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GROWTH IN BELARUS**

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The Impact of Directed Lending on Long-Run Growth in Belarus

Dzmitry Kruk*

Abstract

The study deals with a specific form of financial repression peculiar to Belarus – a mechanism of directed loans. Under selective or directed credit programs, banks are required to allocate certain percentages of their asset portfolios for loans to priority sectors at subsidized loan rates of interest. In order to hedge against possible risks associated with directed loans, banks can offer higher interest rates or ration credit to non-favored borrowers. As a result, the flexibility of the financial system is decreased, while its fragility is increased. Under directed loans the economy may benefit from more rapid capital accumulation, but faces losses in efficiency. Directed lending may be justified until additional gains in capital accumulation compensate losses in efficiency. This may be true in case of definitely high elasticity of output on capital, which might happen within a transitory period. Nevertheless, the practice of directed lending may not be recognized as effective tool for a longer time period. First, gains in capital gradually decline and losses in efficiency might exceed them. Moreover, when the economy reaches its balanced growth pass, only losses will be associated with the mechanism of directed lending. Second, the mechanism of directed lending may be a source of shocks and high-magnitude fluctuations in the economy. Finally, we show that in Belarus the mechanism of directed lending may result in the decline of growth rates of the economy in the long run.

JEL Codes: E37, E43, E61, G28, O41, O42.

Key words: Belarus, directed lending, financial repression, economic growth.

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1. INTRODUCTION

Directed lending may be treated as an element of financial repression, while the latter is defined as policies that comprise interest rate ceilings, high reserve requirements, and discriminatory taxation of financial intermediaries and depositors (McKinnon, 1973; Roubini and Sala-i-Martin, 1992a, 1992b; Reinhart and Sbrancia, 2011). Theories of the role of financial system in economic development disagree on the effects of financial repression on investment and growth (Fry, 1995). These effects are not necessarily deleterious despite segmentation of financial markets resulting from interest rate differentials. For example, neoclassical theoretical models provide conflicting answers to a question whether low real loan interest rates stimulate capital accumulation within the framework of selective credit programs (Buffie, 1991). For instance, the empirical econometric analysis of the economies of India and South Korea (Demetriades) shows that directed lending can induce economic growth at least over the short to the medium run, while in the long run the opposite effect is observed.

In Belarus directed lending consists of two major elements: (i) the provision of designated volume of loans to selected sectors (mainly agriculture and some particular branches of industry) and households (for housing construction), and (ii) at interest rates lower than market rates, which is subsidized by the government¹. Major objectives pursued by the government through this mechanism are stimulating investment demand in a short-term perspective and pushing capital accumulation in a long-term perspective. Herewith, implicitly the government bases on the assumption that market mechanisms cannot provide the desired level of capital investments and capital accumulation.

The latter is justified by the government through the structural peculiarities of the Belarusian economy, which still has much in common with Soviet period, namely the situation when a small amount of enterprises produce a large share of output. These enterprises are mostly controlled by the government, which consider them strategic². Hence, implicit government assumption implies that long-term growth in

¹ As a rule, the government subsidizes interest rate payments for the borrower through compensating the difference between a benchmark lending rate (most frequently National bank's refinancing rate plays this role) and designated level of the interest rate for a particular type of the directed loan.

² . In 2010, about 55% of industrial output was produced by large industrial companies, employing at least several thousand workers on average.

such an economy requires large capital investments for these enterprises, which is hardly to be provided without government interference. This was a core argument for implementation and development of the system of directed lending since mid-1990s.

At the first stages, directed loans were mainly aimed at the support of industrial and agricultural enterprises, due to considerable contribution of these branches to output. This approach assumed that directed loans for investment projects of large enterprises will facilitate their growth of productivity and accordingly will contribute to the growth of the national economy. In other words, that approach was more focused on the supply side of the economy and could be treated as an element of soft budget constraints for firms.

In the sector of state-owned enterprises, who are the recipients of the directed loans, some companies are profitable, while others rely on a continuous support. This particularly concerns enterprises, operating in such sectors as light industry, agriculture, and some sectors of industry. Some enterprises are continuously generating losses or just covering the costs. Therefore, there are reasons to suspect that at least some fraction of directed loans is wasted in low-productivity projects.

During the last decade this approach was transformed somehow. Motivation of supply promotion were still valid, however, this system started to be used as the investment demand promotion scheme as well. The latter vision was implemented through providing directed loans not to the producer of capital goods, but to its potential buyer. Within this scheme the government might have expected two-fold effect. First, it strengthened the demand for capital goods produced by large firms, thus increasing current output in the economy. Second, in a medium to a long-run it might have expected that buyers of capital goods would become more productive due to these investments, thus contributing to long-term growth.

This partial change in the ideology of the directed loans mechanism led to the changes in the structure of correspondent borrowers. For instance, at the first stage investment projects by large industrial firms, say producing agricultural machinery, were supported in order to promote their exports. But at the second stage, directed loans were rechanneled to domestic agricultural enterprises in order then can buy these agricultural machines produced by large industrial firms. In other words, it led to a substitution of potential external demand by a guaranteed portion of domestic

demand. A similar mechanism was activated in respect to construction, whose output was stimulated through granting directed loans to households for housing construction. Hence, if at the first stages this system included mainly large industrial companies as borrowers, later on agricultural companies and households became dominate borrowers.

