Review of the Bank of Russia and NES Seminar 'Financial Dollarisation: Causes and Consequences'

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At the end of February 2021, the Bank of Russia and NES held an online international academic seminar 'Financial Dollarisation: Causes and Consequences'. The seminar addressed a number of aspects of dollarisation, such as the non-linear nature of the relationship between the dynamics of the exchange rate and the demand for foreign currency assets, the existence of the hysteresis effect and efficient distribution of risks associated with the loan dollarisation. In this overview, we will provide a summary of the reports presented at the seminar.

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1. Introduction

The phenomenon of financial dollarisation has long been a pressing problem for emerging market economies, including Russia. On the one hand, this may be attributed to objective historical factors, such as the experience of financial crises and episodes of high inflation. On the other hand, the persisting interest in this subject can be explained by the long-term adverse consequences of dollarisation for the efficiency of monetary policy and the risks to financial stability. The reasons for financial dollarisation and the further evolution of this phenomenon were the subjects of discussion at a joint seminar held by the Bank of Russia and NES in February 2021. Four reports were presented at the seminar; they addressed various aspects of dollarisation in Argentina, Armenia, and Russia.

2. Dollarisation of deposits in emerging markets

Armen Nurbekyan (Bank of Armenia) presented a paper co-authored with Husnu Dalgic and Lawrence Christiano: 'Deposit Dollarisation in Emerging Markets: Efficient Risk Sharing or Prescription for Disaster?' (Christiano et al., 2020). The authors of this paper have compiled a database containing information for 140 countries for 1970–2018, used this information to document the main facts related to dollarisation and tested the hypotheses about its impact on financial stability.

The authors note a sharp increase in the share of dollar deposits in many developing countries after 1980, which made the issue of the impact of this phenomenon on financial stability topical for most central banks and financial regulators around the world. The central fact of the study is that in more dollarised countries the national currencies during recessions tend to depreciate rather than appreciate. One of the possible explanations for this is self-fulfilling prophecies and the adverse impact of dollarisation on financial stability. According to this hypothesis, households might open dollar deposits out of fear of a collapse of the financial system. Therefore, the share of dollar deposits is growing, which means that the foreign currency liabilities of companies and banks are also growing. As a result, currency risks are accumulating in the economy. Ultimately, a severe drop in the value of the national currency might increase the value of the dollar liabilities in local currency and thus lead to a financial crisis.

To test this hypothesis, the authors use data on financial crises from Laeven and Valencia (2018). They find a minor correlation between the share of dollar deposits and the frequency of financial crises in a country and find no correlation between dollarisation and the decline in output during crises. The depreciation of the national currency in more dollarised countries is indeed associated with a more frequent occurrence of crises, but when controlling for the size of external debt and the size of foreign liabilities during estimation, this relationship disappears. In the authors' opinion, these facts suggest that dollarisation has no adverse effect on financial stability.

Another possible explanation for the high share of dollar deposits in countries where the drop in output is accompanied by the depreciation of the national currency is the desire of households to hedge their risks. If household incomes fall simultaneously with the depreciation of the exchange rate, households can secure themselves against falling incomes simply by saving in dollars. The drop in incomes will then be automatically compensated by increased value of dollar savings in the local currency.

To test this hypothesis, the authors use information about the interest rates on deposits in different currencies. Their key assumption is that if households open dollar deposits primarily out of a desire to secure themselves against a decline in incomes, they will be willing to save in dollars even at low interest rates. Moreover, the more they want to save in dollars, the lower the interest rate will be, as it will

be more difficult for banks to place these dollar deposits. Indeed, as shown by the authors, the difference in the interest rates on local currency and dollar deposits is higher in more dollarised countries. The authors also calculate the so-called implicit tax (or the insurance premium) on dollar deposits as the amount of income lost due to the fact that part of the savings was placed at a low dollar rate and not at a high rate on local currency deposits. They have found that the higher the share of dollar deposits in a country, the higher the insurance premium; for countries with a 40–50% share of dollar deposits, this tax amounts to about 0.5–1.5 p.p. The authors interpret these facts in favour of the hypothesis of dollar deposits being used for risk hedging.

Finally, the authors investigate who takes on the currency risk sold by households upon opening dollar deposits. They show that in developing countries the amount of dollar loans taken by companies almost completely covers the total amount of dollar deposits opened by households. Moreover, the overwhelming majority of dollar-denominated deposits are opened by households, and the vast majority of dollar-denominated loans are issued to companies.

