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EURO, DOLLAR OR MAYBE HRYVNIA?

During the second half of the 1990s most of the NIS countries (former Soviet Union) strictly their newborn currencies to some hard and well-established one, primary US dollar. But since then the new currency, evro has arisen on the world financial markets, so it is quite possible that countries, which want to join EU in perspective, are in need to shift their peg from US dollar to evro. This article evaluates unilateral adaptation of euro and movement from single currency peg to basket peg. The main results are that while unilateral adaptation of any currency and especially evro is harmful for the Ukrainian economy, the usage of basket can be beneficial, preferred both to free float and single currency peg.

The evaluation of change of target currency for Ukraine

During the second half of the 1990s most of the NIS countries strictly pegged their newborn currencies to some hard and well-established one, primary US dollar. This was made in order to fight rampant inflation or at least the danger of such inflation that might lead to instability and disruption of currency flows both inside and outside the country. At the moment of introduction of dollar as target currency in 1995 where weren't any other viable alternative for Ukraine - two other world currencies, yen and deutsche mark, were clearly inferior choices for Ukraine at that time. But, since introduction of cash euro in 2002 there exist viable alternative for US dollar as a target currency for Ukraine. Nowadays, situation is to some extent paradoxical - the USA aren't important trading partner for Ukraine (less than 5 percent of total), but dollars are the main unit of measurement of Ukrainian foreign trade (the same situation is in all CIS as well), while Europe share is over 20 percent and stably growing for the last four years.

At the eve of their independence, most of former Soviet Republics introduced some form of own currency or semi-currency (as Ukrainian coupon-karbovanetz which at the start was more akin to the "right to buy" with soviet ruble that where issued by Russian central bank). Alas independent monetary policy of newly independent states (NIS) was not aimed toward stability and creation of socially optimal economic environment. Far from that, most governments started excessive usage of newly appeared soft budget constraint. Such flooding of domestic economies with cheap credits, subsides and other budget transfers of course, led to sharp increase in price levels. High inflation was sad experience in all transitional economies.

Mainstream economic though distinguish two types of exchange rate policies, one of fixed and another of flexible exchange rate, which may be later further separated into (1) 'true' or 'pure' float (without intervention of the central bank), (2) dirty/managed float, (3) adjustable peg to currency or basket of currencies in levels or in changes in levels correspondingly to inflation and similar factors (so called 'crawling peg' when it is determined that currency may depreciate only on given percent per given period). Different transitional economies used different exchange rate policies in different periods.

Currency board arrangements (total number of countries which use it is 8)	Other conventional fixed peg arrangements (including de facto peg arrangements under managed floating) (44)	Exchange rates within crawling bands (5)	Managed floating with no preannounced path for exchange rate (33)	Independently floating (47)
Bulgaria *, Estonia *, Lithuania *	Latvia *, Macedonia *	Hungary	Czech Republic, Croatia, Kazakhstan, Kyrgyz Republic, Romania, Russian Federation, Ukraine, Yugoslavia, Azerbaijan, Belarus, Slovak Republic, Uzbekistan	Albania, Armenia, Georgia, Moldova, Tajikistan

* Indicates that the country adopts more than one nominal anchor in conducting monetary policy. It should be noted, however, that it would not be possible, for practical reasons, to infer from this table which nominal anchor plays the principal role in conducting monetary policy.

Source: INTERNATIONAL FINANCIAL STATISTICS, IMF (As of March 31, 2001).

Most of them started with en-masse liberalization of both domestic and foreign markets, but formerly repressed demand for imports pushed their trade deficits to undesirably high levels, so need for some form of management has arisen. In a group of countries, including Ukraine, such management included a lot of administrative rules and prohibitions, such as compulsory sale of earned foreign currency by exporters at pre-determined exchange rate, rationing of acquired hard currency between importers and other actions of non-market regulations that lead to severe corruption in respective agencies. Moreover, constantly raising inflation summoned by un-wise fiscal policy pushed ordinary citizens and businessmen alike to substantial currency substitution'.

If Ukraine has to use austerely managed exchange rate policy it can choose between several options. It may adopt independent adjustable peg regime similar to one that is used now. It allows infrequent small adjustment of exchange rate upward or downward whenever shifts in fundamentals will call for it.

[1] It should be named 'asset substitution' as those who keep foreign currency use it as an asset, which price doesn't deteriorate with price increases.

The second option is 'crawling' peg regime which, to some extent is assumed by Ukrainian Parliament together with the National Bank. Its objective is to maintain competitiveness of exporters by allowing currency to craws downward (or upward) to offset the differences in inflation rates in Ukraine and its main trading partners. In last year budget as well as this year one exchange rate in set in some corridor and mid-year exchange rate predicted to be above beginning of the year rate and below end of the year rate. The theoretical problem with crawling peg is that most of the empirical studies of relative purchasing power parity (relative PPP)' cannot reject hypothesis that no PPP exists.

The choice between fixed exchange rate pegged to either basket or one currency wasn't discussed a lot in modern literature on exchange rate regime and its determination. Most textbooks and articles alike for simplicity use one currency approach. Meantime the optimal choice depends on conditions in country in question. In the following table advantages and drawbacks of each system presented

Single Currency peg	**Basket peg**

Advantages

1. Simplicity of establishing and monitoring.	1. Trade-weighted exchange rate fluctuates less especially if basket includes most important trading partners with respective weights.
2. If country to currency of which domestic currency pegged has historically low rate of inflation then "discipline-importing" could stabilize and/or reduce domestic inflation.	2. Diversification of risks.
	3. It is assumed that pegging to currency should enhance trade and capital flows within countries, whose exchange is pegged. And greater diversification of trade and capital flows decreases the effect of external shocks.

