MONETARY POLICY, MIGRATION AND REMITTANCES

by

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Abstract

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We extend a standard open-economy New-Keynesian DSGE model to study the implications for monetary policy if labor migration is allowed. The extended model is calibrated for Ukraine. According to the model predictions, if labor migration is present, the Central Bank can be less "aggressive" as most macroeconomic variables are more sensitive to changes in interest rate.

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Chapter 1

INTRODUCTION

Over recent years a substantial increase in migration from Ukraine to European Union countries has been observed. After cancellation of visas for short-terms trips to the Schengen zone for Ukrainians, travels abroad have become much more affordable and simplified. Over two years of the visa-free regime, Ukrainians have made more than 33 million trips[1].

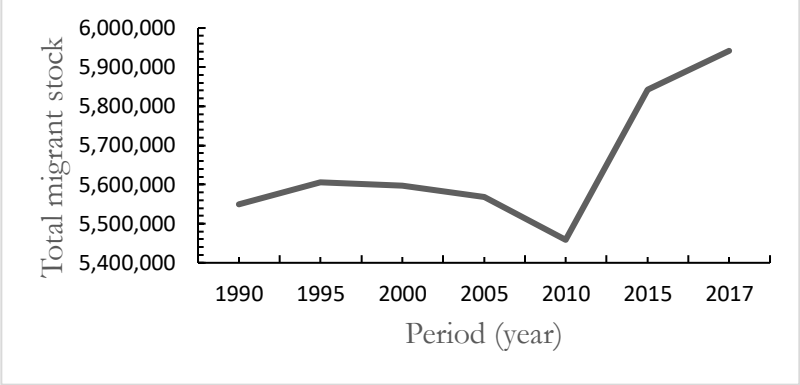

Figure 1. Total migrant stock from Ukraine, 1990-2007[2].

[1] https://112.international/society/ukrainians-make-33-million-trips-to-eu-countries-and-schengen-zone-over-2-years-39625.html

[2] https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates17.asp

Many people from our country chose Poland as their destination country. According to the Ministry of Foreign Affairs of Poland, almost 2 millions of Ukrainians work in this country in 2017. In addition, many other European countries like Germany, Czech Republic and others simplify working requirements for Ukrainians implying that the number of immigrants can potentially increase in the future.

In addition, many other European countries like Germany, Czech Republic and others simplify working requirements for Ukrainians implying that the number of emigrants can potentially increase in the future.

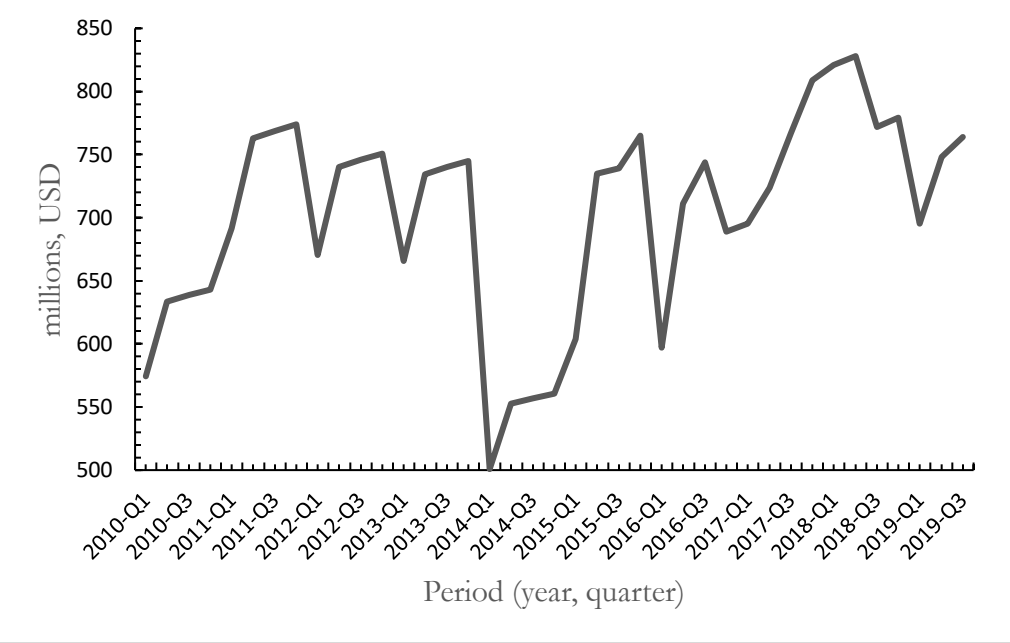

Figure 2. Remittances dynamics in Ukraine3.

3. https://bank.gov.ua/statistic/sector-external/data-sector-external

One of important consequences of migration is remittances. As some members of households migrate their family stay in Ukraine and receive part of migrants' income sent to them. According to the World Bank Ukraine obtained $ 14 billion remittances and private transfers in 2018, which is 19% more than in 2017. The largest amount of remittances to Ukraine come from Poland, Russia, the USA, Czech Republic and Italy.

Such a significant outflow of labor force can affect the Ukrainian economy significantly. Therefore, the National Bank of Ukraine, which started to conduct inflation targeting policy in 2016, is interested in understanding the consequences of migration on inflation and other key macroeconomic variables. Moreover, such a study could be a helpful instrument for policy makers in case of future shocks to immigration or emigration.

Economic theory predicts that an increase in migration affects an economy through several channels. First, this change may affect wages inside the country. As labor supply decreases, the equilibrium wage is expected to increase. As a result, the increase of income of a household can raise the price level. In addition, labor outflow can cause a decrease in GDP and lower supply for goods and services, thus increasing the price level further.