Udara Peiris, Professor at ICEF HSE, spoke as a discussant of this report. He mentioned the novelty and importance of the results showing that dollarisation, all else being equal, leads neither to an increased frequency of financial crises nor to a more precipitous drop in GDP during crises. Udara Peiris also noted that one of the key questions for future research could be the mechanism for forming insurance premiums on dollar deposits. Many of today's highly dollarised countries went through periods of high inflation in the past. This fact is in line with the assumption that the desire of households to save in dollars can be explained by the past behaviour of the exchange rate and not by its expected behaviour in the future. If this is true, such irrational behaviour can lead to extremely high insurance premiums and inefficient distribution of risks in the economy, which, in turn, can be corrected by macroprudential policy.

Udara Peiris also suggested that the authors look into the data on the maturity of dollar deposits. If it turns out that the majority of dollar deposits are long-term, this will confirm the authors' main hypothesis. If the share of demand deposits in the structure of dollar deposits is high, it is most likely that such funds are used for frequent transactions and are, in fact, ousting the national currency from circulation, rather than serving as a tool for risk hedging.

3. The behavioural model of deposit dollarisation

Alexey Ponomarenko (Bank of Russia) presented a paper (joint with Ramis Khabibullin; Khabibullin and Ponomarenko, 2020) 'An Empirical Behavioural Model of Households' Deposit Dollarisation'. The authors note that the dollarisation of deposits has always been an important feature of the Russian economy. The hyperinflation in the early 1990s and the currency crisis of 1998 led to an increase in demand for foreign currency deposits as a means of storing savings. In

subsequent years, periods of a broad decline in dollarisation, observed against the background of a strengthening rouble, were replaced by periods when, in view of rouble depreciation, households again turned to foreign currency deposits, as was the case, for example, during the 2008 financial crisis. This fact may indicate the speculative behaviour of the population.

Before 2015, the Bank of Russia used a managed exchange rate regime and undertook foreign exchange interventions to smooth out the fluctuations in the foreign exchange market. In 2015, the Bank of Russia switched to a fully floating rouble exchange rate, which initially caused a significant increase in its volatility. At the same time exchange rate fluctuations are generally viewed as a factor behind deposit dollarisation (see Honohan, 2007; Neanidis and Savva, 2009). The depreciation of the national currency may presumably lead to an increase in dollarisation due to the influence of households' adaptive expectations. Indeed, the gradual devaluation of the rouble in 2008–2009 facilitated a significant inflow of funds to foreign currency deposits. Given these facts, it is interesting (and somewhat surprising) that changes in the dollarisation of household deposits after 2014 have become unrelated to the observed exchange rate dynamics. This allows us to conclude that there is a time-varying relationship between these variables.

The idea that the relationship between the exchange rate dynamics and dollarisation is non-linear is not new. However, previous research focused mainly on studying the effect of hysteresis (Kamin and Ericsson, 2003; Feige, 2003; Valev, 2010; Samreth, 2011). Barajas and Morales (2003) report that the pegged exchange rate regime promotes dollarisation but do not present the model used to support this conclusion.

To model and predict the dynamics of the relationship between exchange rate dynamics and dollarisation, the authors built a behavioural model (in the spirit of Westerhoff, 2009; Franke and Westerhoff, 2012), according to which households may switch between two different types of exchange rate expectations formations. The first type implies extrapolating exchange rate expectations, and the second one involves mean reversion. The authors empirically evaluate this model using the Stochastic Gradient Variational Bayes with Normalising Flows method. The efficiency of the model is assessed by making an experimental forecast and comparing it with the results obtained using a number of contemporary non-linear time series models. As far as the authors know, their research in this area is the first to put the concepts of behavioural finance into practice.

The authors concluded that it is advisable to use behavioural concepts to model the dollarisation of deposits in Russia. They demonstrate this by estimating the empirical model with two types of exchange rate expectations formations. When the exchange rate dynamics are characterised by a high level of noise, the adaptive extrapolating approach to the formation of exchange rate expectations yields incorrect results and is, therefore, abandoned in such periods. This finding explains why adopting a floating exchange rate stabilises rather than exacerbates

fluctuations in the level of dollarisation. It is important to note that using the behavioural model makes it possible to perform this analysis in pseudo real time. The authors demonstrate that in the context of the transition to a floating exchange rate regime the forecasts obtained using this model are more accurate than those obtained using models based on time series.