Disadvantages

1. All eggs in one basket, absence of diversification and insurance against risks abroad. Any external hock will be imported.	5. Problem with setting rules. Whether to use geometrically or arithmetically weighted basket, etc.
2. Beggar-by-neighbor problem. Country to currency of which domestic currency is pegged may start to pursue less tight monetary policy as drawback of such actions will fall for both countries, while benefits will go only to one.	6. The more countries' currencies are in the basket, the greater is risk that at least one of them will change its monetary policy.
3. If trade of domestic country is much diversified and/or "peg currency's country" isn't large enough trade partner of domestic country then pegging to such currency is purely artificial and doesn't reflect fundamentals of exchange rate determination.	7. If in the basket both low and high inflation countries are presented then problem of undesired imported inflation may arise.
4. Close link to a single currency in general should generate greater imbalances in domestic internal and/or external sectors and thus greater amount of reserves is necessary to offset such imbalances.	8. The commitment to fixed exchange is usually lower in basket, as large devaluation of one currency toward other currencies of the basket may be argument for similar devaluation ("to restore competitiveness for exporters to the specific country") and even to domino effect.

The top five Ukrainian partner countries-importers are responsible for almost 70 % (data for the 1st quarter 2003) of total trade. They are the following: Russia (40.2 %, with most of it being oil and gas), Turkmenistan (12.4 %, 90 % of it being gas), Germany (7.8 %), Poland (3.1 %) and Italy (2.4 %). If to split import on regions then 57 % from CIS countries, 30.4 % came from European Union (including new members, Poland et al.), 7.5 % from Asian countries and rest 5 % from the rest of the world. From this numbers it can be seen that Ukrainian trade is quite centralized with two main direction, often dubbed 'East' and 'West', i. e. former USSR and EU. It is quite unlikely that Ukraine will re-orient own markets toward other countries in the nearest future, as main imported goods are crude oil and gas that came primary from Russian Federation and Turkmenistan, while Europe supplies mainly cars (especially Germany and France) and general machinery, including office equipment and electronics.

The situation in export is quite different. First of all, the top five countries of destinations accounts only for 37.3 % of total export. They are Russia (16.2 %), Germany (6.1 %), Italy (5.8 %), China (5.5 %) and, finally Turkey (3.7 %).

On unilateral euroisation

One of the extreme points of view is that Ukraine should not only shift from managed float with respect to US dollar to the basket of currencies which would include euro, but to move toward unilateral adaptation of euro (e. g. discussed in Blandinieres, 2001). Alas, there is no significant literature on this topic for Ukraine, but the Central Banks of several

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[1] Thus that amount depreciation of one's currency is equal to difference in inflation rates home and abroad.

countries which move to accession to EU and EMU published several papers on this subject and I'll base my position on euroisation on them.

The official **euroisation** is the withdrawal of the national monetary unit and the introduction of the euro as the only legal tender. In this case the Central Bank ceases to issue money, to be a lender of last resort and to control inflation and the interest rate, i. e. independent monetary policy and monetary sovereignty is abolished. Unofficial euro- and before that DM-isation already exists on a large scale in Eastern Europe and the FSU, though often dominated by (informal) dollarization, especially in the CIS. In 1995 the German Bundesbank estimated that about 30 % to 40 % of all DM notes and coins in circulation were held abroad (Seitz 1995), which compares with a Federal Reserve estimate of 40-60 % for the US dollar (Feige et al., 2000).

The reason for recommended euroisation is (1) to decrease the monetary risks; (2) to adequate the high extent of integration of the economy into the eurozone or to press on towards greater economic integration, through both greater trade and greater foreign direct investment, especially if euroisation is accompanied by mutual trade liberalisation or possibly a free trade area without the considerable restrictions still impeding trade with the EU; (3) to evade certain negative developments, that the turbulence experienced by the home economy is symmetrical to the turbulence in the eurozone, so that the European Central Bank's monetary policy would be optimal for home country as well.

The first and foremost argument for or euroisation is the national governments' ability to overcome their inability otherwise to borrow internationally in their domestic currency (Hausmann, 1999, 2000), the problem faced by many transitional economies. Euroisation also avoids both the volatility and inflationary bias of floating rates, and the vulnerability to speculative crises of not irrevocably fixed rates (see Mundell 2000). Even successful regimes of fixed exchange rate can be made vulnerable by their own success, as they attract capital inflows which lead to real revaluation undermining competitiveness (as was in West Germany's case under Breton-Woods in 1957 and 1969); at some point those flows can be easily, suddenly and massively reversed. Irrevocably fixed rates, unlike pegs subject to intermittent adjustments, do not encourage speculation — as demonstrated by the experience of EMU members since May 1998 when Maastricht Treaty Agreements came to action. In addition, the benefits of euroisation, as in the case of monetary unification, are lower transaction costs, precisely as for the EMU members. This is the main argument of optimal currency zones framework created by Mundell (1961).

