# CURRENCY LIBERALIZATION AND MACROECONOMIC STABILITY IN UKRAINE: A TWO-AGENT ANALYSIS OF THE 2019 REFORM

by

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Abstract

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This thesis investigates how Ukraine's 2019 currency liberalization reform affected the transmission of monetary and external shocks, and how household heterogeneity shapes this transmission. I do not estimate the reform directly from post-2019 outcomes, because this period is dominated by the COVID-19 shock and the full-scale war. Instead, I use 2016–2019 as a pre-liberalization benchmark and study the reform as a counterfactual change in the model's financial-openness parameter. I develop a small open economy New Keynesian model with Ricardian and hand-to-mouth households, together with an endogenous debt-elastic country risk premium. Liberalization is modeled as a permanent reduction in the responsiveness of the risk premium to external debt, allowing comparison between less and more financially open regimes. The model is calibrated to Ukrainian data for 2016–2019 and closely reproduces the targeted volatility moments. The regime comparison shows that greater openness shifts shock absorption toward the exchange rate: foreign interest-rate shocks lead to larger exchange-rate movements and smaller output responses, while persistence changes only slightly. Unconditional volatility rises in the more open regime; I interpret this as structural comparative statics rather than a forecast. The thesis treats liberalization as a permanent regime shift in a heterogeneous-agent open-economy framework and quantifies the trade-off between financial openness and macroeconomic stability.

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# AI USE DECLARATION

During the preparation of this thesis, Generative AI (Chat GPT and Claude) was used as a supplementary tool to:

- brainstorming on a) the specification of the two-agent open-economy model and the modelling of currency liberalization as a change in the risk-premium parameter, b) the choice of plots for presenting impulse response functions and regime comparisons, c) robustness and sensitivity checks to apply;
- coding for a) data cleaning and consolidation of the macroeconomic series, b) construction of the model-solution and calibration routines, c) functions and loops for iterative model estimation and counterfactual experiments, d) generation of almost ready-to-paste correctly styled tables.

Any suggestions produced by the AI tool were critically evaluated and substantially modified by the author before being incorporated into the thesis.

The tool was not used to generate research findings, produce literature summaries used directly in the thesis, create citations, or conduct any form of data analysis. All research questions, theoretical framing, methodology, analysis, interpretation of results, and conclusions were developed independently by the author. The author takes full responsibility for the originality, validity, and academic integrity of the work presented in this thesis.

# LIST OF ABBREVIATIONS

**AR(1).** First-order autoregressive process

**CDS.** Credit Default Swap

**CPI.** Consumer Price Index

**DSGE.** Dynamic Stochastic General Equilibrium

**EMBI.** Emerging Markets Bond Index

**HANK.** Heterogeneous-Agent New Keynesian

**HP filter.** Hodrick–Prescott filter

**HtM.** Hand-to-Mouth

**IRF.** Impulse Response Function

**IS curve.** Investment–Saving curve

**MPC.** Marginal Propensity to Consume

**NKPC.** New Keynesian Phillips Curve

**REER.** Real Effective Exchange Rate

**SOE-NK.** Small Open Economy New Keynesian

**TANK.** Two-Agent New Keynesian

**UIP.** Uncovered Interest Parity

*Chapter 1*

# INTRODUCTION

Developing nations continuously face a trade-off between macroeconomic stability and financial integration with global capital markets (Kose, Prasad, and Taylor, 2011; Rey, 2015). Greater openness to foreign capital flows can foster access to external financing, enable risk sharing, and support economic development (Obstfeld, 1998; Kose et al., 2006). At the same time, exposure to global financial cycles increases vulnerability to sharp exchange rate fluctuations, sudden reversals, and external interest rate shocks (Calvo, Leiderman, and Reinhart, 1996; Mendoza, 2010). An important policy question for developing economies is how financial openness influences the transmission of macroeconomic shocks.

The case of Ukraine is particularly pertinent. Classified as an emerging and developing economy by the IMF (2026) and as an upper-middle-income country by the World Bank (2024), and a frontier market in MSCI and FTSE equity indices, Ukraine has experienced a continual series of external shocks, including geopolitical tensions, a changing global monetary environment, and capital flow volatility - most notably the 2014-2015 currency crisis following the annexation of Crimea and the outbreak of war in the Donbas, the 2020 COVID-19 shock, and the full-scale Russian invasion starting in February 2022. In this regard, the introduction of a liberalized currency regime in Ukraine from 2019 under the new Law on Currency and Currency Operations transformed the country's financial regime. The reform eased capital restrictions and expanded access to cross-border financial operations, thereby increasing financial openness. Most notably,

individual licensing for outward foreign investment was lifted, as was mandatory NBU approval for a broad range of cross-border payments, including foreign-currency loans and repatriation of dividends. The theoretical case for capital account liberalization is based on improved access to foreign capital and consumption smoothing, however, the evidence from emerging markets is mixed (Kose et al., 2009).

With robust institutions and a credible monetary policy, greater financial integration can raise welfare (Ghosh, Ostry, and Qureshi, 2016). However, financial integration can also expose countries to global financial shocks and may reduce monetary autonomy. The macroeconomic consequences of liberalisation depend on the structure of the economy, the channels of shock transmission, and the assumptions made about shocks. The analytical literature frequently examines currency liberalization in a representative-agent small open economy New Keynesian (SOE-NK) framework in order to study its macroeconomic consequences (Galí and Monacelli, 2005; Schmitt-Grohé and Uribe, 2003). This type of framework is useful for analyzing exchange-rate dynamics, monetary-policy trade-offs, and the broader endogenous response to financial liberalization. However, it overlooks household heterogeneity and liquidity constraints. This assumption is especially restrictive in emerging economies, where a large share of the population has limited access to financial markets, is effectively hand-to-mouth, and has a high marginal propensity to consume (Kaplan and Violante, 2014; Kaplan, Moll, and Violante, 2018). In this setting, monetary and external shocks operate not only through intertemporal substitution, but also through redistribution across heterogeneous households. Representative-agent SOE-NK models therefore have important limitations in this context.

In this thesis, I address these limitations by incorporating household heterogeneity into such a framework. I build a two-agent New Keynesian (TANK) model in which imperfect international capital mobility generates an endogenous country risk premium. Currency liberalization is modeled as a permanent structural change that reduces the sensitivity of the risk premium to external debt, reflecting improved access to global financial markets.

The effects of the 2019 reform can hardly be understood as a stochastic shock with bounded effects. A more appropriate way to think about the 2019 reform is as part of a regime shift in the economy's institutional setup. Essentially, the reform changed the nature and degree of the economy's financial openness. In order to assess the consequences of this reform, one requires a model that can incorporate such an institutional change directly.

Against this background, the main research question of this thesis is how the 2019 currency liberalization reform changed the transmission of monetary and external shocks in Ukraine, and how household heterogeneity affects this transmission. The main hypotheses of this thesis are as follows. The first hypothesis is that financial liberalization makes the domestic economy more sensitive to external financial shocks, resulting in higher exchange rate volatility and stronger spillovers from foreign interest rate shocks (Kose et al., 2009; Rey, 2015). The second hypothesis is that the presence of liquidity-constrained households amplifies these effects through redistribution channels. As a result, aggregate demand responses differ from those in a representative-agent benchmark (Kaplan and Violante, 2014; Kaplan, Moll, and Violante, 2018; Auclert, 2019). To test these hypotheses, the model compares pre- and post-

liberalization regimes in terms of impulse responses, unconditional volatilities, persistence measures, and cross-sectional consumption responses.

This thesis contributes to the literature in three ways. First, it contributes to the heterogeneous-agent New Keynesian literature by developing a model of a heterogeneous-agent emerging market economy embedded in an open-economy framework. Second, it contributes to the literature on capital account liberalization. The vast majority of papers treat currency reforms as temporary shocks to the asset market, examining one-time revaluation effects on equity prices and short-lived movements in the cost of capital (Henry, 2000; Bekaert and Harvey, 2000; Kim and Singal, 2000). In contrast, this paper treats currency liberalization as a permanent upward shift in the financial openness parameter within a structural dynamic model of a small open economy. A regime-based approach to currency liberalization is more appropriate than a transitory shock approach. Put differently, this paper argues for the importance of distinguishing between regime shifts and shocks in structural models of currency liberalization. Third, the thesis measures how greater financial openness interacts with household heterogeneity to affect macroeconomic stability. While the second contribution is based on a regime comparison across distinct institutional settings, this third contribution compares two regimes within a single structural model.