The discussant of this report **Horacio Aguirre** (Central Bank of Argentina) highly appreciated the relevance of the study. At the same time, he emphasised that the model explains the weakening of the relationship between exchange rate fluctuations and changes in the dollarisation level, yet it does not predict a decrease in the overall level of dollarisation with the transition to a floating exchange rate. Horacio Aguirre also pointed out the possibility of using alternative approaches to specifying the function for the fitness of alternative strategies in order to incorporate into the model different levels of risk aversion of the agents.

4. Dollarisation of Russian corporate loans

Konstantin Egorov (New Economic School) spoke about some of the preliminary results of the project 'Firms' Debt: Currency Choice and Exchange Rate Pass-through' (Burova et al., 2021) that he is working on together with Anna Burova (Bank of Russia) and Dmitry Mukhin (University of Wisconsin–Madison). The researchers aim to find out (using the data of the Russian credit register)¹ what kind of firms take dollar loans, and how they make such a decision. The answers to these questions may have implications for determining the efficiency of risk distribution within the Russian economy.

To explain how firms make a decision on choosing a loan currency, the authors have constructed a theoretical model that allows them to find a sufficient statistic to describe this decision. The authors start with a single-period model in which a firm needs to borrow a fixed amount of funds to finance its operation. The firm can borrow either in roubles or in dollars, or in both currencies in any proportion. At the time of making this decision, the firm has no information about the future exchange rate or its profits. The authors find that in this case the share of the firm's dollar-denominated loans can be expressed by two key variables: the difference between the interest rates in different currencies and the correlation between the firm's profit and the exchange rate. While the first variable is the same for all firms (an assumption that the authors relax later on), the choice of currencies by different firms can only be explained by the second variable, which provides the sufficient statistic.

The approach predicated upon the use of such sufficient statistic has its advantages and disadvantages. The main advantages are that such statistic is easy to measure in data using simple regression and that the measurement will be robust

¹ Referred to as the credit registry is reporting form 0409303, 'Information on Granted Funds to Legal Entities', submitted by the Russian credit institutions to the Bank of Russia on a monthly basis. Description of the form see at http://www.cbr.ru/eng/statistics/pdko/sors/summary_methodology/#highlight=0409303

across a wide range of assumptions and models. In particular, obtaining such statistic does not require any assumptions about how firms' profits are generated, or how the exchange rate is determined. This approach can also be applied to any pair of currencies, not just the rouble and the dollar. One of the disadvantages of this approach is that it only partially takes into account the fact that different firms may have different credit conditions. For example, some firms may find it much easier to borrow in dollars than others. Moreover, the current version of the model does take into account the choice of the debt maturity structure.

To test the model, the authors merged the credit register data for 2017–2019 with the annual reporting data of individual firms. According to these data, in Russia, about 20% of all bank loans issued to enterprises are in foreign currency, of which 76% are in dollars. At the same time, less than 1% of firms have at least some dollar loans, and only 26% of them have loans in more than one currency. So, the high foreign currency debt was found to be highly concentrated among a small number of very large firms.

Having estimated the correlation between the profits and the exchange rate for different firms, the authors established that the sufficient statistic suggested by the model explains well the choice of loan currency by different firms: most dollar loans are taken by the firms whose profits generally increase when the national currency is depreciating. This result is robust across several specifications as well as to using a different currency pair – to compare the volumes of dollar and euro loans. Thus, the authors found preliminary evidence that the current behaviour of firms does not contradict the hypothesis of efficient risk distribution in the economy. Foreign currency debt is primarily taken on by the firms for which it is easiest to repay it in the case of an unexpected depreciation of the national currency. This can improve the economy's overall resilience to various shocks.

During the discussion of this work, **Konstantin Styryn** (Bank of Russia, NES) characterised the results presented as promising. He proposed to relax the assumption that the sufficient statistic is the same for all firms using only one currency for funding. Konstantin Styryn expressed the hope that the database used by the authors could be expanded by adding sources of foreign currency debt that are not included in the credit register: bonds issued by firms and loans from foreign banks. The discussant also noted that the current regulation restricts banks from issuing foreign currency loans to firms with an insufficient share of revenue in foreign currency. This can partially explain the results, and the inclusion of appropriate control variables in the analysis can strengthen the study's findings.