One of the arguments for official, i. e. approved by government euroisation being the fact that after financial crises and devaluation of assess that are denominated in a local currency, the economic agents in most East European and Former Soviet Union countries in transition keep some of their savings in US dollars, euro (previously DM) or Swiss francs. Real estate is quoted in a foreign currency as are some salaries and prices for durable goods, especially imported (cars, computers).

There are two factors needed and sufficient for success from the perspective of pure macroeconomic logic: an official reserve, which is large enough to replace the national currency and a good level of integration with the country (region) whose monetary unit is introduced. The unilateral introduction of the euro is synonymous to final abandonment of whatever monetary policy of the central bank. It is a big sacrifice in a country with non-competitive economy and low-income levels, as it leaves it with very few instruments to strengthen competitiveness to withstand the pressure of the free European market and to attract capital. It takes time, perseverance and phased integration to meet the Maastricht criteria of similarity and the ERM II. This is time of development and adjustment. Remember, that none of the eurozone member countries met these conditions at once.

The unilateral euroisation leads to the loss of the seigniorage (the net income from money issuing) for the past period. Ukraine's seigniorage for the year 2002 was 6.969 bn UAH and accounted for 3.1567 percent of GDP. The reserves of the NBU should be equal to 6.67 bn euro at present exchange rate of 6.01 UAH per euro, or 63 percent more than now even if M1 aggregate is the targeted amount of currency to change (with M2 it is 159 % more). If temps of growth of official reserves will remain the same it will take years to reach the desired amount, if no seigniorage from now on is executed at all (i. e. no growth of hryvnia or change in exchange rate). But there is another *hazard* of abandoning monetary policy, namely absence of a lender of last resort, which would involve a considerable degree of financial fragility, particularly serious in the countries with underdeveloped financial sector, such as Ukraine, where assets of banking sector are just a fifth part of GDP (NBU Bulletin, various issues). Of course, this problem may be partially solved by stand-by arrangements from private banks taking on a lender of last resort function. Note, however, that banks could be bankrupted as a result, not for straight insolvency but for complete illiquidity artificially

created by the deficit of euro within the country. The problem would be aggravated by the fact that the ECB will not take on any responsibility for the supervision of financial institutions in the country, as euroisation was unilateral, i.e. without approval of the ECB.

In conclusion, as of today that will cost the country (counted in a way similar to that in Kosov & Kosova, 2002):

1) onetime sum of approximately 6.7 billion euro needed to replace hryvnia with euro (calculated with Ml = 46815 UAH (June, 2003); and rate 6.014465 UAH/€) or even more in case time deposits also call for the exchange;

2) annual loss of seigniorage at least 3.17 percent of the GDP (data on year 2002, previous years seigniorage was higher);

3) renunciation of monetary sovereignty;

4) elimination of the NBU as supervisor and LLR;

5) loss of reputation due to straight violation of norms signed by Maastricht Treaty. The last three losses cannot be easily measured in terms of currency but the political implications are very high.

The unilateral introduction of the euro is not free admission to the euro system. On the contrary, it is very expensive and politically incorrect.

It is however, very important to note that the primary purpose of monetary integration, and of euroisation as its earlier substitute, is that of promoting the economic integration of Ukraine to the EU. This purpose could be achieved simply by the EU unilaterally removing or at any rate reducing residual trade barriers with those countries, such as those of quotas for lower duty trade as in textiles and chemicals, impositions of anti-dumping provisions, and other measures of contingent protection in case of "injury" to national producers. It is simply inappropriate - for the EU and accession candidates alike - to place almost exclusive emphasis on enlargement and monetary unification neglecting at the same time the existing, immediate opportunities for deeper and faster trade integration (Nuti, 2001).

Theory

Before going deeper in the concept of basket of currencies I wish to give very short overview on mainstream ideas of choosing between fixed and flexible regime of foreign exchange. The following table contains the recommendations of economists toward Ukrainian choice of exchange rate on the basis of its fundamentals.

Structural Characteristic of Ukraine	Preferred Regime
High openiess (over 50 % of GDP in 1st quarter 2003)	Fixed
Small size (less than 0.16 % of world GDP)	Fixed
Low capital mobility, low financial/economic development (underdeveloped financial system, bank assets to GDP ratio is 20 percent; low levels of FDI, etc.)	Fixed
High labour mobility (over 3 millions of Ukrainians are abroad)	Fixed
Low inflation differentials (0.4 deflation last year, 7 % inflation (estimate) this year)	Fixed
High wage/price indexation (special law on indexation is in action now *)	Flexible
High product diversification (Ukraine exported 11.762 kinds of goods to 187 countries and imported 18.029 kinds from 194 countries **)	Flexible
Source: adopted from Jamus J. Lim (2001).	

* Закон України «Про індексацію грошових доходів населення» від 03.07.1991 № 1282-ХІІ.

** Data for year 2000 from "Notes on Trade Diversity in Ukraine" by Victor Golovcn, UET Dec 2001 p. 66.

It can be easily seen from the table that most theories on optimal exchange rate regimes favor fixed arrangements for Ukraine. I want to look up in more detail those two, which support flexible exchange rate instead.