The remainder of the thesis is organized as follows. Chapter 2 reviews the relevant literature on heterogeneous-agent macroeconomic models, open-economy New Keynesian frameworks, and capital account liberalization in emerging markets. Chapter 3 presents the theoretical model, including the household block, the external sector, the monetary policy rule, and the interpretation of currency liberalization as a regime shift in the risk-premium

parameter. Chapter 4 describes the data, sample selection, construction of variables, and calibration strategy used to discipline the quantitative exercise. Chapter 5 reports the main results, including impulse response functions, unconditional volatility comparisons, persistence measures, and sensitivity checks. Chapter 6 concludes by summarizing the main findings, discussing their policy implications, and outlining the limitations of the analysis and possible directions for future research.

*Chapter 2*

# LITERATURE REVIEW

Discussions about macroeconomic policies often become more intense during crises when established models and policy rules are under pressure to perform. The 2008 Global Financial Crisis showed that many central ideas in pre-crisis macroeconomic models, such as frictionless financial markets and representative households, were unable to explain observed dynamics (Blanchard, Dell'Ariccia, and Mauro, 2010). The impact of external financial conditions, exchange rate fluctuations and institutional reform on macroeconomic outcomes has been particularly salient for emerging markets (Calvo, Leiderman, and Reinhart, 1996; Rey, 2015).

This thesis contains three strands of the literature which are connected. First, presented in subsection 2.1, are heterogeneous-agent macroeconomic models with incomplete markets. Second, presented in subsection 2.2, are open-economy New Keynesian models with imperfect capital mobility. And third, presented in subsection 2.3, strand of literature is on capital account liberalization in emerging economies. The thesis is positioned at the intersection of these strands, as described in subsection 2.4, and aims to determine how a rise in financial openness alters the transmission of standard macroeconomic shocks through both the aggregate level and across households. The thesis addresses a gap that arises precisely where they overlap: how external financial shocks propagate in economies with heterogeneous households and incomplete domestic financial markets.

## 2.1 Heterogeneity, Incomplete Markets, and Monetary Transmission

Modern heterogeneous-agent macroeconomics builds on the incomplete-markets models of Huggett (1993) and Aiyagari (1994), in which households face uninsurable idiosyncratic income risk[1] and rely on precautionary saving for consumption smoothing[2]. In these models, the non-degenerate distribution of wealth, as well as the positive mass of borrowing-constrained households, show that the aggregate consumption dynamics depend on the distribution of assets rather than on a representative agent.

Empirical evidence strongly supports this mechanism. Micro-level studies show a remarkable amount of difference in marginal propensities to consume (MPC). Households with low liquid wealth have significantly higher MPCs than wealthier households (Jappelli and Pistaferri, 2010; Kaplan and Violante, 2014). These studies reveal that aggregate responses to income and interest rate changes are disproportionately driven by liquidity-constrained agents.

Kaplan, Moll, and Violante (2018) combine household heterogeneity, nominal rigidities, and monetary policy in a heterogeneous-agent New Keynesian (HANK) framework to formalize these insights. This literature's central outcome is differences in transmission of monetary policy with representative-agent New Keynesian benchmark. Policy affects aggregate demand through redistribution across households with different balance sheets and MPCs rather than mainly through intertemporal substitution.

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[1] Household-specific income shocks that cannot be fully hedged through insurance markets

[2] Accumulating buffer-stock assets in good times to cushion future income shortfalls

Auclert et al. (2018) and Auclert (2019) further decompose monetary transmission into various channels, including the intertemporal substitution channel, income effects, and redistribution channels connected to interest rate exposure and transfers. These contributions demonstrate that a change in interest rates reallocates resources across households resulting in an aggregate consumption effect even with weak intertemporal substitution. This mechanism is relevant for economies with low financial inclusion[3] and high wealth inequality, typical of many emerging markets.

In line with this literature, this thesis employs tractable two-agent New Keynesian (TANK) framework. Unlike full HANK models that solve for an endogenous wealth distribution, this specification captures the core redistribution mechanisms in a parsimonious and transparent way, while remaining computationally compatible with the open-economy structure of the model.

While much of this literature focuses on closed-economy environments, my thesis extends its insights to an open-economy setting, thereby examining how redistribution and intertemporal substitution interact with exchange rate dynamics and external financial conditions.

## 2.2 Open-Economy New Keynesian Models and External Financial Frictions

[3] The share of households with effective access to formal savings, credit, and payment instrument

The small open-economy New Keynesian (SOE-NK) framework extends the closed-economy New Keynesian model by introducing exposure to foreign interest rates and exchange rate fluctuations. Galí and Monacelli (2005) provide the canonical formulation, showing how external shocks and exchange rate dynamics affect domestic inflation and output stabilization.

A major technical challenge in DSGE[4] modelling of small open economies is ensuring the stationarity of net foreign asset positions. Schmitt-Grohé and Uribe (2003) incorporate an endogenous country risk premium that reacts to the net foreign asset position of the economy. To put it another way, they add the foreign interest rate with a spread that reacts to the level of external indebtedness; this mechanism is now commonly referred to as a "debt-elastic interest rate." This has become standard in DSGE models of emerging markets, where the cost of external borrowing depends on the level of external debt and investor sentiment.

Domestic macroeconomic fluctuations in emerging economies are increasingly recognized as being affected by external financial conditions. A sudden tightening of monetary policy by the Federal Reserve, for example, might trigger capital outflows from emerging markets. Sudden changes in global interest rates or risk appetite can result in sharp exchange-rate movements and capital flow reversals, with significant effects on inflation and consumption (Calvo, Leiderman, and Reinhart, 1996; Mendoza, 2010). This perspective encourages to view deviations

[4] Dynamic Stochastic General Equilibrium

from uncovered interest parity as a principal transmission channel rather than as a secondary friction.

Modern literature typically captures imperfect capital mobility in two broad ways: one strand injects a country risk premium into the external financing condition, which may be either exogenous or endogenous, while another uses a reduced-form method for capital flow dynamics(Schmitt-Grohé and Uribe, 2003). Building on both insights, the thesis's external sector captures the empirically relevant relationship between exchange rates, external borrowing, and domestic macroeconomic variables through an endogenous risk premium and reduced-form capital flow dynamics. Unlike typical SOE-NK models that rely on representative households, the thesis adopts a heterogeneous-household approach with external financial frictions, allowing the impact of external shocks on differential household consumption behavior to be studied alongside aggregate transmission.

### 2.3 Capital account liberalization and macroeconomic stability

Many studies address the macroeconomic impacts of relaxing restrictions on the capital account. According to Obstfeld (1998), an early theoretical contribution shows that an increase in global risk sharing and more access to foreign finance can be beneficial. The analysis of Kose et al. (2006) and Kose, Prasad, Rogoff, and Wei (2009) shows that financial integration can support growth and consumption smoothing if the institutional environment is conducive. The experience of developing countries indicates that macroeconomic stability is not assured by liberalisation of the capital account.

Calvo et al. (1996), Reinhart and Reinhart (2008), as well as Rey (2015), point out that more open economies are more exposed to global financial cycles. Rey (2015) argues that global financial conditions can constrain domestic monetary policy independence even under flexible exchange rates.

This implies the existence of a global financial cycle. Consequently, the literature increasingly highlights that the impact of capital account liberalization is highly contextual. According to Kose et al. (2009), domestic financial development, institutional quality, as well as macroeconomic policy frameworks matter in ascertaining whether financial openness stabilizes or destabilizes the economy. Similarly, Ghosh, Ostry, and Qureshi (2016) find that the macroeconomic effects of capital inflow surges crucially depend on the policy response and pre-existing vulnerabilities.

Attention has shifted away from whether liberalization is 'good' as a result of this conditional viewpoint. It has rather become focused on the institutional and macroeconomic conditions under which liberalization enhances performance. The trend of treating capital account opening as a permanent structural change rather than as a temporary shock is now widespread in applied work.

The present thesis adds to this literature with a structural quantitative framework allowing for a clean regime comparison rather than relying only on reduced-form empirical correlations.

These concerns are especially relevant to Ukraine. The economy has relatively shallow financial markets, limited domestic savings instruments, and capital flows that are quite sensitive to global financial conditions. Hence, increased financial openness may heighten susceptibility to external shocks, which raises serious

questions about the stabilising function of currency liberalisation in this institutional framework.

### 2.4 Summary and thesis positioning

Capital account liberalization must be regarded as a permanent institutional reform and not a cyclical shock. The long-term effects of changes in capital and exchange-rate regulations on the set of feasible financial positions, the price of risk, and capital flows are illustrated in the work of Kose et al. (2009) and Reinhart and Reinhart (2008).

Ukraine's 2019 currency liberalization under the Law on Currency and Currency Operations is a relevant example. The easing of cross-border restrictions and improved access by residents and investors to foreign-currency transactions likely affected the cost of external financing and the response of capital flows to external conditions. In modeling terms, this suggests that liberalization should be interpreted as a permanent change in the parameters that govern financial openness rather than as a temporary shock.