As most workers migrate for a short-term period and their families stay in Ukraine, migrants support them by sending a part of their income in foreign currency. The effect of remittances on inflation is ambiguous. On one hand, remittances increase aggregate demand by raising the price level. On the other hand, remittances improve the balance of payments causing the appreciation of local currency. As a result, inflation decreases because imported goods and imported inputs become cheaper.

To sum up, the effect of migration on inflation is not clear. To conduct research into this relationship as well as the implication of migration on monetary policy, I would like to develop New-Keynesian DSGE model for a small open economy. My model will be based on Christiano et al. (2010) small open-economy model, which I extend by introducing migration and remittances. So, comparing to Christiano-Trabandt-Walentin model my extension is going to affect the household problem and balance of payments.

Further discussion proceeds as follows. Chapter 2 reviews the existing relevant literature. Chapter 3 the description of benchmark model and extended model, optimality conditions and other important equations (such as budget constraints, balance of payments and so on). Chapter 4 includes calibration's results of the model parameters. Chapter 5 describes received results. Chapter 6 concludes.

Chapter 2

LITERARURE REVIEW

There are two major branches of literature related to the research question: migration and remittances literature and also relevant monetary economics literature. There is a limited number of studies investigating the relationship between migration, inflation and remittances. In this section we came up with an overview of the papers looking on the empirical evidence into the effects of monetary policy on remittances' flows and how the increase in migration affects monetary policy variables. Moreover, we provide a review of studies relating to monetary policy in case of a small open economy. I conclude the overview of the literature by featuring the monetary economics articles, which are relevant for modeling choices, calibration and estimation of the model.

According to the predictions of the theory remittances affect the income of households. But some empirical studies, for instance Ruiz and Vargas-Silva (2010), show that remittances do not have a significant effect on monetary policy variables. In particular, they study the response of Mexico's monetary policy to inflows of workers remittances. But, at the same time, some empirical studies show that a high level of remittances may significantly change the efficiency of monetary policy in the country. For example, Vacaflores (2012) uses a limited participation model to test what effect remittances can have on monetary policy and show the impact on small open economy under sterilization, and he confirmed this statement. The theoretical paper of Shimada (2007) presents the two-country economy model with efficiency wages and allows labor migration. The main result is that utility of the policy authority and workers is higher under inter government cooperation. In

addition, migration is very sensitive to changes in real wage. Moreover, Gupta (2006) notices that remittances may be also affected by environment in source countries. The author's analysis shows that macroeconomic factors have a marginal impact on the positive trend of remittances. Furthermore, when a part of the working-age population leaves a country there are population shifts inside the country. Juselius, Takats (2008) suggest that demographic shifts, such as population ageing, should be considered as a possible explanation for low inflation, controlling for standard monetary factors.

Nowadays, the standard approach in monetary economics and monetary policy analysis is to use a dynamic stochastic general equilibrium (DSGE) framework with price or nominal wage rigidities with households and firms optimizing their behavior. The early examples of so-called new Keynesian DSGE models include Yun (1996), Goodfriend and King (1998), Rotemberg and Woodford (1998) and many others. One of the key features of new Keynesian DSGE models is that monetary policy is not neutral in the short run and can be used to smooth fluctuations in aggregate demand.

One of the first studies on monetary policy in small open economies was conducted by Clarida, Gali, and Gertler (2001), who showed that the optimal monetary policy problem for a small open economy was isomorphic to a closed economy setting as in Glarida, Gali, and Gertler (1999) and can be implemented by a Taylor rule. The monetary policy of a small open economy in an international setting was studied among others in Glarida, Gali, and Gertler (2002), who showed in a two-country setting optimal policy of a country should also react to foreign inflation. Gali and Monacelli (2005) developed a framework that could be used for the analysis of various monetary policy regimes including domestic inflation Taylor rule, CPI-based Taylor rule and fixed exchange rate.

The number of studies considers an interplay of monetary policy and labor market frictions in DSGE framework. For example, Cristiano, Trabandt, and Walentin (2011) introduce employment frictions to a small open economy setting, however, find that labor supply shock is not important for explaining GDP volatility.

However, a general equilibrium model, which could explain the relationship between migration, remittances and inflation in a small open economy with inflation targeting monetary policy is absent.

Chapter 3

MODEL

Households

Economy in the model is populated by the infinite number of households. Households solve the following problems: choose consumption (domestic and imported), choose labor (domestic or migrate), and choose assets (domestic or foreign). I intend to introduce two types of agents: residents and migrants. Each household makes an endogenous decision to work at home or abroad. A resident is hired by a local firm and receives local wage in national currency. If a person makes a decision to migrate, he/she earns a foreign wage part of which is sent home as remittances. A migrant does not enter domestic labor force. We assume all households have the same preference and are subject to the same budget constraint.