Flexible exchange rate under price/wage indexation is favored because prices in this situation are flexible and any shock will be transferred via prices differential to the real exchange rate under fixed system and endanger external stability of the country by creating excessive trade surpluses or deficits. Ukrainian situation now is slightly different due to several facts. First and foremost, wage indexation is inheritance of period of hyperinflation experienced during 1992—1995 and despite it still should be used, the part of wage that has to be fully indexed is quite low, moreover, prospects of low (below 10 percent per annum) inflation during the next several years are quite likely, so no great pushes should come from this side.

The degree of product diversification is another factor that influences the regime choice. The more diversified a country's exports are, the more stable its foreign exchange earnings and hence also its currency. The greater the degree of product diversification, therefore, the more feasible is a regime of flexible exchange rates. Ukrainian export is diversified, but large part of it consists of a few commodities, namely products of metallurgy (especially peg iron and tubes), chemicals and

transport services (especially rents from transportation of Russian gas through pipeline).

The currency basket is a nominal anchor that allows, under a prudent policy, to keep a relatively stable nominal exchange rate and to effectively limit its volatility. Currency is pegged to a currency basket when it is bound to several currencies via exchange rates in certain proportions. The currency basket is, according to the International Monetary Fund (see IMF, 2001), categorized as a type of fixed exchange rate arrangement.

The concept of a basket of currencies, and the idea of pegging the exchange rate to such a basket, was created in the 1970s after failure of Bretton-Woods system which led to world-wide movement from fixed to flexible exchange rates.

Concept of currency basket is the following. Suppose a country (more precisely, a small country), decides to peg the price of its currency (call it hryvnia, our Hr for short), to a basket consisting of several currencies, e. g. the US dollar and the euro, and it chooses a basket consisting of $1-00 and €1-00. Suppose we start with the following configuration of rates (rates are purely fictional in order to keep things simple at the moment): $1-00 = €2-00, $1-00 = = Hr200, €1-00 = Hr100. The basket is worth Hr300. Pegging the basket at 300 implies appreciating or depreciating with respect to the dollar every time there is a change in the price of euros in terms of dollars, but only by about one-third as much due to weights we have set. Thus, if the euro appreciated by 3 per cent vis-a-vis the dollar, the Central Bank would have to announce an appreciation of the crown vis-a-vis the dollar of approximately 1 per cent, or a devaluation vis-a-vis the euro of about 2 per cent in order to keep the value of basket on Hr300.

Generally, the basket can be constructed in several ways, depending on assumptions about the nature of exchange rates, usefulness of methods and valuation of specific inputs of social welfare function by authority.

The following list roughly depicts main minimization functions either actually used or proposed by economists.

1. Minimization of variability in the balance of payments. In this case their weights used are either export shares of countries or trade shares '.

2. Minimization of variability in debt servicing on the basis on share of each country-creditor weight in total foreign debt.

3. Minimization of variability of the nominal effective exchange rate to ensure stability and competitiveness. It can be seen as amalgamation of first two positions.

4. Minimization of imported inflation. This case is tricky, because one should take into account not only respective inflation rates in countries (in this case a fixed exchange rate to a country with minimal inflation is optimal), but effect of their inflation (especially income based one) on demand of exports from home country.

5. Minimization of variability in internal output and/or expenditures. In this case a model of inter-relation of internal and external sector should be created.

So, (1) the optimal choice of exchange rate regime for a small open economy depends on its policy objectives; (2) the basket-peg can minimize the loss value under the any loss function by moving the optimal weights in the basket; and finally (3) the common practice of choosing trade weights as basket weighs is optimal only under special conditions, which are discussed in detail in the model presented below.

The most common way in the modern world is creation of the basket as a weighted average of nominal exchange rates, despite weighted average mathematically creates a slight discrepancy by not fully using the importance of the respective currencies, which are represented by their weights. (An alternative to it is usage a geometric average. However, I haven't found any country that uses this method, primary due to relatively small bias created by weighted average.) The change in the value of the currency basket is measured by its index $I(t,w)$, which the is defined as

$$I(t,w) = \sum_{i=1}^{N} w_i [ER_i(t)/ER_i(0)],$$

where W_i are weight of r'-th country in general currency basket. For a stable basket $\sum_{i=1}^{N} w_i = 1$, while for crawling peg it should be less than unity. In this paper only stable basket is discussed.

$ER_j(t)$ is the domestic exchange rate at time t, and $ER_i(0)$ is the domestic exchange rate at time 0, i. e. the base period exchange rate. Both rates are at nominal levels. In order to peg the home currency to a currency basket, the index must be fixed. In this case it means that the index is set to be equal to one $(I(t,w) = 1)$.

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[1] The optimal weights equal to trade weights only if (1) exports and imports depend only on nominal exchange rates and (2) the elasticity of total trade with respect to the nominal exchange rate is the same for all trade-partner countries whose currencies arc in the basket (sec e. g. Nuti, 2001).

Despite the fact that weights of each country currency can be different, depending on the choice of target, most countries use just two variants of basket. First basket uses the averaged weight of county j in total export as a weight $\left(\dfrac{export_j}{\sum_{i=1}^{N} export_i} = w_j \right)$. most often TV is number of countries whose currencies are used, not all countries that export from home country. The second basket uses trade turnover as weight instead $\left(\dfrac{import_j + export_j}{\sum_{i=1}^{N}(import_i + export_i)} = w_j \right)$.

Both methods do not give optimal weights for currency, but most likely their bias is small enough to matter, or at least they are still superior to a single currency peg.