The two strands of heterogeneous-agent macroeconomics and open-economy DSGE modeling have developed substantially. However, only a limited number of studies have integrated both strands into a single framework, especially for emerging market economies. Most heterogeneous-agent models are designed for closed economies, whereas most open-economy New Keynesian models rely on a representative household. As a result, the interaction between household heterogeneity, external financial frictions, and changes in financial openness regimes remains insufficiently understood.

This thesis uses that gap as its starting point. I keep the model deliberately tractable: household heterogeneity is represented by a TANK structure, while the open-economy side is captured through the exchange rate, external debt, and a debt-elastic risk premium. The purpose is not to reproduce all distributional dynamics of a full HANK model, but to examine how the same economy reacts to monetary and external shocks when the risk-premium schedule becomes flatter after liberalization.

*Chapter 3*

# THE MODEL

I use a small open economy New Keynesian model with two household types and imperfect international capital mobility. The household side separates Ricardian households, which can smooth consumption over time, from hand-to-mouth households, which mainly consume current income. The external side introduces a debt-elastic country risk premium. This is the part of the model through which the liberalization experiment enters. All equations are log-linearised around a zero-inflation steady state and solved as a linear rational expectations system. Unless otherwise stated, the variables are expressed as deviations from steady state. This keeps the model simple enough for a transparent regime comparison, while still allowing monetary shocks, foreign interest-rate shocks, exchange-rate movements, and household heterogeneity to interact.

The model is organized around five blocks. The household block (Section 3.1) introduces Ricardian and hand-to-mouth households. This distinction is important because the two groups do not react to shocks through the same mechanism: Ricardian households respond through intertemporal substitution, while hand-to-mouth households react mainly through current income and the direct interest-rate term introduced below.

The supply side (Section 3.2) is standard New Keynesian. Firms are monopolistically competitive and face Calvo-style price rigidity, which gives rise to a Phillips curve linking inflation to expected inflation and the output gap. Aggregate demand (Section 3.3) is described by an open-economy IS curve, where domestic demand depends not only on the real interest rate but also on

the real exchange rate and foreign financial conditions. Monetary policy (Section 3.4) follows a Taylor-type rule with interest-rate smoothing, consistent with the inflation-targeting framework used by the NBU after 2015–2016.

The central part of the model for this thesis is the external sector (Section 3.5). The exchange rate is determined by a modified UIP condition with an endogenous country risk premium. The parameter $\psi$ measures how strongly the risk premium responds to external debt. Currency liberalization (Section 3.6) is interpreted as a permanent fall in $\psi$. Therefore, the reform does not directly change preferences, price-setting, or the policy rule; it changes the external financing condition, and the rest of the economy responds through the exchange rate, external debt, output, inflation, and household consumption.

The schematic representation of the model is presented in Figure 1, which helps in visualizing the connectivity of its various blocks before turning to the formal equations. The household block differentiates between Ricardian and hand-to-mouth households, whose consumption responses differ because only Ricardian households smooth consumption intertemporally through asset markets. The firms and price-setting block determines inflation through nominal rigidities. According to a Taylor-type rule, the monetary policy block links domestic inflation and output to the nominal interest rate. The external block connects the domestic economy to foreign financial conditions through the foreign interest rate, exchange-rate dynamics, and the endogenous country risk premium.

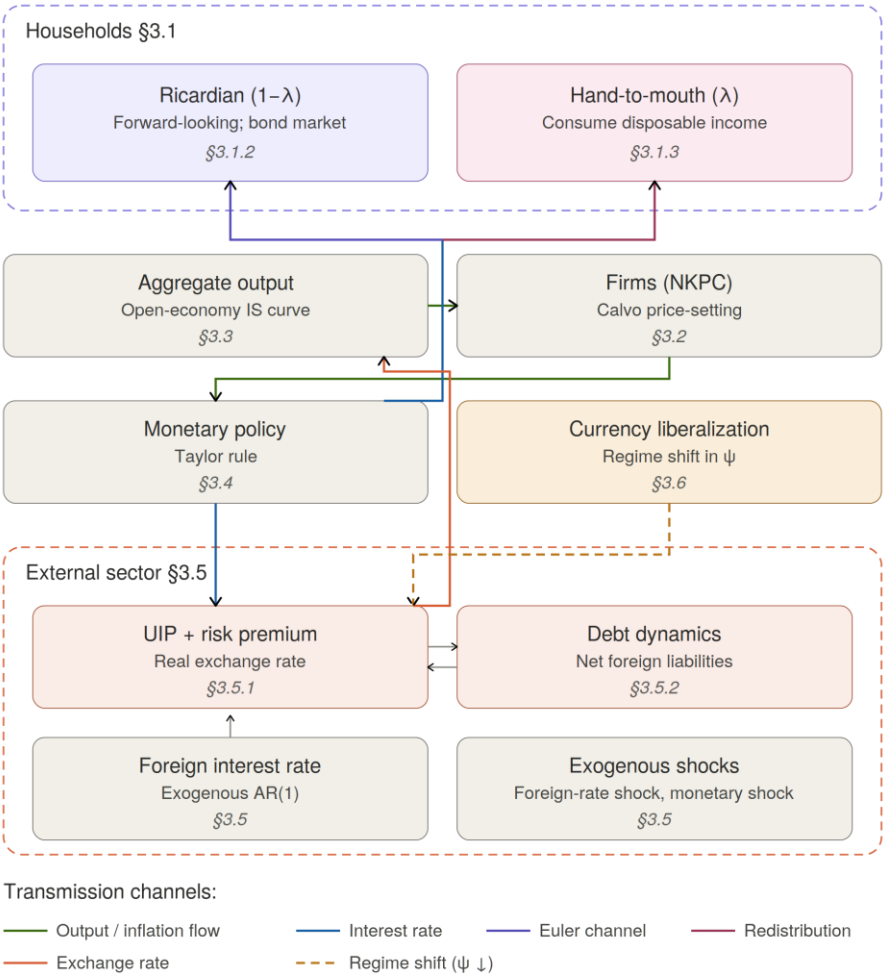



Figure 1. Model structure diagram with arrows indicating key transmission channels

Figure 1 is meant to clarify where the regime change enters the model. The fall in ψ does not directly change preferences, the Phillips curve, or the Taylor rule. It changes the external financial block, and the rest of the model responds through the exchange rate, external debt, and aggregate demand. This is why the

later comparison between the two regimes is mainly a comparison of external-shock transmission.

### 3.1 Households

At each date t, households make consumption decisions within the period and form expectations about future variables at t+1. The distinction between the two household types is economic rather than physical. Ricardian households have effective access to financial markets, meaning that they can save and borrow through financial assets and therefore smooth consumption over time. Hand-to-mouth households, by contrast, are assumed to have little or no effective asset-market participation and therefore consume primarily out of current income. Aggregate consumption is obtained by weighting the consumption of the two household types by their population shares.

The economy is populated by a continuum of households of two types:

- Ricardian households (optimising, unconstrained), with population share $1 - \lambda$

- Hand-to-mouth (HtM) households (liquidity-constrained), with population share $\lambda \in (0,1)$

A key distinction in this model is that the population share $\lambda$ differs from the income share of HtM households. Empirically, households that do not participate in asset markets tend to have below-average income. I therefore introduce two separate parameters: $\lambda$ for the weight in consumption aggregation, and $\mu$ for the share of aggregate income accruing to HtM households, with $\mu < \lambda$.

### 3.1.1 Income Distribution

Total output $y_t$ is distributed between the two household types. Let $(\mu \in (0, \lambda))$ denote the fraction of aggregate income received by hand-to-mouth households. Then:

$$y_t^H = \mu y_t \tag{1}$$

$$y_t^R = (1 - \mu) y_t \tag{2}$$

where $y_t^H$ is the real income (real means deflated by the consumer price index, so it is measured in consumption-good units rather than nominal currency) of HtM households, and $y_t^R$ is the real income of Ricardian households.

### 3.1.2 Ricardian Households

Ricardian households have access to financial markets, can borrow and lend subject to a borrowing limit, and smooth consumption intertemporally. Their optimisation problem is standard: they maximise expected lifetime utility

$$E_{\mathbb{0}} \sum_{t=0}^{\infty} \beta^t \frac{(C_t^R)^{1-\sigma}}{1-\sigma} \tag{3}$$

subject to the sequence of budget constraints

$$C_t^R + A_t = \left(1 + r_{\{t-1\}}\right)A_{\{t-1\}} + Y_t^R \tag{4}$$

where $A_t$ denotes real financial assets held at the end of period t, and $r_t$ is the real interest rate. The first-order condition yields the Euler equation. In addition, optimising households face a no-Ponzi condition:

$$\lim_{T\to\infty} E_t\left[\beta^T \frac{u'(C_{t+T}^R)}{u'(C_t^R)} A_{t+T}\right] = 0 \tag{5}$$

which prevents them from accumulating debt indefinitely and ensures that the intertemporal budget constraint is satisfied. In the linearised framework around a steady state with zero inflation and zero net assets, this condition translates into the requirement that all endogenous variables remain bounded - a standard transversality condition implicitly enforced by solving for a stable and unique rational expectations equilibrium.

