimes is vastly different and has to be looked in terms of absolute values, not growth rates. Same is with the growth of loans to households. From end of 1995 to end of 2000 loans to households have increased by 2,7 bln Euro in Croatia. From end of 2000 to end of 2006 loans to households have increased 9,8 bln Euro. As it can be seen the growth of loans in absolute terms is significantly different under different monetary regimes. Similar picture in terms of household loans can be seen in Slovenia as well. From end of 1993 to end of 2003 loans grew by 2,2 bln Euro, and from end of 2003 till end of 2005 they grew by 1,2 bln euro. As we can see under variable and fixed exchange rate regimes, the percentage growth rates might be the same, but the absolute numbers are significantly different.

5. Conclusion

This paper examines how the households are behaving under alternative monetary regimes, more specifically how the households behave under fixed and floating exchange rate regimes. The paper develops a dynamic model based on the rational expectations econometrics and optimal control mathematics. The funding thesis of the model is that the monetary policy has significant impact on the behaviour of households. This impact is passed on to the households through the real exchange rate.

The paper assumes the households are rational and try to maximize consumption over time. If the domestic and foreign goods are perfect substitutes the households are going to choose the cheaper good. If the real exchange rate appreciates over time, the households are going o substitute domestic goods for foreign goods.

Also under fixed exchange rate the households have less risk aversion towards debt, this can be seen in the absolute levels of loans to households.

These two elements together are basically driving the foreign debt of a country, the substitution leads to increasing trade deficits and increase demand for loans leads to bank's borrowing from non residents, all together increasing the foreign debt of a country.

The conclusion of the paper is the choice of the monetary policy leads to significant impact on the behaviour of the households on micro economic level and the only way to change the behaviour of households is to impact the real exchange rate through the monetary policy.

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