Technically, this mechanism of directed loans provision is based on state-owned banks, whose share in the banking system (by assets and capital) is roughly 70%. The government is a main stockholder of these banks (its share in the equity capital of main state-owned banks is pretty close to 100%). Due to this, economic authorities practice direct interference to the credit policies of these banks through legal acts by the President, the government, etc. State-owned banks, in their turn, enjoy some preferences from the authorities. Historically, such preferences included implicit 100% guarantees by the government on households' deposits in state-owned banks, underfulfilment of reserve requirements and requirements on special provisioning by these banks, etc. However, these forms of state-owned banks support are almost not used nowadays. Nevertheless, there are still other powerful tools. The most crucial is a regular (as a rule, at the end of the year) replenishment of the state-owned banks' equity capital at the expense of consolidated budget. For instance, in December 2010, statutory capitals of three major state banks were increased at the expense of consolidated revenues, which resulted in a jump of their regulatory capital by 22% and an increase of the regulatory capital of the entire banking system by 15%. Further, there was a precedent of long-term bilateral refinancing of two major state-owned banks by the National bank. At the end of 2009, the NBB opened credit lines for these two banks for the sum that was equal at that moment to about 7% of these banks' total assets (or about 45% of their regulatory capital). These credit lines assumed refinancing up to 5 years under the refinancing rate of the National bank. Enormous volume of government's and NBB's injections to state-owned banks witnesses about the lack of alternative sources of increasing capitalization for state banks, when they have to reserve a huge part of their portfolio for loans on government programs.

By the end of 2009, the share of directed loans amounted to about 50% of the total volume of loans outstanding according to Fitch Ratings (2010) estimation, or

46.2% according to the IMF (2010) estimation³. Till recently the government displays no willingness to reduce the scope of directed lending. At the beginning of 2011 new programs of directed loans for housing construction and technological re-equipment of the agricultural sector were adopted. They assume that the banks in 2011 should provide loans in the amount of about 15% of the outstanding loans of entire banking system as of beginning of 2011. Practically all the loans under these programs are assumed to be provided on the preferential terms (the state will compensate the losses for banks). Only recently, the government claimed about possible certain restrictions in the amount of directed loans provision having faced huge inflationary pressure in the economy. Nevertheless, the system of directed loans as a whole still seem to be untouchable and the government is reluctant to its complete deactivation, while considers it to be a growth enhancing mechanism. Hence, estimation of the impact of the directed loans system on the economic growth is still on the agenda.

Over the last decade directed lending has been coupled with high GDP growth rates. At the same time, considerable interference of the government to the credit market through the mechanism of directed lending is the essential characteristic of the Belarusian economy. This raises the question whether directed lending stimulated economic growth or not. Financial repression in the form of directed lending potentially may result in different effects in a finance-growth nexus. On the one hand, it might promote growth due to a more rapid capital accumulation and allocation of the funds to projects with the highest social returns. On the other hand, it might distort the mechanisms of financial intermediation and lead to losses in the contribution of the financial system to total factor productivity growth. Hence, net effect from such mechanism of financial repression on economic growth (in Belarus) is ambiguous and is to be assessed accurately.

The structure of the study is as follows. Section 2 is devoted to formulating preconditions of the model formulation and correspondent assumptions. In Section 3 we deal with data used in the model. In Section 4 formulation of the econometric model that allows capturing the effect of directed lending on long-term growth in Belarus and the results of its estimation are provided. Summary of conclusions and recommendations is provided in Section 5.

³ IMF (2009) stresses ‘directed lending mechanisms’ constitute ‘the large share of bank lending under various state programs’ and they ‘allowed many non-viable enterprises to survive’.

2. PRECONDITIONS OF THE MODEL

As shown in King, Levine (1993) financial intermediation contributes to economic growth. In case of financial repression, we take in mind two rival hypothesis mentioned above: (i) it might spur growth through more rapid capital accumulation and/or allocating funds to projects with highest social returns and positive spillovers generated by the sheltered companies: (ii) it might hamper growth due to: a). losses in efficiency of financial intermediation and underinvestment on the level of the entire economy; b) overinvestment in low-productive firms. Hence, the mechanism of directed lending might alter growth path through changes in capital accumulation and total factor productivity. However, TFP is of a bigger concern, while major channels of financial system's contribution to growth are associated with just with TFP (Thiel, 2001).

In a long-run the growth path is determined by the supply side of the economy. For this, we use Cobb-Douglas production function with neutral technical progress (1).

$$\bar{Y} = Ae^{\gamma t} K_t^\alpha L_t^\beta \quad (1).$$

where

\bar{Y} – potential output, $Ae^{\gamma t}$ – exogenous time-dependent technological progress, K_t – physical capital, L_t – labor employment under natural rate of unemployment, α and β – elasticity of output on capital and labor correspondingly. Within our approach we treat labor employment (under natural rate of unemployment) as constant, i.e. $\frac{dL}{dt} = 0$.

Physical capital (as of the beginning of the period t) is determined by identity (2):

$$K_t = K_{t-1} * (1 - RDR_{t-1}) + RI_{t-1} \quad (2)$$

where

RDR_t – exogenous depreciation rate, RI_t – gross capital formation.

From the demand side, we trace individually only capital investments, while other components of domestic demand are considered to be not treated by directed lending. Hence, we treat targeted by the government current output as the sum of

investments (dependent on the volume of directed loans) and other components (independent from directed loans) (3).

$$RGDP_t = RI_t + OD_t \quad (3)$$

where

$RGDP_t$ – current level of output, determined by demand, OD_t – other demand components.

As shown above, we suppose that the government introduces the system of directed loans in order to: (i) provide a targeted level of current output through investment demand, (ii) enhance additional growth of TFP and fixed capital in the long-term.

When disturbing the credit market through the designation of particular borrowers, volume of loans to be granted, and the interest rates, the government distorts initial market equilibrium. They select a definite share from the agents that form an overall demand for credit and satisfy the demand of this fraction at a lower than market interest rate. Having spent a part of its capital, banks have less funds available for credit supply and other borrowers can obtain these funds only at higher interest rates. In other words, banks are balancing their portfolios with good loans provided to sound borrowers at higher interest rates.