Log-linearising the Euler equation around the steady state gives the consumption Euler equation for Ricardian households:

$$c_t^R = E_t c_{t+1}^R - \frac{1}{\sigma}(i_t - E_t\pi_{t+1}) \tag{6}$$

where:

- $c_t^R$ - consumption of Ricardian households (log deviation from steady state)

- $\sigma$ - coefficient of relative risk aversion (inverse of intertemporal elasticity of substitution)

- $i_t$ - nominal interest rate

- $\pi_t$ - inflation rate

- $E_t$ - rational expectations operator conditional on information available at date t

Lowercase letters denote log deviations from steady state. Equation (6) captures the standard intertemporal substitution channel of monetary transmission: higher real interest rates induce Ricardian households to postpone consumption.

The asset accumulation equation and the no-Ponzi condition are not explicitly needed for the log-linearised dynamics around the steady state, as I restrict attention to bounded solutions and the economy is always assumed to remain in a neighbourhood of the steady state.

### 3.1.3 Hand-to-Mouth Households

Hand-to-mouth households do not participate in asset markets and cannot smooth consumption intertemporally. They consume their entire disposable income each period, but their consumption may also be directly affected by financial conditions - for instance, through variable-rate debt or access to credit. Their behaviour is modelled in reduced form as:

$$c_t^H = y_t^H - \theta i_t = \mu y_t - \theta i_t \quad (7)$$

where:

-$c_t^H$ - consumption of HtM households (log deviation)

- $\theta$ - sensitivity of HtM consumption to the nominal interest rate

- $y_t$ - aggregate real output (log deviation from steady state); under goods-market clearing this also equals aggregate real income

- $\mu$ - share of aggregate real income accruing to HtM households (introduced in equation 1), with $0 < \mu < \lambda$; HtM disposable income is therefore $y_t^H = \mu y_t$

The parameter $\theta$ captures the exposure of liquidity-constrained households to monetary conditions. A higher $\theta$ strengthens the redistribution channel of monetary policy: when interest rates rise, HtM households reduce consumption not only because aggregate income falls, but also directly due to tighter financial conditions. This reduced-form specification parsimoniously captures the idea that HtM households may have debt indexed to short-term rates or face tighter borrowing constraints when policy tightens.

The formulation $c_t^H = \mu y_t - \theta i_t$ embeds two channels through which monetary policy affects HtM consumption:

1)Indirect income channel: higher interest rates reduce aggregate output $y_t$, which reduces HtM income proportionally via $\mu$

2.) Direct financial channel: higher interest rates directly reduce HtM consumption via $\theta$

### 3.1.4 Aggregation

Aggregate consumption is the weighted average of the two household types, using their population shares:

$$c_t = (1 - \lambda)c_t^R + \lambda c_t^H \tag{8}$$

Goods market clearing requires that aggregate output equals aggregate consumption:

$$y_t = c_t \tag{9}$$

Substituting (5) into (6) gives:

$$y_t = (1 - \lambda)c_t^R + \lambda c_t^H \tag{10}$$

which will be used to close the model.

## 3.2 Firms and Price Setting

The supply side of the economy is standard in the small open-economy New Keynesian literature, but it deserves comment. A continuum of monopolistically competitive firms produce differentiated goods using labour as the only input. The assumption of monopolistic competition is well suited to the Ukrainian case because most consumer-goods and service sectors of the Ukrainian economy exhibit substantial product differentiation and non-trivial price-setting power at the firm level rather than perfect competition with price-taking; the same assumption is standard in the small open-economy New Keynesian literature (Galí and Monacelli, 2005; Galí, 2015). Abstracting from capital is a deliberate simplification: in the baseline New Keynesian framework (Galí, 2015) it preserves the central supply-and-demand transmission channels of monetary policy while keeping the model analytically tractable, and it is innocuous for the short-run business-cycle dynamics that are the focus of this thesis. As a result, the production technology is linear in labour, $Y_t(i) = N_t(i)$. Firms face Calvo-style price rigidity: in each period, a fraction $1-\theta$ of firms can reset their prices, while the remaining fraction $\theta$ keep their prices unchanged. With slight abuse of notation, the same symbol $\theta$ is used for the Calvo non-adjustment probability and for the HtM interest-rate sensitivity introduced earlier in equation (7); however, the meaning is unambiguous from context, since the Calvo $\theta$ appears only in the firm block. Further, $Y_t(i)$ denotes the real output of firm i and $N_t(i)$ denotes the labour input it uses in period t; aggregate labour and aggregate output therefore satisfy $N_t = \int N_t(i)\ di$ and $Y_t = \int Y_t(i)\ di$.

When the first-order conditions for price-setting firms are log-linearised around the zero-inflation steady state, the standard New Keynesian Phillips Curve is obtained. The derivation is well known and can be outlined in two steps. First, an adjusting firm chooses its reset price to maximise the expected discounted

stream of profits over the random duration of the price spell. This delivers a recursive equation in real marginal cost. Second, the aggregate price level evolves according to a Calvo weighted average of last period's price index and the optimal reset price, $P_t=[\theta P_{t-1}^{1-\varepsilon} + (1-\theta)(P_t^*)^{1-\varepsilon}]^{\frac{1}{1-\varepsilon}}$. The two equations can then be combined and log-linearised around the zero-inflation steady state under the auxiliary assumption that real marginal cost moves one-for-one with the output gap, which holds in this model because labour is the only input and the labour market clears at the wage that equates the marginal disutility of work to the real wage, to obtain:

$$\pi_t = \beta E_t \pi_{t+1} + \kappa y_t \tag{11}$$

where:

- ($\beta \in (0,1)$ - discount factor

- $\kappa > 0$ - slope of the Phillips curve, determined by the degree of price stickiness and the elasticity of substitution between goods

- $y_t$ - output gap (deviation from flexible-price output, normalised to zero in steady state)

Equation (11) captures the forward-looking nature of inflation determination: current inflation depends on expected future inflation and on current real activity, which here is measured by the output gap $y_t$ (i.e. the percentage deviation of actual output from its flexible-price counterfactual; both are normalised to zero at the steady state). The reason for using the gap rather than

output itself is that, under flexible prices, output would equal its frictionless level and inflation would be zero; what generates inflation in the New Keynesian framework is the deviation of output from this frictionless benchmark, because such a deviation moves real marginal cost away from its steady-state value. Output as a level is, by construction, normalised to zero in the steady state, but it is the gap relative to the flexible-price equilibrium that matters for price-setting decisions and hence for inflation. "Current real activity" in the previous sentence refers precisely to this output gap.

### 3.3 Aggregate Output (Open-Economy IS Curve)

Aggregate output is determined by an open-economy the investment-saving (IS) curve that incorporates the effects of the real exchange rate and foreign interest rates. The label is retained from the closed-economy New Keynesian literature even though, in this two-agent variant, the curve aggregates the consumption decisions of both household types under goods-market clearing rather than equating investment and saving in the textbook sense:

$$y_t = E_t y_{t+1} - \frac{1}{\sigma}(i_t - E_t \pi_{t+1}) - a_q q_t + d_{r^*} r_t^* \tag{12}$$

where:

- $q_t$ - real exchange rate (an increase denotes real appreciation)

- $r_t^*$ - exogenous foreign real interest rate

- $a_q > 0$ - elasticity of aggregate demand with respect to the real exchange rate

- $d_{r^*} > 0$ - direct effect of foreign interest rates on domestic demand (channels not captured by the real exchange rate, such as foreign-currency debt service or balance-sheet effects)

For completeness, the remaining symbols in equation (12) reuse definitions introduced earlier: $y_t$ is the output gap (subsection 3.2), $E_t$ is the rational expectations operator, $i_t$ is the nominal interest rate set by the central bank (subsection 3.4), $\pi_{t+1}$ is next-period inflation, and σ is the inverse intertemporal elasticity of substitution introduced in subsection 3.1.2. The combination $(i_t - E_t\pi_{t+1})$ is again the ex-ante real interest rate.

The negative sign on $q_t$ captures the expenditure-switching channel: a real appreciation of $q_t$ makes domestic goods relatively more expensive, reducing net exports and thus aggregate demand. The coefficient $a_q$ measures the strength of this channel.

The term $d_{r^*}$ captures financial spillovers: higher foreign interest rates may directly affect domestic demand through various channels not fully captured by the exchange rate - for instance, through the cost of foreign-currency denominated debt or through the balance sheets of domestic firms and banks.

The IS curve can be derived from the household Euler equation combined with the goods market clearing condition and the external sector relationships, but for our purposes this reduced form is sufficient.