The representative household maximizes the expected lifetime utility of consumption (C_t) and immigration (N_t^f), solving the following dynamic problem

$$\max E_0 \sum_{t=0}^{\infty} \beta^t (u(C_t) - \frac{N_t^{1+\varphi}}{1+\varphi}), \quad (1)$$

subject to

$$P_t C_t + B_t \leq B_{t-1} R_{t-1} + W_t N_t + \Pi_t \quad (2)$$

where

$$N_t = [(1-\omega_N)^{\frac{1}{\eta_N}}\left(N_t^d\right)^{\frac{\eta_N-1}{\eta_N}} + \omega_N^{\frac{1}{\eta_N}}\left(N_t^f\right)^{\frac{\eta_N-1}{\eta_N}}]^{\frac{\eta_N}{\eta_N-1}} \quad (3)$$

$$W_t = [(1-\omega_N)\left(W_t^d\right)^{1-\eta_N} + (1-\omega_N)\left(S_t W_t^f\right)^{1-\eta_N}]^{\frac{1}{1-\eta_N}} \quad (4)$$

$$C_t = [(1-\omega_C)^{\frac{1}{\eta_C}}\left(C_t^d\right)^{\frac{\eta_C-1}{\eta_C}} + \omega_C^{\frac{1}{\eta_C}}\left(C_t^f\right)^{\frac{\eta_C-1}{\eta_C}}]^{\frac{\eta_C}{\eta_C-1}} \quad (5)$$

$$P_t = [(1-\omega_C)\left(P_t^d\right)^{1-\eta_C} + \omega_C\left(S_t P_t^f\right)^{1-\eta_C}]^{\frac{1}{1-\eta_C}} \quad (6)$$

where P_t^d represents the price of the domestic consumption goods and P_t^f is price of foreign good, P_t is consumer price level, N_t^d is domestic labor and N_t^f is migrated labor. Also, S_t represents rate of depreciation (change in exchange rate), W_t^d is domestic wage and W_t^f represents wage of migrated labor in foreign currency. Moreover, C_t^d is consumption of domestic goods and C_t^f is consumption of imported goods. The first-order conditions of the household's maximization problem from the Lagrangean:

$$\frac{N_t^f}{u'(C_t)} = \frac{W_t}{P_t} \quad (7)$$

$$\frac{u'(C_t)}{\beta u'(C_{t+1})} = R_t \frac{P_t}{P_{t+1}} \quad (8)$$

$$Q_{t,t+s} \equiv \beta^s \frac{u'(C_{t+s})}{u'(C_t)} \frac{P_t}{P_{t+s}}. \quad (9)$$

Demand for domestic goods and imported goods, supply of domestic and migrated labor from FOC:

$$P_t^d = P_t(1-\omega_C)^{\frac{1}{\eta_C}}(C_t^d)^{\frac{-1}{\eta_C}}C_t^{\frac{1}{\eta_C}} \tag{10}$$

$$C_t^d = (1-\omega_C)(\frac{P_t^d}{P_t})^{-\eta_C}C_t \tag{11}$$

$$C_t^f = \omega_C(\frac{S_t P_t^f}{P_t})^{-\eta_C}C_t \tag{12}$$

$$N_t^d = (1-\omega_N)(\frac{W_t^d}{W_t})^{-\eta_N}N_t \tag{13}$$

$$N_t^f = \omega_N(\frac{S_t W_t^f}{W_t})^{-\eta_N}N_t \tag{14}$$

Demand for individual good is:

$$C_t^d(i) = \left(\frac{P_t(i)}{P_t^d}\right)^{-\epsilon} C_t^d. \tag{15}$$

Moreover, η_c is elasticity of substitution between domestic and imported goods and η_N is elasticity of substitution between domestic and migrated labor.

Firms

There are two types of goods: home and foreign. Home good is produced by infinitely many local firms, which use labor for production. Local firms solve two problems: choose labor inputs and set the prices. There is nominal rigidity: firms set prices in a staggered fashion, as in Calvo (1983). Each period only a fraction of firms sets new prices. The price of foreign good is assumed to be constant in foreign currency.

Production of final good can be split into two stages: production of intermediate good using labor input, production of differentiated final goods from the intermediate good. Intermediate good firms solve the following maximization problem

$$maxE_t^i \sum_{j=0}^{\infty} \beta^j \vartheta_{t+j} \left[P_{i,t+j} Y_{i,t+j} - P_{t+j} s_{t+j} Y_{i,t+j} \right] =$$

$$= maxE_t \sum_{j=0}^{\infty} (\beta\theta)^j \vartheta_{t+j} Y_{t+j} P_{t+J}^{\varepsilon} \left[P_t^{1-\varepsilon} - P_{t+j} s_{t+j} \widetilde{P_t^{-\varepsilon}} \right] \quad (16)$$

where ϑ_{t+j} is the Lagrange multiplier on the household budget constraint.

The first-order condition of the intermediate good firms profit-maximization problem with respect to $\widetilde{P_t}$ is:

$$E_t \sum_{j=0}^{\infty} (\beta\theta)^j \vartheta_{t+j} Y_{t+j} P_{t+J}^{\varepsilon+1} \left[\frac{\widetilde{P_t}}{P_{t+j}} - \frac{\varepsilon}{\varepsilon-1} s_{t+j} \right] = 0. \quad (17)$$

Intermediate good i is produced by a monopolist and the demand curve has the following view

$$Y_{i,t} = Y_t \left(\frac{P_t(i)}{P_t^d} \right)^{-\varepsilon}, \quad (18)$$

and the production function is

$$Y_{i,t} = e^{a_t} N_{i,t} \quad (19)$$

where a_t is exogenous shock to technology.

The Calvo price-setting friction implies that $P(i,t) = \widetilde{P}_t$ with probability $1-\theta$ and $P(i,t) = P_{i,t-1}$ with probability θ.