Moreover, if the difference between initial market interest rate and interest rate designated by the government is huge, banks may intend to compensate it through introducing a minimum acceptable effective interest rate (i.e. average interest rate on total portfolio). If the portfolio that consists of both directed and market loans provides the rate of return less than those minimum acceptable rate, it is an incentive for a bank for further shrinking the credit supply in order to get the desired inflow of interest payments. The latter case means that banks start credit rationing in respect to those firms that are not sheltered by the government. The latter is pretty much the same mechanism showed by Stiglitz and Weiss (1993), when non-recipients of directed loans can be credit-rationed given the limitations of a size of an individual's bank portfolio and the risks associated with too high interest rates⁴.

⁴ Banks may face a reduction of revenues as firms would be tempted to engage in risky projects.

The effect of the increase in the market interest rate is irrelative to the shape of directed loans system provision, i.e. whether all banks provide both type of loans or a couple of banks provide both market and directed loans and other banks only market loans (the latter is the case for Belarus). Until we consider initial demand on loanable funds as an integral one, we admit that reservation of part of the funds available for credits will be reduced. For the latter case, it might mean that a part of the demand that initially could be satisfied by state banks, after granting directed loans will spill over in order to compete for the resources of other banks. Hence, we again face an increase in the market interest rate. To summarize, irrespective of the design of the banking system (either with a representative bank or two dominant banks), the effects of directed lending upon interest rates and demand for loans are essentially the same.

If directed loans were granted at a market interest rate, we would expect possible losses from it associated only with overinvestment in low-productive firms and underinvestment in high-productive ones. When the government adds interest rate subsidizing alongside with the allocation of funds, it introduces additional losses in efficiency of financial intermediation that may result in underinvestment in the whole economy. Hence, interest rate spread between market interest rates and interest rates on directed loans should be a good regressor of the efficiency of the allocation of resources in the economy. Hence, we may expect TFP to be dependent on directed loans, market loans, overall investments in the economy, and interest rate spread between market and subsidized interest rate (4).

$$TFP_t = F(RDL, RML, RI, SPREAD) \quad (4)$$

where

RDL – directed loans (in real terms), RML – market loans (in real terms), RI – capital investments, SPREAD – interest rate spread between market interest rate and interest rate on directed loans.

As for the other variables of interest, from the mechanisms shown above we may expect the following dependencies (see (5)-(7)). As for the directed loans (RDL), we treat this variable as exogenous policy variable.

$$RI_t = F(RDL, RML, SPREAD, TFP) \quad (5)$$

$$RML_t = F(RDL, RML, SPREAD, TFP) \quad (6)$$

$$SPREAD_t = F(RDL, RML, TFP, RI) \quad (7)$$

Expected relationships among the variables may be captured through correspondent vector autoregression (VAR) in case of no long-term relationship among the variables, or through vector error-correction model (VECM) framework otherwise. Already at the early stages, we may expect that the variables under consideration are non-stationary, and the mechanisms shown above represent specific long-term relationship among them, i.e. cointegration. If the latter is a case supported by statistical tests, we may exploit VECM framework for capturing the dynamic effect of directed lending on other variables of interest.

3. DATA

Data of real GDP, real investments, other components of domestic demand is provided by Belstat within their SNA reports. We use this time series in 2005-year prices, on the quarterly basis within a sample of 1995q1 to 2010q4.

Banking statistics does not report the data on directed loans or its share in total loans. True values of correspondent time series require data from the microlevel, i.e. from those banks who provide directed loans. Even if that a case, some discrepancies in the data are possible, while in banks' accounting directed loans are not registered separately. Hence, different interpretations on the definition of directed loans may alter data output. Taking this into account, we derive time series on directed loans from not from micro, but from macro statistics, depending on the beneficiaries of the loans. As shown above, main beneficiaries are agricultural enterprises and households that receive loans for housing construction. A small fraction is borrowed by large industrial firms, which however can hardly be captured from available banking statistics. Inside first two groups of beneficiaries, the share of directed loans is huge: almost 100% in case of agricultural enterprises and roughly 80% in households' outstanding loans. Moreover, all directed loans as a rule are granted in national currency, while granting of a loan in a foreign currency assumes market conditions. This allows us reducing discrepancies in assessment of directed loans – we treat the sum of loans to agricultural firms and loans on households in national currency to be directed ones. Obtained time series are close to the individual estimations (for specific dates) of directed loans made for example by the IMF (see Chart 1).