5. Dollarisation and the concept of uncertainty

At the conclusion of the seminar, **Horacio Aguirre** and **Eduardo Corso** (Central Bank of Argentina) presented a report 'Financial Dollarisation in Argentina: Historical Perspective and Analytical Approaches', which was largely based on a paper by Corso (2014). The authors proceed from the concept of Frank Knight, who demonstrated

in his paper in 1921 a distinction between risk and uncertainty (Knight, 1921). Knight's concept of risk refers to a situation in which agents can assign probability values univocally, with said values being determined either objectively or subjectively. The notion of uncertainty in his analysis is equivalent to the later concept of ambiguity and refers to a situation in which agents do not have enough information to assign univocally determined probability values to the realisation of stochastic variables. The difference between risk and uncertainty was first demonstrated experimentally by Ellsberg (1961). His work helped to get insight into the preferences for actions in circumstances of ambiguity: preferences based on the maxmin procedure for expected utility (Gilboa and Schmeidler, 1989), multiplicative preferences (Hansen and Sargent, 2001; Strzalecki, 2011), smoothed preferences (Klibanoff et al., 2005), variational preferences (Maccheroni et al., 2006), etc. In subsequent years, this approach was used in a large number of papers on financial topics (see e. g. Epstein and Schneider, 2010; Guidolin and Rinaldi, 2013). Despite the widespread use of this approach, one problem remained unexplored: the effect of ambiguity and aversion to uncertainty in respect of demand for the store of value.

In the authors' opinion, the concept of uncertainty can be applied to the analysis of financial dollarisation in Argentina. Financial repression and the growing inflation that characterised the Argentine economy from the mid-1940s to the mid-1970s discouraged demand for stores of value denominated in local currency. This process intensified after the crisis that followed the financial liberalisation in the late 1970s. As a result, the economy began to develop a long-term tendency towards disintermediation; it reached a minimum during the period of hyperinflation in 1989–1990.

In such conditions, agents had to use protective mechanisms to preserve the purchasing power of their savings. In 1960–1970, when the economy remained relatively closed, real estate investments became a non-financial option to preserve the real value of savings. Although in this period foreign assets were increasingly viewed by agents as insurance against episodes of devaluation, it was not until the opening of the economy and the financial liberalisation in the late 1970s that they started to be used as a means of preserving savings.

In the 1980s, the mega-devaluation, the financial crisis and persistently high inflation resulted in the de facto dollarisation of contractual relationships in the economy. This process peaked during hyperinflation. The convertibility regime established in the 1990s consolidated the dollarisation and gave impetus to the use of dollar-denominated contracts in the domestic market. As a result, in the 1990s, a high proportion of deposits with financial intermediaries were denominated in the US dollars. The convertibility crisis became a new factor holding back the demand for the assets of the national financial system.

In 2003–2012, macroeconomic conditions in Argentina were far better than in previous years. However, foreign assets and real estate investments held their positions as the preferred stores of value in the portfolios of Argentine households (due to a lack of information, it is not possible to distinguish between the savings

of households and firms in Argentina). The authors show that the protective mechanisms developed by economic agents over the past decades can be attributed to the effect of ambiguity and aversion to uncertainty and conclude that uncertainty is a significant explanatory factor for the dollarisation of the household portfolio of assets in Argentina. The authors illustrate their conclusion using a formal model for the composition of an optimal asset portfolio, taking into account the correlations of returns and uncertainty parameters.

The discussant of the report, **Alexey Ponomarenko** (Bank of Russia), agreed that the portfolio of household assets can be viewed in the proposed context and that real estate investments can be viewed as a means of storing savings in the event of a financial crisis. In this respect, the proposed report is in line with other existing researches on the non-linear nature of exchange rate expectations and, as a consequence, dollarisation (for example, with the concept of hysteresis). According to Alexey Ponomarenko, the fact that real estate prices in Argentina rise during periods of financial crises indicates the existence of not only financial but also real dollarisation in the economy (that is, dollarisation of contracts).

6. Seminar results

The seminar participants considered a number of interesting aspects of dollarisation, including the non-linear nature of the relationship between exchange rate dynamics and the demand for assets denominated in foreign currencies. On the one hand, the dynamics of dollarisation may demonstrate the hysteresis effect since economic agents demand dollar-denominated assets as a store of value in the event of a financial crisis. Thus, a certain level of dollarisation may persist for a long time in economies where the onset of a financial crisis is regarded by agents as a likely event. On the other hand, the transition to a floating exchange rate regime and, accordingly, the decreased predictability of exchange rate dynamics lead to a reduction in the sensitivity of demand for foreign currency deposits to exchange rate fluctuations.

It should be noted that financial dollarisation potentially threatens financial stability. At the same time, the speakers presented some evidence that there are certain mechanisms for protecting against such risks, related primarily to the pursuit of hedging on the part of economic agents. This supports efficient risk distribution in the economy.

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