A homogeneous final good is produced using the Dixit-Stiglitz production function:

$$Y_t = \left[\int_0^1 Y_{i,t}^{\frac{\varepsilon-1}{\varepsilon}} di \right]^{\frac{\varepsilon}{\varepsilon-1}} \quad (20)$$

Competitive firms solve the following profit maximization problem

$$max\left(P_tY_t - \int_0^1 P_{i,t}Y_{i,t}dj\right) = max\left(P_t\left[\int_0^1 Y_{i,t}^{\frac{\varepsilon-1}{\varepsilon}}di\right]^{\frac{\varepsilon}{\varepsilon-1}} - \int_0^1 P_{i,t}Y_{i,t}dj\right). \quad (21)$$

The first-order condition of the final good firms' profits maximization problem with respect to $Y_{i,t}$ is:

$$Y_{i,t} = Y_t\left(\frac{P_t}{P_{i,t}}\right)^{\varepsilon}. \quad (22)$$

Local good inflation defined as

$$\pi_t = \frac{P_t}{P_{t-1}}. \quad (23)$$

Furthermore, consumption good inflation and homogeneous good inflation:

$$\pi_t^c = \pi_t \left[\frac{(1-\omega_c)+\omega_c (p_t^m)^{1-\eta_c}}{(1-\omega_c)+\omega_c (p_{t-1}^m)^{1-\eta_c}} \right]^{\frac{1}{1-\eta_c}}. \quad (24)$$

Clearing in domestic homogeneous goods market is:

$$Y_t = (1-\omega_c)(p_t^c)^{\eta_c} C_t + X_t, \quad (25)$$

where X_t is export.

Real Exchange Rate, Nominal Depreciation and Export

Nominal export represented by following equation:

$$X_t = \left(\frac{P_t^x}{P_t^f}\right)^{-\eta_E} Y_t^f = (p_t^x)^{-\eta_X} Y_t^f \quad (26)$$

where p_t^x is terms of trade. No arbitrage for exporters implies

$$P_t^d = S_t P_t^x. \quad (27)$$

Nominal depreciation is defined in the model as

$$s_t = \frac{s_t}{s_{t-1}} \tag{28}$$

and then the definition of real exchange rate implies

$$\frac{q_t}{q_{t-1}} = s_t \frac{\pi_t^f}{\pi_t}. \tag{29}$$

Balance of Payments

We depart from Christiano-Trabandt-Walentin in modeling the balance of payments by adding remittances. In the balance of payments import is covered by export and remittances:

$$S_t W_t^f N_t^f + S_t P_t^x X_t = S_t P_t^f C_t^f, \tag{30}$$

were $S_t P_t^f C_t^f$ is spending on consumption of foreign goods in local currency and $S_t W_t^f N_t^f$ represents wage of migrated labor in local currency units.

Central Bank

Monetary policy is conducted via interest rate Taylor rule which reacts to inflation and (potentially) unemployment and exchange rate:

$$\frac{R_t}{R} = \left(\frac{R_{t-1}}{R}\right)^{\propto} e^{[(1-\alpha)\varphi_\pi(\widetilde{\pi_t}-\tilde{\pi})+\varphi_x x_t]} \tag{31}$$

were x_t denotes the log deviation of actual output from target. It should also satisfy the Taylor Principle when $\varphi_\pi > 1$.

Chapter 4

CALIBRATION

In this chapter we present calibrated parameters for Ukraine. Most of the parameters are calibrated directly and some of them are taken from the New-Keynesian literature. The main model parameters are presented in the Table 1.

Table 1. Calibrated parameter values

Parameter name	Notation	Value
Utility discount factor	β	0.9924
Coefficient of relative risk aversion	σ	1
Inverse Frisch elasticity of labor supply	φ	1
Calvo Parameter	θ	0.75
Price elasticity of exported goods	η_X	1.5
Elasticity of substitution between domestic and imported goods	η_C	3
Elasticity of substitution between domestic and migrated labor	η_N	-2
Share of imported consumption	ω_C	0.3
Share of migration	ω_N	0.0115
Price elasticity of intermediate good	ε	6
Markup (supply)	ν	0.1667
Nominal exchange rate depreciation	ψ	1

The share of migration is equal to 0.0115. This parameter was calibrated to set the share of migrated labor to 10% which approximately corresponds to the situation in Ukraine.

In the benchmark model the parameter $\omega_N$was set to 0. This calibration allows to have share of migrated labor equals 0, so do not allowed people to migrate abroad at all.

Elasticity of substitution between domestic and migrated labor is equal to -2. This value was chosen, because according to the robustness check our model is not very sensitive to this parameter and demonstrated fairly similar results when η_N in range [-1.5; -2.5].

Utility discount factor β is computed as the ratio between the average CPI Inflation 2010:Q1-2019:Q3 and the average quarterly return on 3-6 deposits from the period 2010:Q1-2019:Q2. After the computation β is set to 0.9924.

The model features nominal rigidity. Calvo price-setting parameter θ is set to the level of 0.75. Each period only a fraction of firms equals 75% sets new prices. If the firms cannot change the price in resent period, they use the prices from the previous period. This setting affected the firms decision process when they set the prices, because they should account on the probability that they will not be allowed to do any changes.

In this model we assumed logarithmic utility function and therefore the coefficient of relative risk aversion (σ) is set to 1. This coefficient related to the ration of income elasticity of labor supply to the wage elasticity. The calibrated value in line with Chetty (2004). According to findings in this paper, σ cannot exceed 1.25

in case of upward sloping labor supply curve and this result generalize to dynamic models.

Price elasticity of exported goods affects the impact of a change in terms of trade on the trade balance. Moreover, the improvement in the terms of trade may worsen the trade balance if demand for export is price elastic. In the following model η_X is calibrated to 1.5, this parameter was taken from the related literature.

Chapter 5

DISCUSSION OF RESULTS

In this chapter I discuss the response of the model to interest rate, production, foreign income, foreign inflation and foreign wage shocks.