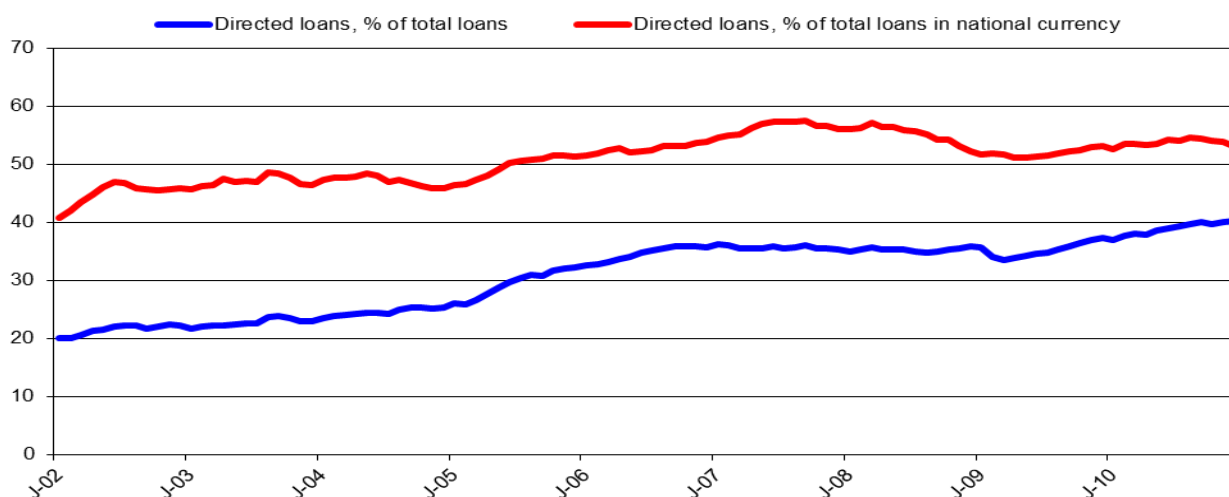


Chart 1. The Dynamics of Generated Series of Directed Loans.

Correspondingly, the data on market loans we derive as the difference between total outstanding loans and directed loans.

Interest rate spread is captured as the difference between interest rate on loans granted to construction companies (benchmark for market rate) and on loans to agricultural companies (benchmark for interest rate on directed loans).

In order to get the values of outstanding loans (both directed and market) and interest rate spread in real terms, they are deflated by GDP deflator, with 2005-year as a base period (2005=1).

The data on fixed capital on a quarterly basis is obtained from the available correspondent time series on an annual basis. Knowing quarterly data on capital investments, we assume that the ratio between depreciation and investments is constant during the year and, thus, we get quarterly data on fixed capital in 2005-year prices.

The data on labor employment on a quarterly basis is reported by Belstat. In order to use this series in a production function, we need it to represent a natural level of employment. The latter is captured by the correspondent trend, when smoothing the series with Hodrick-Prescott filter⁵.

⁵ For getting this trend we use $\lambda=104.36$ in the HP-filtering, which assumes 5-year cycle in regard to the quarterly data.

Finally, we get TFP through estimating Cobb-Douglas production function (see (1)) in levels in log-form. Hence, we estimate it in the following form (8), on the sample 1995Q1-2010Q4.

$$\log(RGDP) = c_{rgdp(1)} + c_{rgdp(2)} * \log(L_{trend}) + c_{rgdp(3)} * \log(K) + c_{rgdp(4)} * T \quad (8)$$

where

L_{trend} – natural level of employment (derived by HP-filter), T – time trend.

Estimation in levels might be consistent, if there's a cointegration among output, capital, and labor. Most often such estimations are based on the assumption of constant return to scale. Chubrik (2002) shows that such a hypothesis is worthwhile to be tested econometrically, and their grounds to expect increasing returns to scale in transition economies, which captures learning-by-doing effect and improving quality of newly employed physical capital.

Wald-test allows rejecting the hypothesis that $(c_{rgdp(2)} + c_{rgdp(3)}) = 1$, i.e. the hypothesis of constant return to scale⁶. Hence, we may eliminate this restriction on the coefficients of the productions function.

Initial estimation shows a structural break within the production function. According to Chow breakpoint test we date it on 2008q3. Such a breakpoint may be explained by the impact of the external environment during the crisis, and a number of additional specific shocks peculiar to Belarus since that time. For instance, Kruk (2010) shows that in 2008 a number of external shocks may be treated as an aggregate shock in TFP that led to the reduction of the potential GDP growth rates. Interpreting this structural break in this way, we may capture it through changing time-trend since 2008q3. Finally, our estimation of the production function looks like as follows (9):

$$\log(RGDP) = -17.15 + 0.78 * \log(L_{trend}) + 1.59 * \log(K) + 0.013 * T(T \leq 2008Q3) + 0.011 * T(T > 2008Q3) \quad (9)$$

Engle-Granger single equation cointegration test rejects the null hypothesis of no cointegration⁷. Hence, such estimation may not be treated as a false regression. From this specification we get the series of TFP, according to (10).

⁶ T-statistics is 6.09 [0.0000] and F-statistic is 37.07 [0.0000], p-values are in parenthesis.

$$TFP = \exp(\log(RGDP) - c_{rgdp(1)} - c_{rgdp(2)} * \log(L_{trend}) - c_{rgdp(3)} * \log(K)) \quad (10).$$

Dynamic characteristics of the data (the results of unit root tests for data in logs) are provided in Table 1.

Table 1. Unit root tests.

Variable (in logs)	ADF-test specification	ADF-statistics (p-values)
TFP	const	-1.60 (0.475)
RI	const, trend	-2.86 (0.184)
RML	const, trend	-2.38 (0.386)
RDL	const, trend	-1.68 (0.739)
SPREAD	const	-1.82 (0.367)

Note: The series were tested basing on Schwarz Info criterion automatic selection of the lag length.

4. MODEL FORMULATION AND RESULTS OF THE ESTIMATIONS

According to our assumptions, there should be both long-term relationship and short-term dependencies among directed loans, TFP, market loans, capital investments, and spread. Dynamic characteristics of the data allow us testing this set of variables for cointegration. We exploit Johansen system cointegration test with 2 lags. Trace test rejects the hypotheses of no cointegration and of at most one cointegration vector⁸. However, trace test adjusted to small sample rejects the hypothesis of no cointegration, but do not reject the hypothesis of at most 1 cointegration vector⁹. While for small samples the results of the second test are more robust, we use the assumption of 1 cointegration vector among the variables of interest. Hence, the long-term relationships and short-term adjustments within (4)-(7) may be captured through VECM framework (11).

$$\Delta Y_t = \sum_{j=1}^n \Gamma_j \times \Delta Y_{t-j} + \Pi \times Y_{t-1} + \mu + \varepsilon \quad (11)$$

where

Y_t is the vector of endogenous variables (TFP, RI, RDL, RML, SPREAD), Γ_j is the matrix of coefficients of short-term impact of endogenous variables with lag j, Π is a cointegration matrix for the vector of the variables; while μ is a constant term, and ε is an error term.