### 3.4 Monetary Policy

Monetary policy follows a Taylor-type interest rate rule with partial adjustment:

$$i_t = \rho_i i_{t-1} + (1-\rho_i)\left(\phi_\pi \pi_t + \phi_y y_t\right) + \varepsilon_t^{mp} \quad (13)$$

where:

- $\rho_i \in [0,1)$ - interest rate smoothing parameter

- $\phi_\pi > 1$ - inflation coefficient (satisfying the Taylor principle)

- $\phi_y \geq 0$ - output gap coefficient

- $\varepsilon_t^{mp}$ - i.i.d. monetary policy shock with mean zero and standard deviation $\sigma_{mp}$.

The central bank adjusts the nominal interest rate in response to deviations of inflation and output from their targets (both zero in steady state). The smoothing term captures the gradual adjustment observed in practice.

Monetary policy affects the economy through three distinct channels in this model:

1. Intertemporal substitution channel - via the Euler equation for Ricardian households (equation 6)

2. Redistribution channel - via the direct effect on HtM consumption ($\theta i_t$ in equation 7)

3. Exchange rate channel - via the UIP condition (equation 14 below)

### 3.5 External Sector

Ukraine is modelled as a small open economy facing an exogenous foreign real interest rate. The foreign rate follows an AR(1) process:

$$r_t^* = \rho_* r_{t-1}^* + \varepsilon_t^* \quad (14)$$

where $\rho_* \in [0,1)$ and $\varepsilon_t^*$ is an i.i.d. foreign interest rate shock.

### 3.5.1 Uncovered Interest Parity with Endogenous Risk Premium

International financial markets are characterised by imperfect capital mobility. The real exchange rate satisfies a modified uncovered interest parity (UIP) condition that includes an endogenous country risk premium:

$$q_t = (i_t - E_t\pi_{t+1}) - r_t^* - \psi b_t \quad (15)$$

where:

- $q_t$ - real exchange rate

- $b_t$- real net foreign liabilities (deviation from steady state)

- $\psi > 0$ - sensitivity of the country risk premium to external debt

The intuition is standard:

Higher domestic real interest rate $(i_t - E_t\pi_{t+1})$ attracts capital inflows, causing appreciation of $q_t$. Higher foreign real interest rate $r_t^*$ causes capital outflows and depreciation $q_t$

-Higher external debt $b_t$ increases the perceived default risk, requiring a higher premium for foreign investors, which manifests as a depreciation $q_t$

### 3.5.2 External Debt Dynamics

Net foreign liabilities evolve according to a reduced-form law of motion that captures capital flow responsiveness to exchange rate movements while ensuring stationarity:

$$b_t = \rho_b b_{t-1} + (1 - \rho_b) q_t \tag{16}$$

where $\rho_b \in [0,1)$ governs the persistence of external debt.

This specification has two key features:

1. Mean reversion: The term $\rho_b b_{t-1}$ ensures that external debt returns to its steady state (normalised to zero) over time
2. Exchange rate sensitivity: The term $(1 - \rho_b) q_t$ captures the effect of exchange rate movements on the external position. For instance, an appreciation of $q_t$ may worsen the trade balance and increase net foreign liabilities

The coefficient $(1 - \rho_b)$ determines how strongly exchange rate fluctuations feed into the external debt position. This reduced form summarises in a shortened way the complex dynamics of capital flows, trade balances and

valuation effects, keeping the model tractable while capturing the essential feedback between the exchange rate and the external position.

### 3.6 Currency Liberalisation as a Regime Shift

The 2019 currency liberalisation reform is modelled as a permanent structural change in the degree of financial openness. Specifically, the reform is interpreted as reducing the sensitivity of the country risk premium to external debt - i.e., a decrease in the parameter $\psi$.

Two regimes are considered:

$$\text{Pre-liberalisation:} \quad \psi = \psi_{pre} \tag{17}$$

$$\text{Post-liberalisation:} \quad \psi = \psi_{post}, \quad \psi_{post} < \psi_{pre} \tag{18}$$

A lower $\psi$ implies flatter risk-premium schedule: for a given level of external debt, the required risk premium is smaller; improved access to international financial markets ; greater sensitivity of the exchange rate to interest rate differentials and capital flows

All other structural parameters are held constant across regimes, allowing a clean comparison of shock transmission before and after the reform. The analysis thus isolates the effects of increased financial openness on macroeconomic dynamics.

### 3.7 Equilibrium Definition

A rational expectations equilibrium is a set of sequences:

$$\{y_t, \pi_t, i_t, q_t, b_t, c_t^R, c_t^H, r_t^*\}_{t=0}^{\infty} \tag{19}$$

satisfying:

1. Ricardian households: Euler equation (6)

2. HtM households: Consumption rule (7)

3. Income distribution: Relations (1)-(2)

4. Aggregation and market clearing: Equations (8)-(9)

5. Firms: Phillips curve (11)

6. Aggregate demand: Open-economy IS curve (12)

7. Monetary policy: Taylor rule (13)

8. External sector: UIP condition (15), debt dynamics (16), foreign rate process (14)

for given sequences of shocks $\{\varepsilon_t^{mp}, \varepsilon_t^*\}$, with all expectations formed rationally.

The system is log-linearised around a deterministic steady state with:

- Zero inflation: $\pi = 0$

- Zero net foreign assets: $b = 0$

- Real interest rate determined by discount factor: $r = 1/\beta - 1$

- Output normalised to $y = 0$ (deviations from flexible-price equilibrium)

### 3.8 Solution Method

The log-linearised equilibrium conditions form a system of linear expectational difference equations. This system can be written in compact matrix form as:

$$A\boldsymbol{x_t} = B\boldsymbol{x_{t-1}} + CE_t\boldsymbol{x_{t+1}} + D\boldsymbol{\varepsilon_t}, \tag{20}$$

where:

- $\boldsymbol{x_t} = [y_t, \pi_t, i_t, q_t, b_t, c_t^R, c_t^H, r_t^*]'$ - vector of endogenous variables

- $\boldsymbol{\varepsilon_t} = \left[\varepsilon_t^{mp}, \varepsilon_t^*\right]'$ - vector of exogenous shocks

- $A, B, C, D$ - matrices of coefficients derived from the model equations

The system is solved numerically using standard methods for linear rational expectations models. Specifically, I use policy function iteration implemented in Julia, which computes the recursive law of motion:

$$\boldsymbol{x_t} = P\boldsymbol{x_{t-1}} + Q\boldsymbol{\varepsilon_t} \tag{21}$$

The solution algorithm ensures that the equilibrium is unique and stable (the Blanchard-Kahn conditions are satisfied).

### 3.8.1 Impulse Response Functions

For each regime (pre- and post-liberalisation), I compute impulse response functions (IRFs) to two types of shocks:

1. Foreign interest rate shock $\varepsilon_t^*$ a temporary 1 percentage point increase in the foreign real interest rate
2. Domestic monetary policy shock $\varepsilon_t^{mp}$ a temporary 1 percentage point increase in the domestic nominal interest rate

IRFs trace the dynamic response of all endogenous variables to these shocks over a 20-quarter horizon. By comparing IRFs across regimes, I assess how the transmission mechanism changes with financial openness.

### 3.8.2 Model Implementation

The model is solved separately for each regime:

- Regime A (pre-2019): $\psi = \psi_{pre}$

- Regime B (post-2019): $\psi = \psi_{post}$

All other parameters are identical across regimes. This allows us to isolate the effect of the structural change in $\psi$ on the propagation of shocks.

The solution algorithm proceeds as follows:

1. Specify all structural parameters
   $(\beta, \sigma, \kappa, \lambda, \mu, \theta, a_q, d_{r^*}, \rho_i, \phi_\pi, \phi_y, \rho_*, \psi, \rho_b)$
2. Construct the matrices $A, B, C, D$ from the log-linearised equations
3. Solve for the recursive law of motion using a linear rational expectations solver
4. Compute impulse responses by iterating the law of motion forward from an initial shock
5. Repeat steps 1-4 for the alternative regime with the modified $\psi$ parameter

All computations are performed in Julia.

### 3.9 Quantitative Evaluation and Stability Metrics

For each regime, the analysis is computed:

**(1) Impulse response functions (IRFs)**

To external interest-rate shocks and monetary policy shocks.

**(2) Volatility metrics**

Standard deviations of:

$$x_t, \quad \pi_t, \quad q_t, \quad B_t^{ext}.$$

**(3) Persistence metrics**

First-order autocorrelations:

$$\rho(x_t), \quad \rho(\pi_t), \quad \rho(q_t).$$

*Chapter 4*

# DATA AND CALIBRATION

This section describes the data sources, sample selection, and construction of key macroeconomic variables used to calibrate the model and to establish the empirical patterns that motivate the theoretical analysis. The focus is on comparing two distinct periods in Ukraine's recent economic history: the pre-liberalization baseline (2016-2019) and a reference period with different monetary policy framework (2010-2013). The volatility moments derived here serve as targets for the model calibration and as benchmarks for the counterfactual experiments.