The benchmark model does not allow for migration and thus there is no remittances. This case is relevant. Given the current situation in the world in light of the COVID-19 pandemic, people are restricted in their trips abroad. In this setup $N_t^f = 0$.

Figure 3 displays impulse responses of the benchmark small open economy to the positive monetary policy shock (e^R). There is one standard deviation shock to interest rate (R_t).

When the interest rate goes up local consumption (C) and output (Y) drop. The aggregate employment (N) and inflation (pid) also decline with an increase in interest rate. All the variables return to the steady state level approximately after nine quarters except for the interest rate (R_t).

The largest influence of positive interest rate shock is observed on nominal export. This result is very intuitive, because with an increase of the interest rate the consumption of goods should respond the in opposite direction as theory suggest. Moreover, the higher value of local currency leads to fewer exports from Ukraine and more imports into our country, so local net exports will decrease.

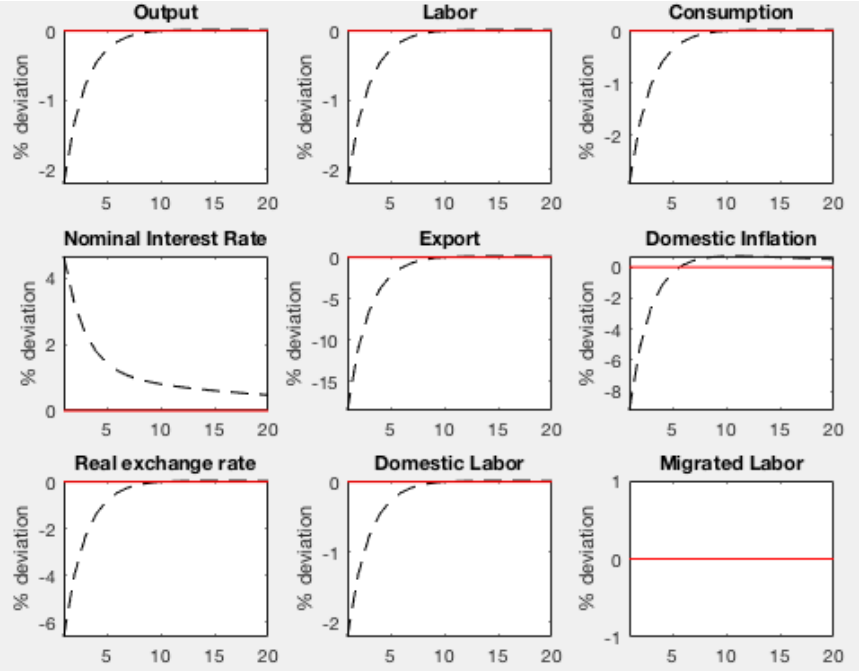

Figure 3. Impulse responses to the monetary policy shock (e^R)

Figure 4 displays impulse responses of the benchmark small open economy to the foreign inflation shock (e^{Pf}). If the foreign inflation increases, , domestic goods become relatively cheaper. As a consequence, export increases and consumers switch from foreign goods to domestic goods. The aggregate output increases as a result as well as employment.

As we can see from the figure, the domestic inflation also reacts positively to the shock and it can be explained by the interest rate parity. It takes around six quarters to return to the steady state value. Also, the response of interest rate to the foreign inflation increase is hump-shaped in the case of zero migration.

Next we can look at the response of small open economy benchmark model to the foreign GDP shock (e^{yf}). This shock affects the demand for export directly. The impulse responses to the foreign GDP shock represent on the Figure 5. As we can see, the abovementioned shock positively affects domestic consumption and the effect holds for the long period of time and even exceeds the twenty-quarters period before consumption returns to the steady state level. Increase in foreign GDP also increases domestic output, because as foreign consumers become richer, they demand more domestically produced goods. This change in domestic production causes an increase in aggregate employment.

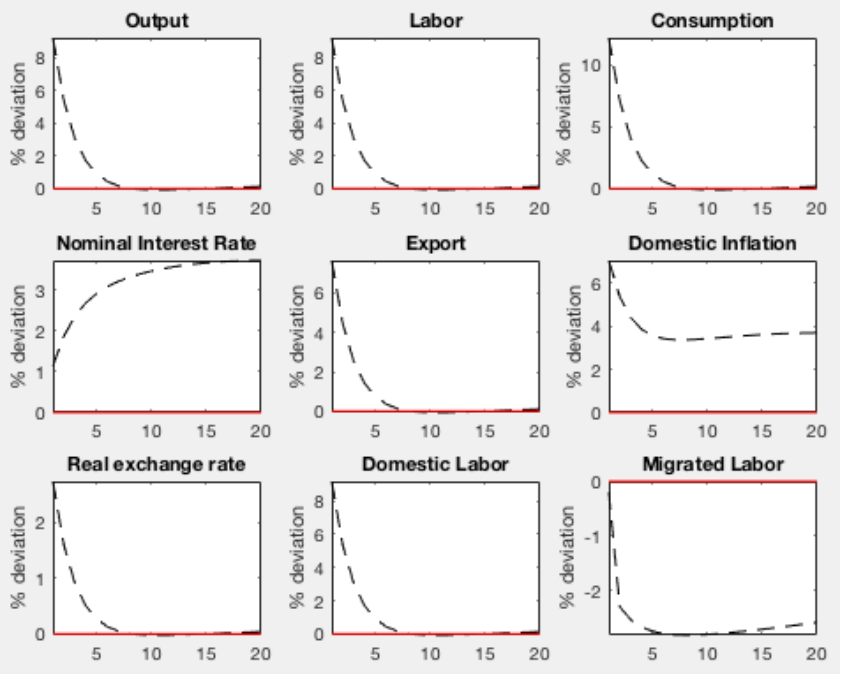

Figure 4. Impulse responses to the foreign inflation shock (e^{Pf})