For finding optimal weight can be used model developed by Rhomberg (1976) and Helpman (1979) '. In the following paragraphs I present Helpman (1979) model with slight simplifications which aren't crucial for the model.

Assume there are just 3 countries, home country (UA), the 1st (call it US) and the 2nd (EU) trading partners[2]. Numeraire country (US) is introduced in order to set exchange rate as external variable. Lets denote price of the z'-th country's currency in terms of dollars ($R_{us} = 1$) as R_r The price of every product in terms of domestic currency is set equal to 1, and is assumed constant throughout. Hence, 7?, is also the dollar price of the ith country's product.

We assume ordinary demand functions for the home country is the following:

$$D_i^{UA} = D_i^{UA}(R_{US}, R_{EU}, R_{UA}, R_{UA}Y)$$

$$\text{for } i = US, EU, UA$$

where the 7 is the home country's output in the real terms. We assume that the demand functions are homogeneous of degree zero in prices and income and that all goods are normal.

We have ordinary demand elasticities denoted as

SEU.US expressing the home country's elasticity of demand for the European good with respect to US price of this good. For $B_{Ev\,UA}$ elasticity includes the direct income effect, that is, the effect of a increase in nominal income when the price of the home production raises. The cross-elasticities of demand

are assumed to be non-negative and the own elasticities are negative. (For $\varepsilon_{vA\,UA}$ this implies that the own substitution effect, which is negative, is stronger than the net income effect, which is positive since all goods are assumed to be normal.) Since the demand functions are assumed to be homogeneous of degree zero in income and prices and $G_{,UA}$ includes the direct income effect, we have:

$$\varepsilon_{i,US}^{UA} + \varepsilon_{i,EU}^{UA} + \varepsilon_{i,UA}^{UA} = 0 \text{ for } i = US, EU, UA$$

$D_{EU}^{UA} = D_{EU}^{UA}(R_{US}, R_{EU}, R_{UA}, Z_{EU})$ is European demand for the Ukrainian export as a function of all dollar prices (Remember, we set dollar as numeraire) and a vector of variables, Z_{EU}, which are assumed to be constant and are omitted from the statement of the model and from further consideration for simplicity. Under 'small country' framework this is quite feasible.

The European price elasticities are expressed as $\&_{UA}\,t$, and lets assume that the foreign demand functions are also homogeneous of degree zero in prices (exchange rates), so that

$$\varepsilon_{i,US}^{j} + \varepsilon_{i,EU}^{j} + \varepsilon_{i,UA}^{j} = 0 \text{ for } i, j = US, EU.$$

Again, own price elasticities are assumed to be negative and cross price elasticities are non-negative.

The home country's output is determined by aggregate demand since we for the purposes of our model (shocks) I should assume unemployment. Local output equals local demand plus foreign demand for home output, as in usual Keynesian framework:

$$Y = D_{UA}^{UA} + D_{UA}^{US} + D_{UA}^{EU}$$

(i. e. domestic consumption and export).

The surplus in the home country's balance of trade in terms of dollars (numeraire), *NX,* can be expressed as exports (foreign demand for the home product) minus imports (domestic demand for foreign goods) thus net export, or, using previous equation, as income minus expenditure:

$$NX = EX - IM = [R_{UA}(D_{UA}^{US} + D_{UA}^{EU})] -$$
$$- \{R_{US}D_{US}^{UA} + R_{EU}D_{EU}^{UA}\} = R_{UA}Y - \sum_{i \in US, EU, UA} D_i^{UA}$$

It is the simplest model we could devise that would highlight the problem under review. The home country assumed to be "large" in the market for its exports, but "small" in all other respects, so no need

Both papers arc quite old, but no significant breakthrough in the theory of optimal weights for the currency basket was made since then.

'· Original model uses N-countries framework.

to worry about feedbacks from income and price effects. Making foreign prices, as well as exchange rates variable, is possible, but it substantially complicates the analysis and makes the results more difficult to interpret (Helpman (1977)). The assumption of a downward-sloping demand for our exports, and fixed price in home currency of export goods, is a simple way of highlighting the importance to a country of what happens to any particular bilateral exchange, rate. For short-run applications, different demand elasticities can be thought of as also capturing the cost of shifting to new destinations of exports (such as marketing costs) and commitments to contracts.

Now compute the impact of exchange rate changes on the home country's income and surplus in the balance of trade. Logarithmic differentiation of output yields:

$$ y = \frac{\sum_{i \in US,EU,UA} r_i \varepsilon_{UA,i}}{\left(1 - \frac{D_{UA}^{UA}}{Y} \varepsilon_{UA,UA}^{UA}\right)}, $$

where $y = d\backslash ogY;$ and $\hat{} = i/\log/?_{(.)};$ (note that by definition $r_{us} = 0$ and can be omitted)

$\left(1 - \frac{D_{UA}^{UA}}{Y} \varepsilon_{i,UA}^{UA}\right)$ is Keynesian multiplier, $\&_{UA;}$ is elasticity of total demand for the home country's output with respect to currency rate $R,$, which further can be described as:

$$ \varepsilon_{UA,i} = \frac{D_{UA}^{UA}}{Y} \varepsilon_{UA,i}^{UA} + $$
$$ + \left(1 - \frac{D_{UA}^{UA}}{Y}\right)\left[\frac{D_{UA}^{US} \varepsilon_{UA,US}^i + D_{UA}^{EU} \varepsilon_{UA,EU}^i}{D_{UA}^{US} + D_{UA}^{EU}}\right]. $$

This means that demand for our exports depends on part of domestic consumption of exportable product as a share in output multiplied by home country elasticity of our good with respect to exchange rate RI plus the rest of production (i. e. pure export) multiplied by sum of elasticities and shares of z'-th country in the home country's total export with respect to exchange rate R_f.