## 4.1 Data Sources

I used quarterly Ukrainian data from multiple sources for empirical analysis:

Table 1. Data Sources, Frequency, and Coverage

| Variable | Source | Frequency | Coverage |
|---|---|---|---|
| Real GDP | State Statistics Service of Ukraine (SSSU) | Quarterly, seasonally adjusted | 2010Q1–2019Q4 |
| Consumer Price Index (CPI) | SSSU | Monthly | 2010M1–2019M12 |

| Variable | Source | Frequency | Coverage |
|---|---|---|---|
| Real Effective Exchange Rate (REER) | National Bank of Ukraine (NBU) | Monthly | 2010M1–2019M12 |
| Policy interest rate | NBU | Monthly | 2010M1–2019M12 |
| External debt (EMBI Ukraine spread) | Bloomberg | Monthly | 2010M1–2019M12 |

All data are taken as published, with no additional adjustments except those explicitly described below.

### 4.2 Sample selection

The analysis focuses on two non-overlapping periods which were representing different macroeconomic regimes in Ukraine's recent history:

1. Period A (2010Q1–2013Q4): A period of relatively stable growth before the major structural break of 2014-2015. During this time, monetary policy was not yet operating under a fully-fledged inflation targeting regime and capital account restrictions were largely in place.

2. Period B (2016Q1–2019Q4): This period follows the deep crisis of 2014-2015 and the subsequent stabilization. Crucially, it coincides with the adoption of inflation targeting by the NBU (officially announced in 2015, fully implemented by 2016). During this period, monetary policy followed a Taylor-type rule

consistent with our theoretical framework. However, the 2019 currency liberalization had not yet taken effect, making this period an ideal pre-liberalization baseline for calibrating the model's parameters under the new monetary regime but old capital account regime.

The years 2014–2015 are excluded due to the extraordinary shocks (political upheaval, military conflict, massive devaluation). The post-2019 period is excluded because it is contaminated by the COVID-19 pandemic (2020–2021) and the full-scale war (from 2022), which prevent a clean identification of the liberalization's effects. The counterfactual experiment in the model will therefore simulate the post-liberalization economy under peaceful conditions, using the 2016–2019 period as the starting point.

### 4.3 Construction of Key Variables

#### 4.3.1 Output Gap

Quarterly real GDP (seasonally adjusted, constant 2021 prices) is transformed into natural logarithms. The output gap is obtained by applying the Hodrick-Prescott (HP) filter with a smoothing parameter λ = 1600 (standard for quarterly data):

$$q_t = (i_t - E_t\pi_{t+1}) - r_t^* - \psi b_t \tag{22}$$

where $GDP_t^{trend}$ is the HP trend component.

### 4.3.2 Inflation

Monthly CPI indices (percentage change relative to previous month) are first converted to gross inflation factors:

$$g_m = 1 + \frac{CPI_{m,m-1}}{100} \tag{23}$$

Here, quarterly gross inflation is the product of the three monthly factors within the quarter:

$$G_q = g_{m1} \cdot g_{m2} \cdot g_{m3} \tag{24}$$

The quarter-on-quarter inflation rate is then annualized for comparability with typical policy targets:

$$\pi_t^{ann} = \left(G_q^4 - 1\right) \times 100 \tag{25}$$

### 4.3.3 Real Exchange Rate Changes

Monthly REER indices (2015=100) are averaged to obtain quarterly levels:

$$REER_q = \frac{REER_{m1} + REER_{m2} + REER_{m3}}{3} \quad (26)$$

Quarterly log changes are computed as:

$$\Delta q_t \; = \; 100 \; \times (\ln R\,EER_q - \ln R\,EER_{q-1}) \quad (27)$$

and annualized by multiplying by 4.

### 4.3.4 Risk Premium Proxy

For the EMBI Ukraine spread (monthly, in basis points), I convert to quarterly averages and then to decimal units (divide by 10,000). The cyclical component is extracted using the same HP filter (λ=1600 applied to the quarterly series). This cyclical component is used as the empirical counterpart of the model's risk premium $rp_t = \psi b_t$.

## 4.4 Stylized Facts: Volatility Patterns

Table 2 reports the standard deviations of the constructed variables for the two periods. These moments capture the degree of macroeconomic volatility under different regimes.

Table 2. Volatility of key macroeconomic variables

| Variable | Period A (2010–2013) | Period B (2016–2019) | Change |
|---|---|---|---|
| Output gap ( $\sigma_y$ ) | 3.94% | 2.42% | -38.6% |
| Annualized inflation ( $\sigma_{\pi^{ann}}$ ) | 7.38% | 5.77% | -21.8% |
| Annualized REER change ( $\sigma_{\Delta q^{ann}}$ ) | 9.35% | 14.27% | +52.6% |
| Risk premium (cyclical) ( $\sigma_{rp}$ ) | – | 1.17% | – |

Table 2 reveals an interesting pattern:

In 2016–2019, inflation and output became significantly less volatile than in 2010–2013 There has been improvement in monetary policy credibility under inflation targeting and greater macroeconomic stability after crisis of 2014-2015.

The annualized standard deviation of real exchange rate has become more than 50% more volatile. It indicates that the economy absorbed external shocks more through exchange rate adjustments rather than through output or inflation changes.

During the 2016-2019 period, the risk premium highlighted by CDS Spread exhibited volatility within the ballpark of 1.17% which will serve as important calibration target defining rough size of foreign shock in the model.

The evidence above, then, underpins the theoretical mechanism: increased capital openness (lower ψ in the model) should increase exchange rate volatility, while dampening (or at least not increasing) output and inflation volatility through an improved shock-absorbing capacity. The σrp values and the relative increase in σq will be used to calibrate the model. The calibrated model will be used to evaluate the counterfactual effect of additional liberalization on the transmission of shocks.

### 4.5 Calibration Strategy

The model is calibrated using a combination of standard parameter values from the literature, institutionally motivated regime assumptions, and a targeted moment-matching procedure. The purpose of the calibration is not full structural estimation in the econometric sense, but rather the construction of a disciplined quantitative benchmark that reproduces the main unconditional features of the Ukrainian pre-liberalization economy and allows for a transparent regime comparison.

Parameters that are well established in the New Keynesian and small open economy literature are fixed at conventional values. In particular, the discount factor is set to $\beta = 0.99$, the Taylor-rule inflation coefficient to $\varphi\pi = 1.5$, the interest-rate smoothing parameter to $\varrho i = 0.8$, the persistence of the foreign interest-rate process to $pr^* = 0.8$, and the population share of hand-to-mouth households to $\lambda = 0.5$. These values are standard in quarterly DSGE applications and provide a transparent benchmark for the Ukrainian case.

The key regime parameter is ψ, which governs the sensitivity of the country risk premium to external debt. In the model, ψ determines the slope of the risk-

premium schedule: a higher $\psi$ implies that a given increase in external debt generates a larger premium response, while a lower $\psi$ implies a flatter schedule and therefore greater effective financial openness. Modeling the external interest-rate premium as debt-elastic follows the standard small open economy DSGE approach of Schmitt-Grohé and Uribe (2003), where such a premium is introduced to ensure stationarity of external positions. In the present thesis, this mechanism is given a regime interpretation: a higher $\psi$ is associated with tighter external financing conditions and lower financial openness, whereas a lower $\psi$ corresponds to easier access to international capital markets. The pre-liberalization regime is defined by $\psi_{pre} = 0.08$, while the post-liberalization counterfactual is defined by $\psi_{post} = 0.01$. These values are not estimated from post-2019 realized outcomes. Instead, they are imposed to represent two qualitatively different financial environments: a relatively less open regime before the 2019 reform, and a more open regime after liberalization.

This choice should be interpreted as a structural counterfactual rather than a point estimate of the true post-2019 parameter. Economically, the change from 0.08 to 0.01 corresponds to a substantial flattening of the risk-premium schedule: for the same increase in external debt, the implied premium response is much smaller in the post-liberalization regime. This captures, in reduced form, the idea that the 2019 reform improved access to international financial markets and reduced the degree to which external borrowing was penalized by country-specific financial frictions. Thus, while Schmitt-Grohé and Uribe (2003) provide the methodological justification for the debt-elastic premium, the interpretation of $\psi$ as a regime-dependent measure of financial openness is specific to the present thesis.