⁷ ADF-statistic of residuals is 4.49, which assumes significance at 5%-level according to MacKinnon critical values (MacKinnon, 1991).

⁸ Correspondent statistics are 138.49 and 73.75, and both hypotheses are rejected at 1% level.

⁹ Correspondent statistics are 86.55 and 46.09. First hypothesis are rejected at 1% level, while the second one may be rejected only at 10% level.

An important step here is including RDL in this model for capturing its long-run impact on other variables. At the same time, stylized facts allow us treating it as the exogenous (policy) variable. This contradiction is to be eliminated through testing RDL on weak exogeneity. Hence, we imply a restriction of α -coefficient of matrix Π in the individual RDL-equation equal to 0. We verify this restriction through LR-test, which cannot reject null hypothesis¹⁰. Thus, we will keep this variable in the cointegration equation, while exclude short-run equation of RDL from the model.

Estimation of the model (11) assumes a cointegration relationship specified as follows (12):

$$C\text{Ia} = \log(TFP) + 0.244769 * \log(RI) - 0.0425753 * \log(RML) - 0.155441 * \log(RDL) + 0.0983002 * \log(\text{spread}) \quad (12)^{11}.$$

Formulation of the model in I(0) space is provided in Table 2¹²:

Table 2. VECM estimation in I(0) space (in logs).

Regressors	Dependent Variables				
	D(RDL) ¹³	D(TFP)	D(RI)	D(RML)	D(SPREAD)
D(TFP(-1))	0.677 (0.281)	-	-	-	-2.087 (0.918)
D(RI(-1))	-	-	-	-	-
D(RML(-1))	-	-	-	0.4286 (0.137)	-1.017 (0.502)
D(SPREAD(-1))	0.085 (0.037)	-	-	-	-
D(RDL(-1))	0.385 (0.118)	-	0.506 (0.222)	0.5203 (0.167)	1.372 (0.448)
D(TFP(-2))	0.525 (0.247)	-	-	-	-
D(RI(-2))	-	-	-	-	-
D(RML(-2))	-	-	-	-	0.8181 (0.37)
D(SPREAD(-2))	-	-	-	-0.08729 (0.0405)	-
D(RDL(-2))	-	-	-	-0.2951 (0.123)	-
Cla(-1)	-	-0.3714 (0.071)	- 0.6474(0.315)	0.5584 (0.189)	3.076 (0.532)
Const	0.041 (0.011)	0.2443 (0.0449)	0.4059 (0.204)	-0.3471 (0.123)	-2.073 (0.342)

Note: Standard errors are provided in parenthesis.

¹⁰ Correspondent χ^2 -statistic=0.21064 and p-value=0.9000.

¹¹ Its graphical illustration provided in Annex A.

¹² After moving out insignificant variables from individual equations.

¹³ This equation is used only for impulse responses. Further, this equation is moved out from the model and the variable is treated as exogenous.

Main vector diagnostic characteristics of the model are provided in Table 3.

Table 3. Diagnostic test of VECM.

	Model with RDL equation	Model without RDL equation
AR-test	F(75,85)=1.1075 [0.3230]	F(48,82) =1.1892 [0.2423]
Normality test	Chi ² (10)=4.0719 [0.9440]	Chi ² (8)=4.5707 [0.8023]
Hetero test	F(110,68) =0.93092 [0.6351]	F(88,57)=1.1471 [0.2917]

Note: P-values are provided in parenthesis.

In order to capture the impact of a shock in RDL on other variables of the model, we can exploit the specification of the model were RDL equation is included, despite it contradicts to its status of policy variable. Technically, it enables us to use impulse response function for capturing the dynamic effect of RDL on other variables of the model. Impulse responses and accumulated impulse response on a shock defined as a unit start of RDL is provided in Appendixes B and C.

Impulse responses show that both our rival initial hypotheses may be supported but in different period. Up to the 10th period after the shock, there is a period of overinvestment. Through this, we can admit that during a certain period directed lending is more effective from the view of stimulating investments. However, this effect is mitigating in a longer-term and the economy faces the problem of underinvestment. Furthermore, there is a second channel working – due to the increase in RDL, financial intermediation is losing its efficiency, which results in TFP underperformance. Hence, at the current stage we may argue that directed loans may provide more rapid capital accumulation during a certain period, but losses in efficiency will be the other side of the coin. Judging on the pure accumulated effect in the long-term basing on the impulse response function is not seemed correct, while this specification assumes endogenous short-term adjustments of RDL that contradicts the practice of directed loans provision as a policy tool.

This problem may be solved through implementing this VECM-model into a broader structural model, where RDL will be treated as an exogenous policy variable. Besides VECM-block we can include potential GDP according to the identity (13):

$$\log(\bar{Y}) = -17.15 + 0.78 * \log(L_{trend}) + 1.59 * \log(K) + TFP \quad (13).$$

Furthermore, we can derive capital basing on the identity (8), and GDP from the demand side according to the identity (3). For further interpretations we can trace the indicator of GDP gap, defined as the difference between GDP from the demand

side and potential GDP. Finally, this structural model includes nine equations: 4 simultaneous equations from VECM, identities for cointegration relationship (12), GDP (3), potential GDP (13), capital (3), and GDP gap. The model includes 13 variables: 9 of them are defined by equations or identities, and 4 variables are exogenous (directed loans (RDL), other components of domestic demand (OD), depreciation rate (RDR), and natural labor employment (L_trend)).