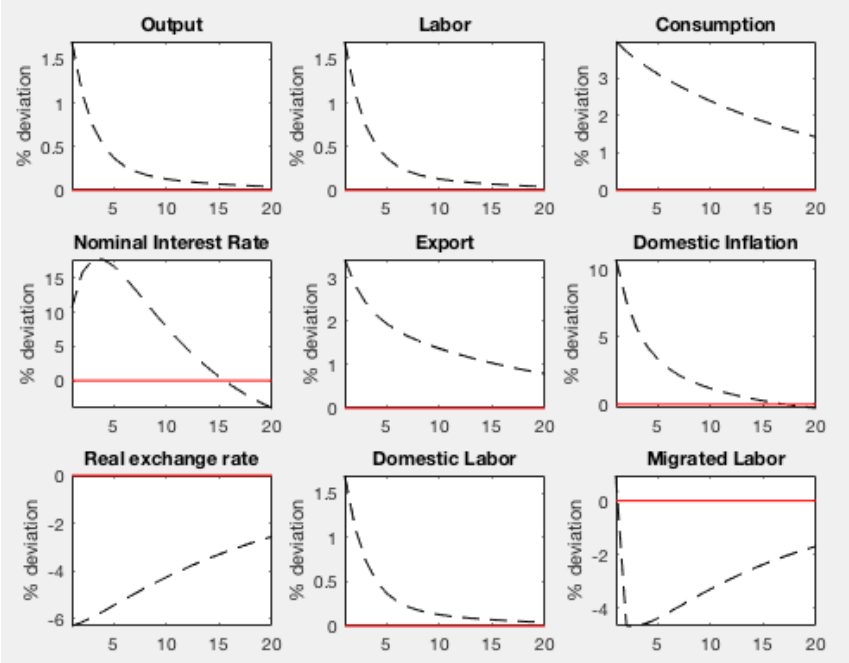

Figure 5. Impulse responses to the foreign GDP shock (e^{yf})

Inflation level within the country also increases substantially, because on one hand demand for local goods increases, and on the other hand domestic workers spend more time on work and as result get more income, so they can afford more goods that push prices even farther.

Next let us discuss a small open economy which features labor mobility and the steady state level of migrated labor equals to ten percents. We consider the responces to the all shocks that were mentioned above.

Figure 6 displays impulse responses of the extended small open economy to a positive monetary policy shock (e^R). It presents the responses of the benchmark model without migration. As we can see, the results of two models are similar in

the directions of changes. However, there are some changes in magnitudes of the responses.

First, as a part of labor force migrates from the country, there is an additional drop in domestic labor. This higher decrease in labor explains stronger decline in aggregate output and export. The decrease in consumption is significantly lower, as migrants earn extra income.

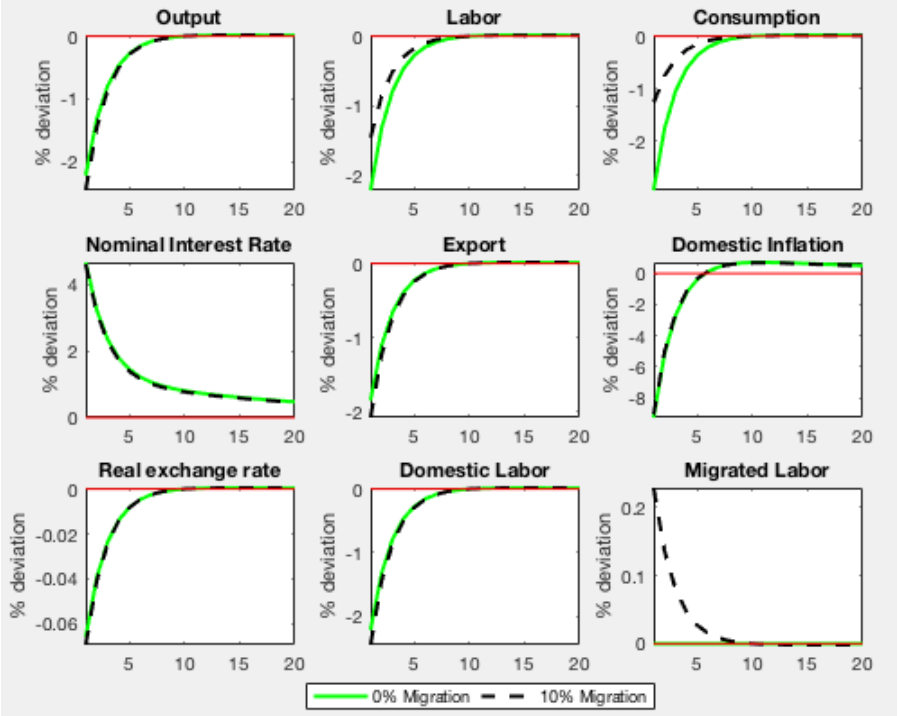

Figure 6. Impulse responses to the monetary policy shock (e^R) when migration is present

Figure 7 shows the response of domestic and foreign employment, inflation, aggregate output, interest rate and consumption to the foreign inflation shock (e^{Pf}). An increase in foreign price level, keeping all other variables constant, implies a decrease in real wage paid abroad. The immediate response is a decrease in migrated labor and an increase in domestic labor. Overall, the index for aggregated labor increases. With an increase in domestic labor we observe higher output and export, which also increases due to better terms of trade. We also observe much stronger response of private consumption compared to the case without migration: more than a 10% increase compared to only 5% if borders were closed for labor force.