Two further points clarify how strong this counterfactual is and why the calibrated parameters are economically disciplined rather than arbitrary. First, the magnitude of the $\psi$ change is deliberately large: 0.08 is a conventional "closed" value within the range used in small open economy DSGE models following Schmitt-Grohé and Uribe (2003), while 0.01 represents a near-frictionless external-financing regime. The reform is thus modelled as an upper bound on plausible liberalisation rather than a marginal change, which is why the resulting volatility differences should be read as the direction and approximate scale of the trade-off, not as a precise prediction. A reform that moved $\psi$ only part of the way from 0.08 toward 0.01 would, by the monotone sensitivity in Section 5.4, generate proportionally smaller effects. Second, the calibrated parameters are pinned down by economically meaningful targets. The hand-to-mouth income share $\mu$ = 0.0891 is set well below the population share $\lambda = 0.5$ because households outside asset markets are empirically poorer than average; this gap is what makes the redistribution channel quantitatively bounded, as discussed in Section 5.5. The external-debt persistence $\varrho_b = 0.3647$ is not free either: it is disciplined by the joint requirement that the model reproduce the observed exchange-rate and risk-premium volatility while keeping the net foreign asset position stationary, so it reflects the speed of external adjustment implied by the data rather than an imposed value.

The remaining structural parameters are chosen to match selected empirical moments from the 2016Q1–2019Q4 period, which serves as the pre-liberalization baseline under the inflation-targeting monetary regime. The targeted moments are the standard deviation of the output gap, annualized inflation volatility, annualized exchange-rate-change volatility, and risk-premium volatility. This period is particularly suitable for calibration because it combines

the post-2015 monetary framework with the pre-liberalization capital-account regime, while remaining unaffected by the large shocks associated with the pandemic and the full-scale war.

Several calibrated parameters also have a clear economic interpretation. The income share of hand-to-mouth households, μ, is calibrated below their population share λ in order to reflect the idea that liquidity-constrained households are not only financially excluded, but also poorer on average. This is consistent with the empirical observation that households with limited financial-market participation typically receive below-average income and exhibit a higher marginal propensity to consume. Likewise, the persistence of external debt, ϱ_b, is calibrated to reproduce the joint behavior of exchange-rate movements, debt adjustment, and risk-premium volatility. Although this parameter is not directly estimated from a separate debt equation, it is economically disciplined by the requirement that the model generate plausible external adjustment dynamics while preserving stationarity.

The foreign shock standard deviation is calibrated separately so that the model reproduces the empirical volatility of the risk premium in the baseline sample. More specifically, the model is first simulated under a unit foreign shock, and the implied volatility of the endogenous risk premium is computed The foreign shock is rescaled so that the model-implied standard deviation of the risk premium equals the empirical standard deviation. Therefore, the foreign shock size is not a target moment in itself, but rather a scaling device that enables the model to match the observed volatility of external financial conditions.

Table 3 shows the fit of the calibrated baseline model. The final calibration is very much in accordance with all four targeted moments. Given the above close

fit, it follows that the model reproduces the essential unconditional features of the Ukrainian pre-liberalization macroeconomic environment, which serves as the benchmark for the regime comparison. While interpreting the quantitative results, we must still remain disciplined: as the post-liberalization regime is modelled as a strong counterfactual shift in ψ, the differences between regimes must not be interpreted as a direct estimate of what actually happened in Ukraine post-2019, but rather as model-based implications of a fundamentally more open financial environment.

Table 3. Model fit

| **Moment** | **Data** | **Model** | **Error** |
|---|---|---|---|
| std(y) | 0.024211 | 0.0242109 | -6.32 × 10^-8 |
| std(π_ann) | 0.057735 | 0.0577348 | -1.56 × 10^-7 |
| std(Δq) | 0.142669 | 0.1426689 | -1.20 × 10^-7 |
| std(rp) | 0.015542 | 0.0155420 | -1.73 × 10^-18 |

Table 4 reports the final baseline parameter values used in the quantitative exercises, while Table 5 clarifies which parameters are fixed, calibrated, and imposed by design.

Table 4. Structural parameters — baseline calibration

| Parameter | Description | Value | Source / Justification |
|---|---|---|---|
| Households | | | |
| $\beta$ | Discount factor | 0.99 | Standard in quarterly NK models; implies steady-state real rate ≈ 4% p.a. |
| $\sigma$ | Coefficient of relative risk aversion (inverse of IES) | 2.522 | Calibrated via grid search |
| $\lambda$ | Population share of HtM households | 0.5 | Kaplan et al. (2014); benchmark value consistent with a large hand-to-mouth share in emerging economies. Supported by pre-war surveys |
| $\mu$ | Income exposure of HtM households | 0.0891 | Calibrated so HtM earn less than population share ($\mu < \lambda$); consistent with inequality patterns |

Table 5. Structural parameters — baseline calibration — continued

| | | | |
|---|---|---|---|
| $\theta$ | Direct interest sensitivity of HtM consumption | 0.01 | Reduced-form exposure to financial conditions; moderate value |
| *Firms and Prices* | | | |
| $\kappa$ | Phillips curve slope | 0.1995 | Calibrated within a standard NK range; corresponds to average price duration ~2–3 quarters |
| *Monetary Policy* | | | |
| $\phi_\pi$ | Taylor-rule inflation coefficient | 1.5 | Taylor (1993); satisfies Taylor principle |
| $\phi_y$ | Taylor-rule output coefficient | 0.1295 | Standard NK calibration; mild response to output gap |
| $\rho_i$ | Interest-rate smoothing | 0.8 | Solodarenko (2024); estimated for Ukraine |

Table 6. Structural parameters — baseline calibration — continued

*External Sector*

| | | | |
|---|---|---|---|
| $\psi_{pre}$ | Risk premium elasticity (pre-liberalization) | 0.08 | Within typical SOE ranges; "more closed" benchmark |
| $\psi_{post}$ | Risk premium elasticity (post-liberalization, counterfactual) | 0.01 | Higher openness (flatter premium schedule); used to illustrate stronger openness |
| $\rho_b$ | Persistence of external debt | 0.3647 | Moderate persistence; ensures stationarity |
| $\rho_{r^*}$ | Persistence of foreign interest rate | 0.8 | Typical AR(1) value in SOE models |
| $a_q$ | Exchange rate elasticity of demand | 0.052 | Moderate expenditure-switching strength |
| $d_{r^*}$ | Direct effect of foreign rate on demand | 0.00529 | Captures spillovers not mediated by exchange rate |

Table 7. Structural parameters — baseline calibration — continued

| | | | |
|---|---|---|---|
| ***Shocks*** | | | |
| $\sigma_{foreign}$ | Std. dev. of foreign interest-rate shock | 0.13775 | Calibrated to match empirical moments for 2016-2019 under ψ pre=0.08 |
| $\sigma_{mp}$ | Std. dev. of monetary policy shock | 0 | Set to zero in the moment-matching exercise; used separately for impulse-response analysis |

5 summarizes how each parameter is treated in the calibration exercise. It distinguishes between parameters fixed from the literature, parameters calibrated to match empirical moments, and parameters imposed by design for the regime-comparison exercise.

Table 8. Structural parameters — baseline calibration treatment.

| **Parameter** | **Treatment** | **Value** | **Why treated this way** |
|---|---|---|---|
| β | Fixed from literature | 0.99 | Standard quarterly discount factor in New Keynesian models; implies a |

| Parameter | Treatment | Value | Why treated this way |
|---|---|---|---|
| | | | steady-state real rate of about 4 percent annually. |
| $\phi_\pi$ | Fixed from literature / policy benchmark | 1.50 | Standard Taylor-rule response to inflation; satisfies the Taylor principle and preserves policy-rule interpretability. |

Table 9. Structural parameters — baseline calibration
treatment — continued

| Parameter | Treatment | Value | Why treated this way |
|---|---|---|---|
| $\rho_i$ | Fixed from literature / policy benchmark | 0.80 | Standard degree of interest-rate smoothing in quarterly monetary-policy rules. |
| $\rho_{r^*}$ | Fixed from literature | 0.80 | Standard persistence assigned to the foreign interest-rate process in SOE applications. |
| $\lambda$ | Fixed from literature / model design | 0.50 | Benchmark share of hand-to-mouth households; chosen to capture meaningful household heterogeneity without overcomplicating the model. |

| Parameter | Treatment | Value | Why treated this way |
|---|---|---|---|
| $\psi_{pre}$ | Fixed as regime parameter | 0.08 | Baseline pre-liberalization value of the risk-premium elasticity; represents a relatively less open financial regime. |
| $\psi_{post}$ | Fixed for counterfactual regime comparison | 0.01 | Post-liberalization counterfactual value; captures greater financial openness through a flatter risk-premium schedule. |