Now denote the home country's income elasticity of demand for the z'-th good by m_i of and assume that the marginal propensity to consume (MPC) is positive and less than one. Also denote share of own consumption of domestic product as $s^{UA} \equiv D_{UA}^{UA}/Y$

and $s_i^{\exp} \equiv D_{UA}^i \Big/ \sum_{j \in US,EU} D_{UA}^j$ is the share of i-th country export in our total exports. By definition $s^{UA} \varepsilon_{UA,UA}^{UA} = m_{UA}$ and general MPC is $\sum_{i \in US,EU,UA} m_i \equiv m$.

Total differentiation of net export as the share of GDP (which is necessary later, when balance of payments optimization considered) is

$$ d\frac{NX}{R_{UA}Y} = \sum_{i \in US,EU,UA} r_i \left(\frac{1-m}{1-m_{UA}} \varepsilon_{UA,i} - \frac{R_{US}D_{US}^{UA}+R_{EU}D_{EU}^{UA}}{R_{UA}Y} \gamma_i^{UA}\right) + 1. $$

γ_i^{UA} is the elasticity of the home country's absorption (spending) with respect to exchange rate, such that:

$$ \gamma_i^{UA} = \frac{R_{US}D_{US}^{UA}(\tau_{US,i} + \varepsilon_{US,UA}^{UA}) + \cdots}{R_{US}D_{US}^{UA} +} $$
$$ \cdots + \frac{R_{EU}D_{EU}^{UA}(\tau_{EU,i} + \varepsilon_{EU,UA}^{UA}) + R_{UA}D_{UA}^{UA}(\tau_{UA,i} + \varepsilon_{UA,UA}^{UA})}{+ R_{EU}D_{EU}^{UA} + R_{UA}D_{UA}^{UA}}, $$
$$ i \in US, EU, UA; \tau_{j,i} \equiv \begin{cases} 0, j \neq i \\ 1, j = i \end{cases} $$

This formula states that a rise in the **dollar** price of the home country's good (i. e. appreciation) leads to a reduction in the home country's trade surplus (or an increase in its deficit). Effect on import may be either positive or negative.

In order to discuss the impact of foreign exchange rate movements when the home currency is pegged to a basket, we have to substitute the right-hand side of the basket's formula ($r_{UA} = w_{US}r_{US} + w_{EU}r_{EU}$) instead of r_{UA} in all the relevant equations, namely trade balance and GDP. Substituting, the following formulas are obtained (using $r_{US} = 0$):

$$ y = r_{EU}(\varepsilon_{UA,EU} + \varepsilon_{UA,UA}w_{EU})(1 - \frac{D_{UA}^{UA}}{Y}\varepsilon_{UA,UA}^{UA})^{-1} $$

$$ b \equiv d\frac{NX}{R_{UA}Y} = r_{EU}\{(\frac{1-m}{1-m_{UA}}\varepsilon_{UA,EU} - \gamma_{EU}^{UA}\frac{R_{US}D_{US}^{UA}+R_{EU}D_{EU}^{UA}}{R_{UA}Y}) + $$
$$ + w_{EU}(\frac{1-m}{1-m_{UA}}\varepsilon_{UA,UA} - \gamma_{UA}^{UA}\frac{R_{US}D_{US}^{UA}+R_{EU}D_{EU}^{UA}}{R_{UA}Y})\} + 1. $$

Thus formulas for basket were calculated. Now one or several of them can be used in welfare loss function, specification of which is not the aim of this paper (but those interested may find different specifications in Helpman (1979) and Naoyuki et al. (2002)).

List of data description and sources

Nominal GDP (nGDP) - period Jan.- 1997 to Apr- 2003, monthly data, billions UAH, The official DerzhKomStat. Problem is that DerzhKomStat of Ukraine regularly revises quarterly GDP data without revising the constituent monthly figures, thus creating some problems of estimation. As UEPLAC writes in comments to their tables: "The GDP (Gross Domestic Product) is the key indicator of economic activity in the international System of National Accounts. The State Committee for Statistics (Derzh-KomStat) began to apply this accounting framework in 1994. However, Ukrainian SNA accounts do not register all transactions, which take place in the economy".

Export from (1) the commonwealth of independent states (CIS); (2) European Union (EU); (3) rest of the world (ROW) - Jan.- 1997 to Apr.- 2003, monthly data, thousands USD, The official DerzhKomStat data, author's calculations.

Exchange rate for euro (pre-2001 ECU), dollar and ruble - Jan.- 1997 to Apr.- 2003, monthly averages of NBU official rates, Hryvnia per unit. The official NBU data, author's calculations of dollar-euro rate.

Description of the econometric model

The model I intend to use should capture the cross-elasticities for export and import. Of cause not only exchange rate and Gross Domestic Product affect trade but also a group of other factors. Usually, the economists assume that the following list of factors should impose the change in import/export: changes in aggregate expenditures, either caused by government (change in budget revenue, expenditures or deficit) of by external factors (affecting net export); changes in distribution of incomes; lagged values of export/import; changes in wages.