We simulate this model with true values of exogenous variables, and after that formulate a shock – permanent 30% level-shift in absolute value of directed loans (Scenario 1). The dynamics of this model under this shock is provided in Appendix D.

A permanent shock in directed loans leads to more rapid capital accumulation alongside with losses in TFP. However, we may consider that a pure impact on potential GDP and actual GDP is not that enormous – additional capital accumulation almost fully compensates losses in efficiency. This shock leads to “more heating” of the economy, through forming additional investment demand alongside with less potential GDP.

This compensation mechanism was possible due to high output elasticity on capital, i.e. α in (1). As shown above, directed loans may also lead to accumulating less productive capital, which may lead to the decrease of its productivity and alter α -parameter in the production function. Hence, further we simulate the model with the same variable as in Scenario 1, but assume gradually decreasing α (by 0.01 quarterly) (Scenario 2). Comparison of Scenarios 1 and 2 is provided in Appendix E. Scenario 2 shows that if elasticity of output on capital is not that overwhelming as the estimated coefficient in (9), the losses in efficiency are much more considerable than gains from rapid capital accumulation. Furthermore, the latter mechanism determines rapid ‘heating’ of the economy.

5. CONCLUSIONS

Under selective or directed credit programs, banks are required to allocate certain percentages of their asset portfolios for loans to priority sectors at subsidized loan rates of interest. In order to hedge against possible risks associated with directed loans, banks can offer higher interest rates or ration credit to non-favored borrowers. As a result, the flexibility of the financial system is decreased, while its

fragility is increased. This has sensible implications for capital accumulation and growth.

More precisely, under directed loans the economy may benefit from more rapid capital accumulation, but faces losses in efficiency. Directed lending may be justified until additional gains in capital accumulation compensate (or even higher than) losses in total factor productivity (i.e. efficiency). This may be true in case of definitely high elasticity of output on capital (which depends on productivity of capital and capital-output ratio). Such a situation might be a case within a transitory period, when the productivity of capital is pretty high and there is a desire to push growth/avoid decline in capital-output ratio. The obtained results show that a similar situation took place in Belarus during the last decade: losses in efficiency were more than compensated by gains in capital accumulation. It was due to mitigating decline in capital-output ratio (this decline is mainly consequent to high depreciation rate peculiar to Belarusian economy) by means of directed loans

Nevertheless, the practice of directed lending may not be recognized as effective tool for a longer time period (even within a transitory period, i.e. before the economy reaches balanced growth path) both due to long-term and short-term reasons.

We have showed that the mechanism of directed lending (both supply-oriented and demand-oriented, though in different extent) leads to losses in efficiency (total factor productivity). For the same reasons, we may expect that it hurts the productivity of capital as well (in case of demand-oriented mechanism, this decline in capital productivity might be more sensible). Hence, the longer the mechanism of directed lending is maintained, the lower is capital productivity. When losses in capital productivity becomes higher than gains in capital-output ratio, the elasticity of output on capital goes down and capital gains becomes lower than losses in total factor productivity. However, if the economy has reached its balanced growth path, i.e. capital-output ratio is stable, directed lending will generate no gains, only losses: losses in productivity of capital and losses in total factor productivity.

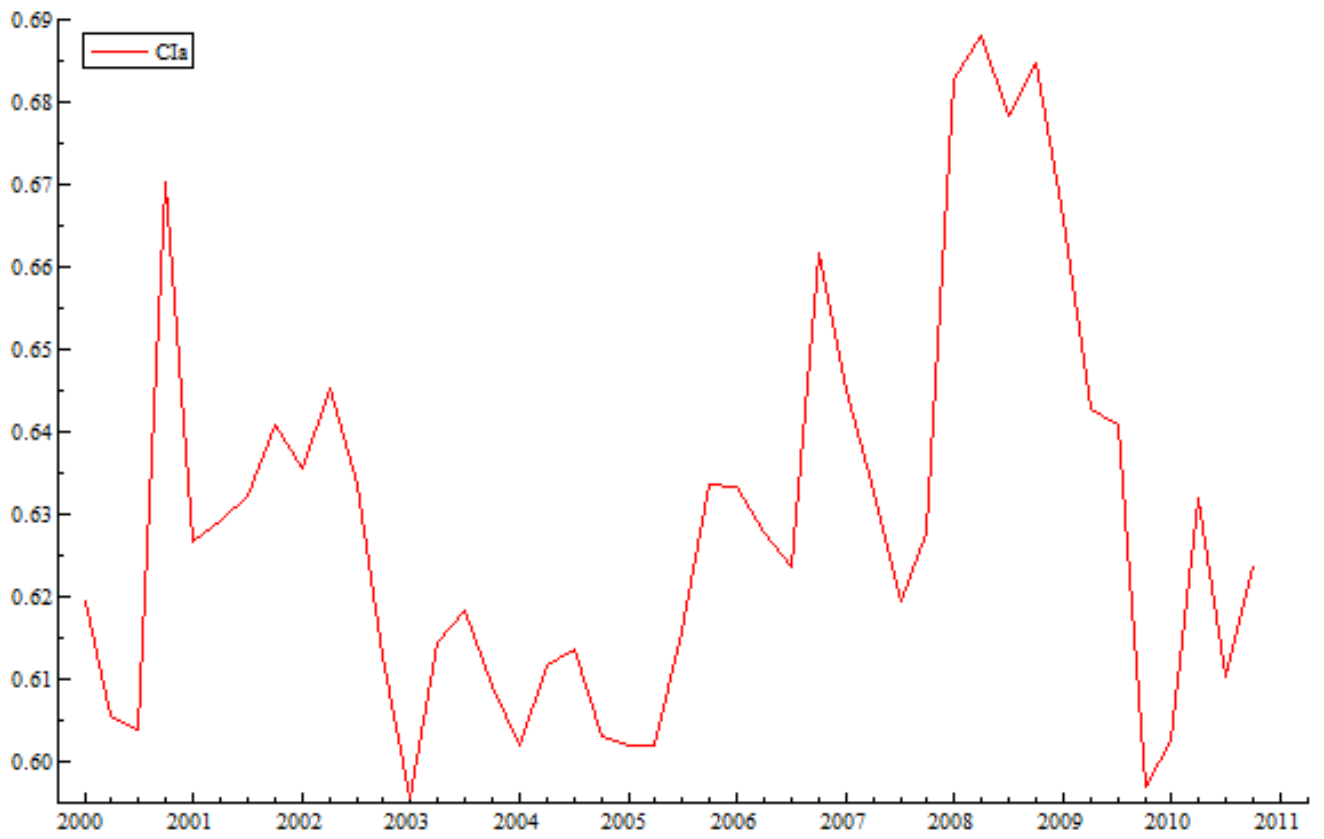
Furthermore, we have showed that directed lending assumes stimulation of domestic demand. Through this, it may become the source of macroeconomic fluctuations for the economy, leading to permanent booms and recessions.