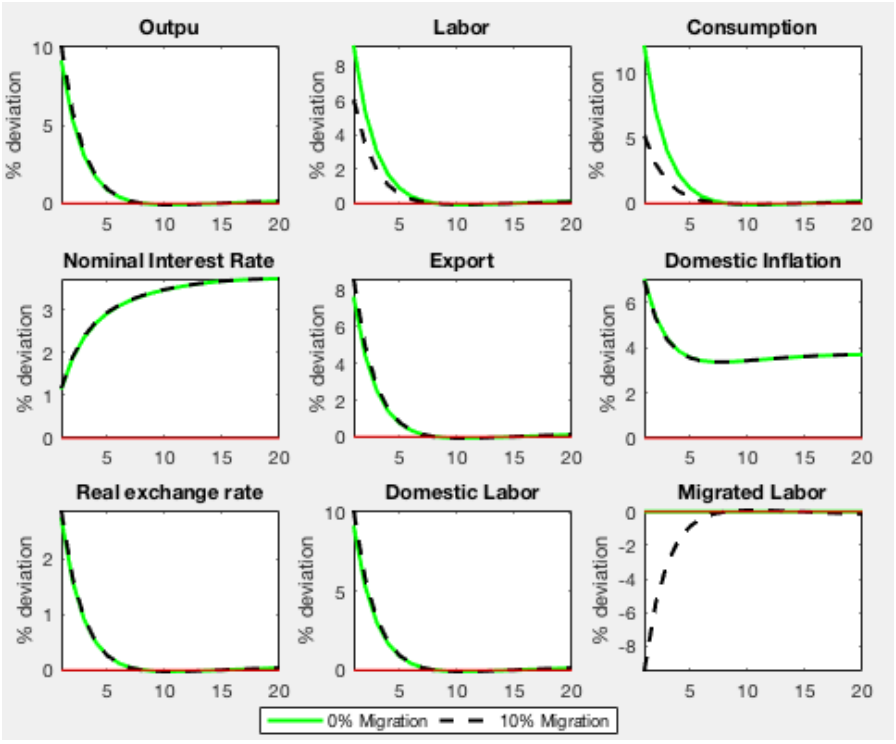

Figure 7. Impulse responses to the foreign inflation shock (e^{Pf}) when migration is present

Finally, we look at how small open economy responds to a positive foreign wage shock (e^{wf}) Figure 8. In a world without migration, this shock would have no impact on domestic economy (strictly speaking, it could probably increase the foreign demand for export, and we have already discussed this case, however, in this model we model the foreign demand for export goods and foreign wages separately, as the main importers of Ukrainian goods and not necessarily the main destinations of Ukrainian migrants). Thus, we do not compare the results to the benchmark model but rather discuss the responses.

As expected, the rate of migration increases dramatically due to the increased difference between wages at home and abroad. The domestic labor naturally decreases. Therefore, the domestic output drops as well as inflation. The domestic wage increases as local employers compete for labor force with foreign firms.

The consumption increases significantly. This is a result of an increase in both foreign and domestic wages. The increase in aggregate real wage also motivates the households to work more, increasing the aggregate labor index and raising the aggregate consumption further.

An important result is an increase in domestic inflation. This is a result of both higher wages, increased remittances, and decreased output in the economy. The Central Bank, thus. raises the nominal interest rate in a response to labor outflow caused by better working conditions abroad.

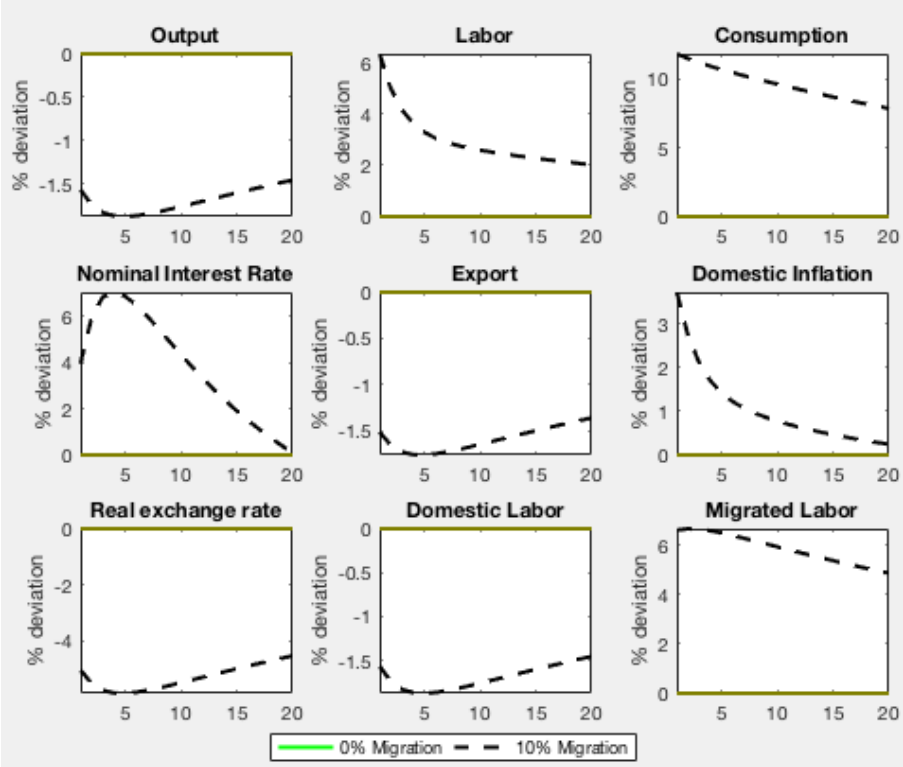

Figure 8. Impulse responses to the foreign wage shock (e^{wf}) when migration is present

At the same time domestic labor decreases, but with some lag. It could be explained by the fact that it takes some time to adjust to changes (find job abroad, move and so on). Aggregate labor also reacts to the foreign wage shock positively, so more people choose to spend their time to work and reduce time spend on leisure.