One of the problems is that all parameters often interdependent, so for example deficit of budget financed via emission (increase in money supply), or wages increase due to increase in export.

As the contemporary statistical literature suggests that almost all macroeconomic time series are non-stationary, or in other words follow a random walk (see e. g. Peter Kennedy, 1999). Usage of non-stationary data can lead to spurious regressions that give inappropriate measures of usual statistics as R1, F-statistics, *t*-statistics or others. Thus a good econo-metrician should firstly check, whether regressors are stationary or not, and in the latter case should use *и*-th differences (if series are not exploding). If one needs to perform test for stationarity, she should calculate unit root of time series in question and compare achieved augmented Dickey-Fuller test statistics with critical values or Phillips-Perron (PP) test. The Results of ADF test are summarized in the following table.

	ADF	Diff.	Intercept	Trend
USD	-4.258468	1	yes	no
EU	-5.154086	1	yes	no
RUR	-5.154086	1	yes	no
NGDP	-1.723507	0	yes	yes
EXPJTOT	-6.744487	1	no	no
EXP_TOT_UA	-6.041447	1	no	no
EXP_EU	-7.22297	1	no	no
EXP_EU_UA	-4.246669	0	yes	yes
EXP_CIS	-6.832494	1	no	no
EXP_CIS_UA	-6.513028	1	no	no
EXP_ROW	-6.642798	1	no	no
EXP_ROW_UA	-6.279491 [1] 1	no	no	
IMPJTOT	-7.813317	1	no	no
IMP_TOT_UA	-3.228842	0	yes	yes
IMP_EU	-8.239999	1	no	no
IMP_EU_UA	-4.859226	0	yes	yes
IMP_CIS	-3.39062	0	yes	yes
IMP_CIS_UA	-3.385048	0	yes	yes
IMP_ROW	-7.090586	1	no	no
IMP_ROW_UA	-3.920993	0	yes	yes

Absence of trend in almost all series is probably due to the fact that transformation of economic system was made.

As a first model I used simple OLS with foreign trade and other parameters as independent variables. In this case all right hand side variables treated as linearly independent from exchange rate. The general form of the econometric specification is the following:

$$\Delta import_{t,j} = \alpha + \sum_{i=1}^{n} \beta_i \Delta FE_{t-i,j} + \sum \gamma parameters + \varepsilon_t$$

as the controlling parameters I used the following: simple and cumulative changes in the exchange rates of 2 other currencies (so all three currencies (euro, US dollar and Russian ruble) are present; 12 month lagged value of respective dependent variable in order to account for seasonality; nominal GDP, measured in either Ukrainian hryvnia, euro, US dollar and Russian ruble in order to keep the same unit of measure in trade and income.

Of cause inclusion of all these variables may lead to over-identification problem, especially taking to a notion that some parameters are interdependent. If we calculate correlations between exchange rates of

Dollar, Euro and Ruble, we receive numbers quite close to unity in absolute value, namely:

	RUR	EU	USD
RUR	1.000000	-0.918434	-0.877273
EU	-0.918434	1.000000	0.968047
USD	-0.877273	0.968047	1.000000

It is very important, because, as further analysis shows, relation between trade and exchange rate(s) is lower than that, at least linear one. One of the ways to omit spurious regression is to use differences. As ADF has showed, first differences are stationary already. The correlation matrix is the following;

	D(RUR)	D(EU)	D(USD)
D(RUR)	1.000000	-0.325847	-0.314931
D(EU)	-0.325847	1.000000	0.825555
D(USD)	-0.314931	0.825555	1.000000

Another way is to use averages, which should capture not momentary (one month) variation, but some trends if they are present. In levels correlation doesn't decrease significantly enough compared to 'base' values, while differences in 4 month arithmetic averages perform better:

	D(RUR_4)	D(EU 4)	D(USD_4)
D(RUR_4)	1.000000	-0.608351	-0.550021
D(EU_4)	-0.608351	1.000000	0.799578
D(USD_4)	-0.550021	0.799578	1.000000

Results

The results of the OLS model's specification are the following (in levels because real Hryvnia value of total import is stationary in levels):

Dependent Variable: IMP_TOT_UA/CPI
Method: Least Squares
Sample(adjusted): 1998 : 01 2003 : 04
Included observations: 64 after adjusting endpoints

This estimators generally go in accordance to theory, with main import currency denominator being dollar (thus raise in dollar-hryvnia exchange rate leads to decrease in import); increase in real output and real expenditure leading to increase in import and, finally positive and highly significant value for lagged dependent variable suggests inertia in trade.

This OLS model, one can observe quite low value of Durbin-Watson statistics, which suggest possible correlation of error terms. In usual models usage of autoregressive term is enough to improve the model, but as long as I use lagged dependent variable in the models such remedy cannot be used. In order to test whether there exist any other hints for serial correlation the serial correlation LM test was performed. The results give not enough statistics to reject the hypothesis of no correlation.