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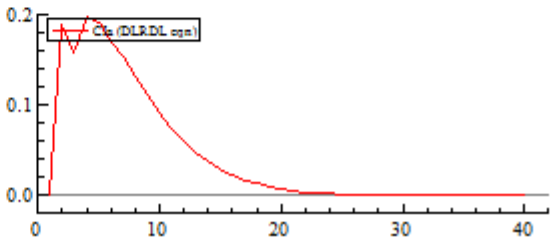
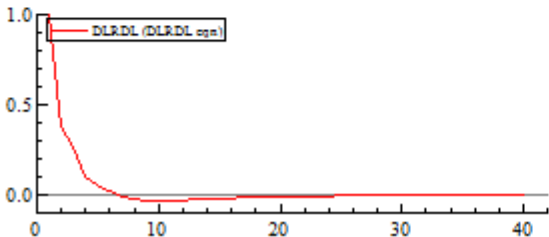
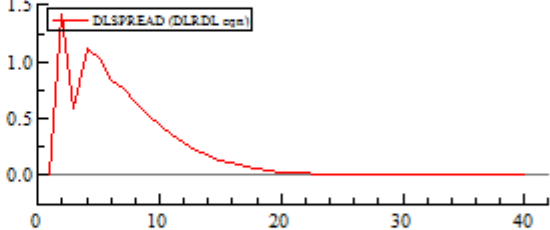
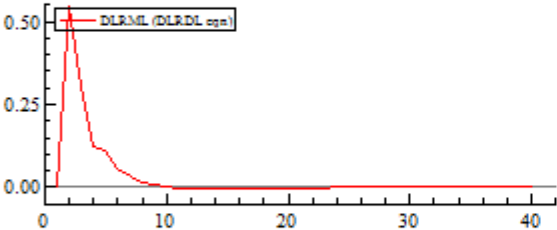
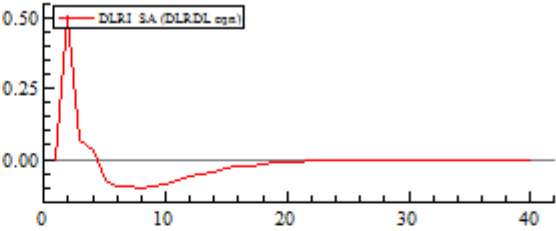
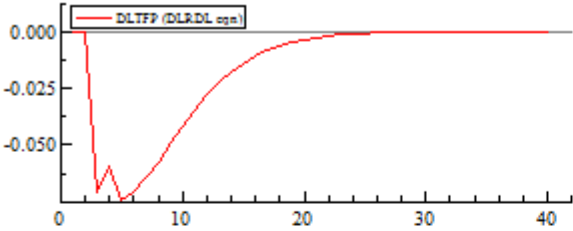
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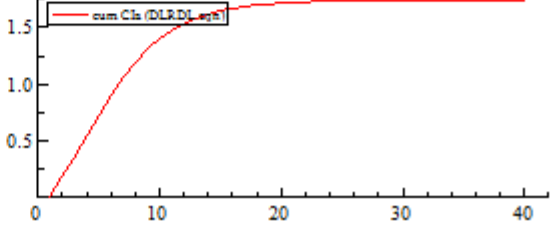
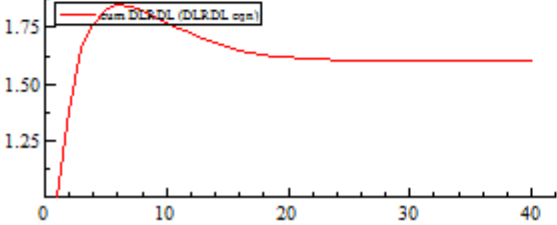
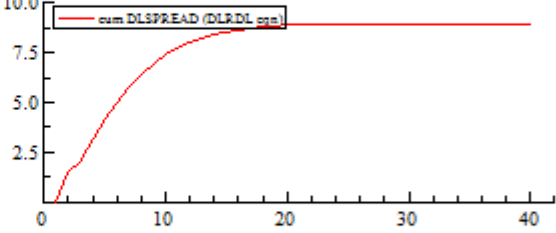
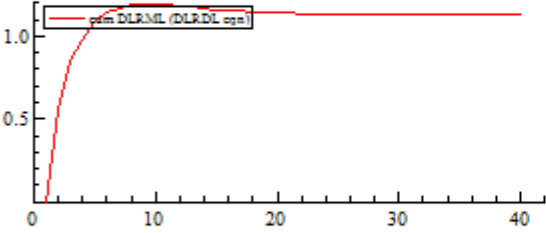
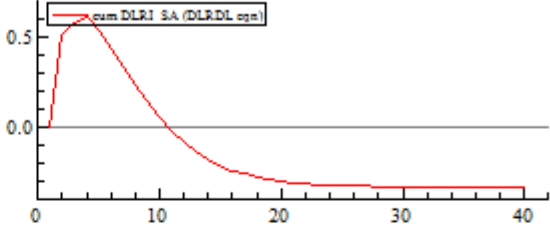
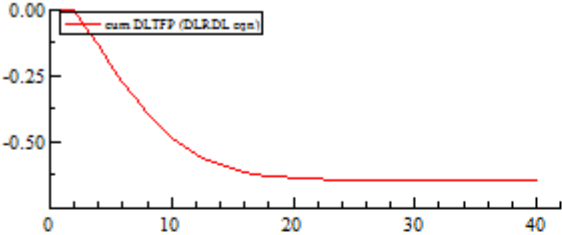
Appendix A. Cointegration relationship