Moreover, as we can see from the Figure 8, domestic inflation increases dramatically, and it did not return to the steady state level within twenty quartiles. Also, the response of domestic interest rate to the foreign wage shock is hump-shaped in case of ten percent migration with peak at around fourth quarters. Since

Central Bank reacts to this significant increase in price level with a higher interest rate, the local currency appreciates.

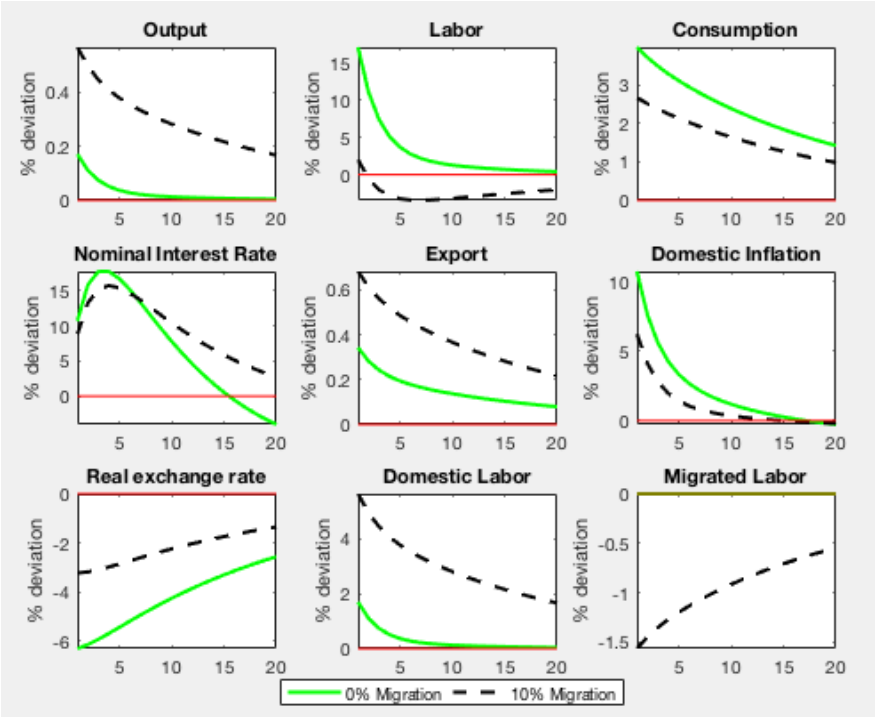

Figure 9. Impulse responses to the foreign GDP shock (e^{yf}) when migration is present

As we can see from the Figure 9, after a positive foreign income shock if migration is allowed, an increase in export is larger compared to the benchmark model with prohibited migration.

As expected, the output of domestic goods significantly increases due to the increased foreign income. Therefore, we can see increase in export, as our goods now relatively cheaper for foreign consumers. Moreover, increase in domestic

output could be also explained by increase in local consumption. Households that receive remittances in foreign currency, from family members that work abroad, can afford now more local goods. The domestic labor naturally increases, because in case of foreign GDP increase, local output increase and work on local production is becoming more economically attractive due to local wages increase.

Depreciation of the real exchange rate is also expected result. As our currency is worth less compere to foreign currency, this makes our exports more competitive, but at the same time raises the cost of importing goods into Ukraine.

Chapter 6

CONCLUSIONS

In this paper, we considered an effect of migration on an open economy as well as implications of the presence of migration to monetary policy. We find that in the presence of migration, the response of economy to a monetary policy shock is similar in directions and magnitudes. Nonetheless, in a model with migration the responses of domestic inflation and domestic output are a bit larger. Thus, the Central bank can be a bit "less aggressive" when conducting the monetary policy which is an important policy implication. In addition, we find that the contractionary monetary policy leads to some immigration from the country as there is some drop in domestic wages. The decrease in the private consumption is significantly lower though, as there is an increase in remittances. The disinflationary policy in a case of migration is thus less costly from the point of view of the welfare of households.

We also compared the responses of macroeconomic variables to different shocks in economy with and without migration. For an increase in foreign price level, we find that there is inflow of labor force as foreign real wage drops and local employers become more competitive. However, the dynamics of domestic price level does not change, thus, there are no changes in the response of a Central bank to this shock which is to increase the interest rate in response to higher inflation and positive output gap.

When there is emigration due to an increase in foreign wage, domestic labor decreases leading to a drop in aggregate output. The local wage increases as local

firms compete for labor force. An increased income of households together with depressed supply of local goods leads to an increase in domestic price level, thus, a Central bank respond is an increase in nominal interest rate.

Finally, in case of foreign income shock, domestic labor increases dramatically due to increase in local output. Depreciation of the hryvnia cause the increase in export and decrease in the quantity of imports. As a result, we can see decrease in migration, because households members decide to work for local firms.

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