The real surprise to me was the fact that under almost every specification of model, where import from EU is the dependent variable, in spite the fact that I used different sets of parameters (real wage, budget deficit, interest rates, etc.) the euro-hryvnia (or euro-dollar) exchange rate coefficient is positive if significant, while dollar-hryvnia is negative and usually significant. Moreover, í-statistics suggested that generally dollar exchange rate was more significant than such of euro. The only model where I received 'right' sign was using real, not nominal exchange rates, but it cannot be used for the main aim of this paper, namely the search for optimal weights of nominal currencies within currency basket.

The equations with import from the CIS also show significant negative coefficient with respect to dollar, and low general statistics. This came with no astonishment, as main trade partners there are

Variable	Coefficient	Std. Error	i-Statistic	Prob.
C	-3.35E + 08	9.93E + 07	-3.367085	0.0014
IMPJTOT JJ A(-12)/CPI(-12)	0.331682	0.104188	3.183508	0.0023
USD_4	-4705.899	1562.582	-3.011616	0.0038
RUR_4	545823.6	218429.3	2.498857	0.0153
EU_4	11318.02	2264.974	4.996977	0.0000
RGDP	36357 169	11466911	3.170616	0.0024
R-squared	0.710947	Mean dependent var		3.30E + 08
Adjusted R-squared	0.686029	S. D. dependent var		71 949 473
S.E. of regression	40315 553	Akaike info criterion		37.95143
Sum squared resid	9.43E+16	Schwarz criterion		38.15383
Log likelihood	-1208.446	F- statistic		28.53105
Durbin-Watson stat	1.774569	Prob(F-statistic)		0.000000

The variables used: C - constant; IMP TOT UA(-12)/CPI(-12) - import by Ukraine from all countries during the same month last year in Ukrainian Hryvnia divided by CPI index to get real data, used for accounting for seasonal factors; average change in CPI during previous 6 months; USD 4, RUR 4, EU 4 - average change in foreign exchange rate of US Dollar, Euro and Russian ruble respectively during previous 4 months; RGDP - real gross domestic product on constant 1990 soviet Rubles.

Russia and Turkmenistan, both of which primary supply Ukraine with gas and oil, prices on which are determined nearly once per year in dollar term and not re-negotiated later, as well as the fact that dialogue on how much to supply came not in the time of greatest need (which can be captured post factum by the change in the real expenditures).

Conclusions

In this work I tried to show the main theoretical ideas on preferred peg for Ukrainian Hryvnia. Alas, most of the economists argue about exchange rate regime, floating or fixed, but not about specific arrangements of such regime. The basket of currencies can be optimal choice for a small open economy with diversified foreign trade, such as Ukraine. The basket may not only stabilise the welfare function of country better than either one-currency fix or free float, but may also re-direct trade as it was in case of Cyprus.

Analysis shows that the extreme idea of total shift from US dollar toward euro as the main foreign currency up to unilateral adaptation of euro is wrong. Integration to EU is feasible only if Ukraine wins from such amalgamation, especially from uniting its fiscal policy and totally abandoning monetary instruments in the final, fifth stage. Right now there is a long way to it, but even now Ukraine may start to use at least currency board that contains euro as well dollars and later move to unilateral adoption of euro that might became soon the way for new members of EU, notably Poland and Estonia.

If Ukraine will really move toward European integration then the importance of trade and financial links with EU will increase greatly and Ukraine. Even trade alone consists almost a fifth part of total value of Ukrainian trade and forth part of gross FDI. Despite inclusion of Ukraine in European monetary union is nigh to impossible in the nearest decade, the growth of trade clearly suggests the movement of our country to euro currency area.

For the period since devaluation after august 1998 crisis Ukrainian currency is quite tightly linked to US dollar. My work tries to find out, whether Ukraine should move from de facto fixed dollar-hryvnia exchange rate to some pool of currencies that includes euro, or even to euro only.

Model of choosing optimal weight for each currency in the basket, employed in the paper uses Keynesian approach to the demand for export and import. Despite it is theoretically plausible, but all empirical models which I tried to use show positive elasticity of demand on country import with respect to value of that county's currency, even after accounting for income effect. In the basket, where currencies depend on elasticities of demand and supply this most likely will lead to negative weights for some currencies.

The suggestions for the future research. If one wished to strengthen the results achieved in this work, he should collect more data about missed elements, namely import/export and try to evaluate real effective exchange rate on basis of which nominal crawling peg for a basket may be calculated. The main import of Ukraine in terms of value is oil and gas, the came only from two countries, Russia and Turkmenistan and all contracts are made on the highest official level, often rendering pricing which aren't the optimal. This may screw the regressions, so I propose to omit them from analysis with re-incorporation of them to the results at the latter stage. The other important factor is relative wages in tradable to non-tradable sectors and productivity in both. These factors should improve the analysis and enable creation of system of equation with wages as a dependent variable affected and affecting both trade and exchange rate.

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ЄВРО, ДОЛАР ЧИ, МОЖЕ, ГРИВНЯ?

Упродовж: другої половини 90-хроків нові незалежні країни -республіки колишнього Радянського Союзу зробили спробу досить жорстко прив'язати власні грошові одиниці до світових валют, перш за все - долара США. Поява євро поставила питання про використання його як резервної валюти. В статті оцінюється доцільність для зазначених країн переходу з долара на євро та моновалютної прив'язки до кошика валют. Аналіз показує, що для України моновалютна прив'язка до євро недоцільна, бо матиме негативні макроекономічні та політичні наслідки, але перехід до резервування кошика валют оцінюється позитивно.