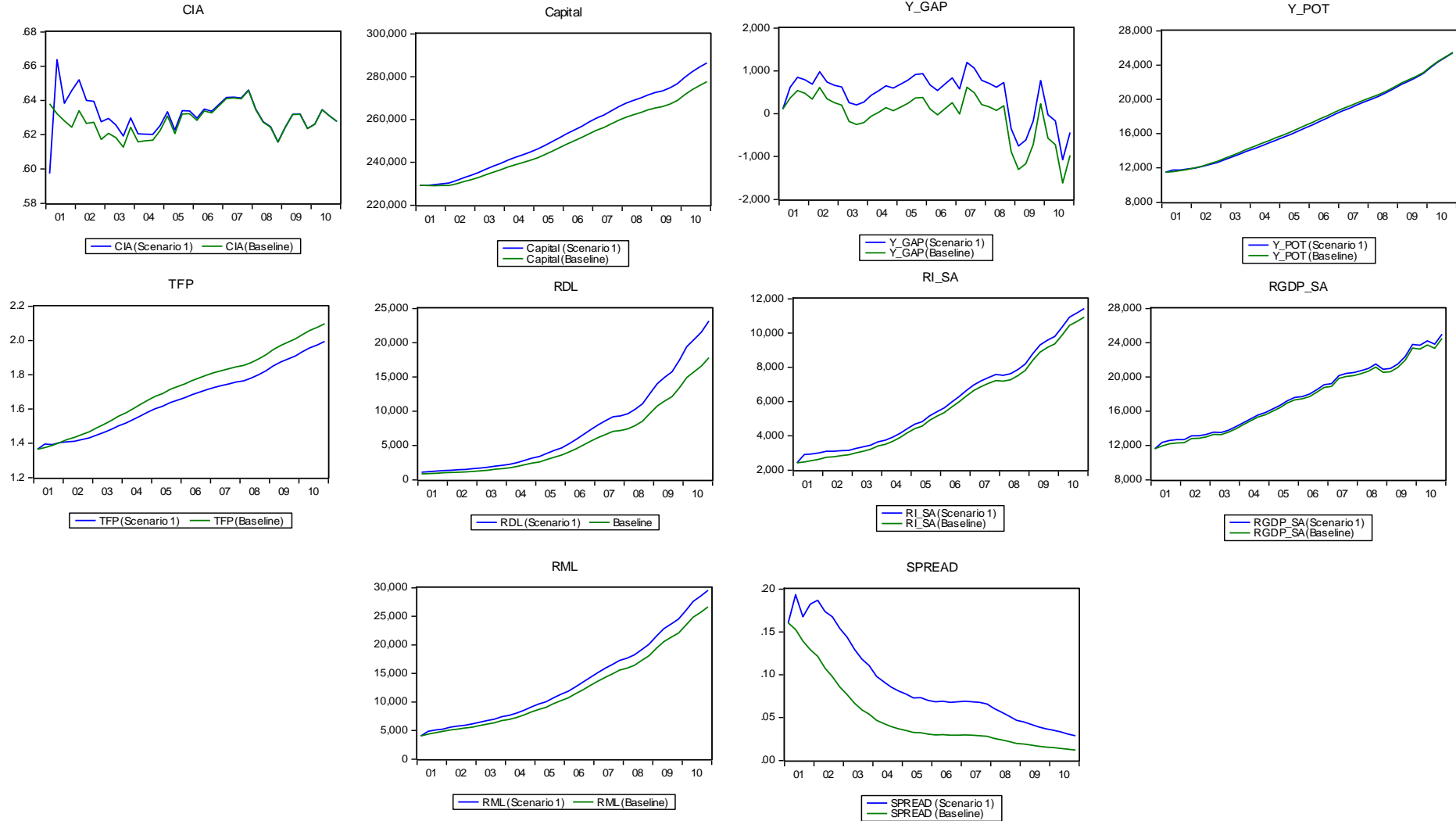
Appendix B. Impulse responses of model variables on a shock (unit start) in RDL



Appendix C. Accumulated impulse responses of model variables on a shock (unit start) in RDL



Appendix D. 30% permanent shock (Scenario 1) in the level of directed loans vs. Baseline scenario (with actual values of directed loans)



Appendix E. 30% permanent shock (Scenario 1) in level of directed loans vs. the same shock plus gradual (by 0.01 points quarterly) decrease in alpha (GDP elasticity on capital stock)