Table 10. Structural parameters — baseline calibration treatment — continued

| Parameter | Treatment | Value | Why treated this way |
|---|---|---|---|
| σ | Calibrated | 2.5220 | Chosen to help match output, inflation, and exchange-rate volatility jointly in the pre-liberalization baseline. |
| κ | Calibrated | 0.1995 | Selected to reproduce inflation dynamics and improve the fit of annualized inflation volatility. |

| Parameter | Treatment | Value | Why treated this way |
|---|---|---|---|
| $\phi_y$ | Calibrated | 0.1295 | Chosen to capture the output response embedded in the Ukrainian baseline volatility moments. |
| $\mu$ | Calibrated | 0.0891 | Ensures that hand-to-mouth households receive a smaller income share than their population share, consistent with inequality in the data. |
| $\theta$ | Calibrated | 0.00994 | Captures the direct sensitivity of hand-to-mouth consumption to interest rates in reduced form. |

Table 11. Structural parameters — baseline calibration
treatment — continued

| | | | |
|---|---|---|---|
| $a_q$ | Calibrated | 0.05174 | Governs the exchange-rate channel in aggregate demand and is crucial for matching exchange-rate-change volatility. |

| | | | |
|---|---|---|---|
| $d_{r^*}$ | Calibrated | 0.00529 | Captures the direct effect of foreign interest rates on domestic demand beyond the exchange-rate channel. |
| $\rho_b$ | Calibrated | 0.3647 | Determines the persistence of external debt and affects exchange-rate and risk-premium dynamics. |
| $\sigma_{foreign}$ | Calibrated to match a targeted moment | 0.137755 | Chosen so that the model-implied standard deviation of the endogenous risk premium matches its empirical counterpart, std(rp) = 0.015542, in the 2016–2019 baseline. |
| $\sigma_{mp}$ | Fixed / not targeted in moment matching | 0 | Monetary-policy shock variance is set to zero when matching unconditional moments and is used separately for impulse-response analysis. |

The baseline reform experiment is summarized in Tables 6 and 7. Table 6 reports the aggregate peak and cumulative effects of the regime shift, while Table 7 reports the corresponding consumption responses of Ricardian and hand-to-mouth households.

Table 12. Reform Effect: Baseline

| Variable | Peak Effect | Cumulative Effect |
|---|---|---|
| **Output (y)** | 0.0030 | -0.0056 |
| **Inflation (π)** | 0.0006 | 0.0003 |
| **Interest rate (i)** | 0.0004 | -0.0009 |
| **Exchange rate (q)** | 0.0055 | -0.0220 |
| **External debt (b)** | 0.0017 | -0.0220 |
| **Risk premium (rp)** | 0.0004 | 0.0046 |

Table 13. Distributional Effects of the Reform

| Variable | Peak Effect | Cumulative Effect |
|---|---|---|
| **Ricardian consumption (cR)** | 0.0032 | -0.0061 |
| **Hand-to-mouth consumption (cH)** | 0.0029 | -0.0052 |

Tables 8 and 9 examine how the reform effect changes with the population share of hand-to-mouth households. Table 8 reports the sensitivity of output responses to $\lambda$, while Table 9 reports the corresponding sensitivity of exchange-rate responses.

Table 14. Sensitivity to λ: Reform Effect on Output

| λ | Peak Effect (y) | Cumulative Effect (y) |
|---|---|---|
| 0.2 | 0.0028 | -0.0051 |
| 0.3 | 0.0028 | -0.0052 |
| 0.4 | 0.0029 | -0.0054 |
| **0.5** | **0.0030** | **-0.0056** |
| 0.6 | 0.0032 | -0.0060 |
| 0.8 | 0.0039 | -0.0073 |

Table 15. Sensitivity to λ: Reform Effect on Exchange Rate

| λ | Peak Effect (q) | Cumulative Effect (q) |
|---|---|---|
| 0.2 | 0.0051 | -0.0194 |
| 0.3 | 0.0052 | -0.0200 |
| 0.4 | 0.0054 | -0.0208 |
| **0.5** | **0.0055** | **-0.0220** |
| 0.6 | 0.0058 | -0.0238 |
| 0.8 | 0.0070 | -0.0322 |

Table 10 provides a robustness check for the direct interest-rate exposure of hand-to-mouth households. It shows how the reform effect on output changes when θ varies across alternative values.

Table 16. Robustness to θ: Reform Effect on Output

| θ | Peak Effect (y) | Cumulative Effect (y) |
|---|---|---|
| 0.3 | 0.00278 | -0.00510 |
| 0.5 | 0.00284 | -0.00523 |
| 0.7 | 0.00290 | -0.00535 |

*Chapter 5*

# RESULTS

This chapter presents the main quantitative findings. The analysis proceeds in four steps: impulse response functions (Section 5.1), unconditional volatilities (Section 5.2), persistence (Section 5.3), and sensitivity analysis (Section 5.4).

## 5.1 Impulse Response Analysis

### 5.1.1 Foreign Interest Rate Shock

The real exchange rate and output responses to a one-standard-deviation positive shock to the foreign interest rate under the pre-liberalization regime ($\psi = 0.08$, blue) and the post-liberalization regime ($\psi = 0.01$, red) are shown in Figures 2-3.

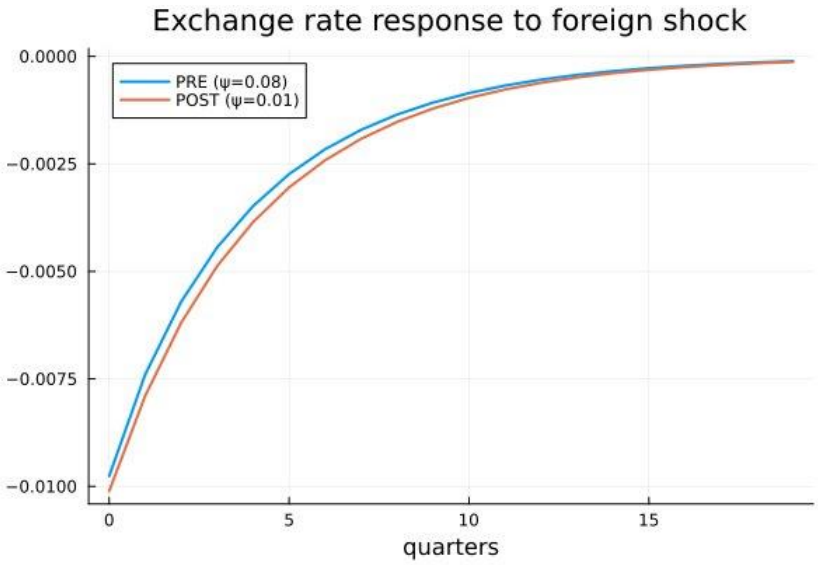



Figure 2. Exchange rate response to foreign shock

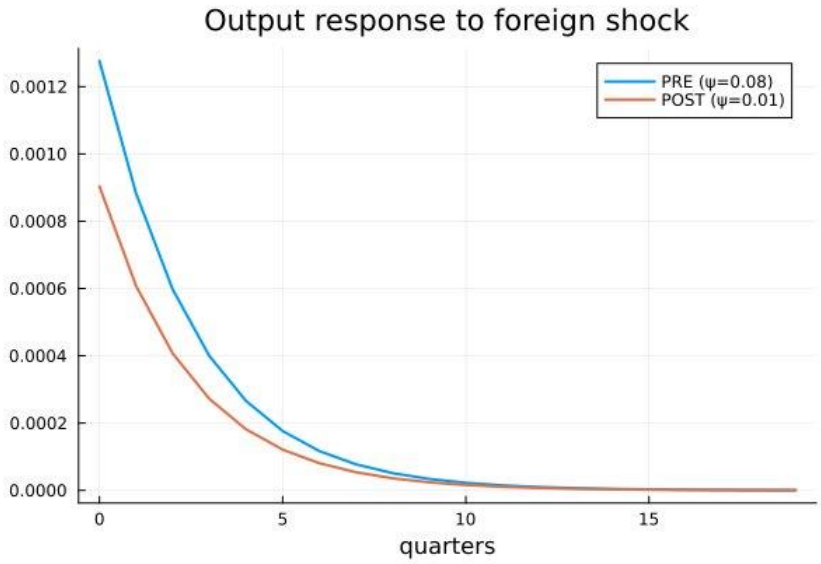



Figure 3. Output response to foreign shock

An increase in the foreign interest rate leads to capital outflows and real depreciation. The peak exchange-rate response is −0.00976 in the pre-liberalization regime and −0.01011 in the post-liberalization regime, which corresponds to a 3.6 percent larger response after liberalization. The output response is positive on impact because of the expenditure-switching effect, but it is considerably dampened after liberalization: the peak falls from 0.00128 to 0.00090, or by 29 percent. A higher degree of financial openness therefore shifts shock absorption toward the exchange-rate channel and reduces the output stimulus.

This supports the first hypothesis: liberalization amplifies exchange-rate responses while dampening output responses to foreign shocks.

### 5.1.2 Domestic Monetary Policy Shock

Figures 4 and 5 present the exchange-rate and output responses to a domestic monetary policy shock under the pre-liberalization and post-liberalization regimes.

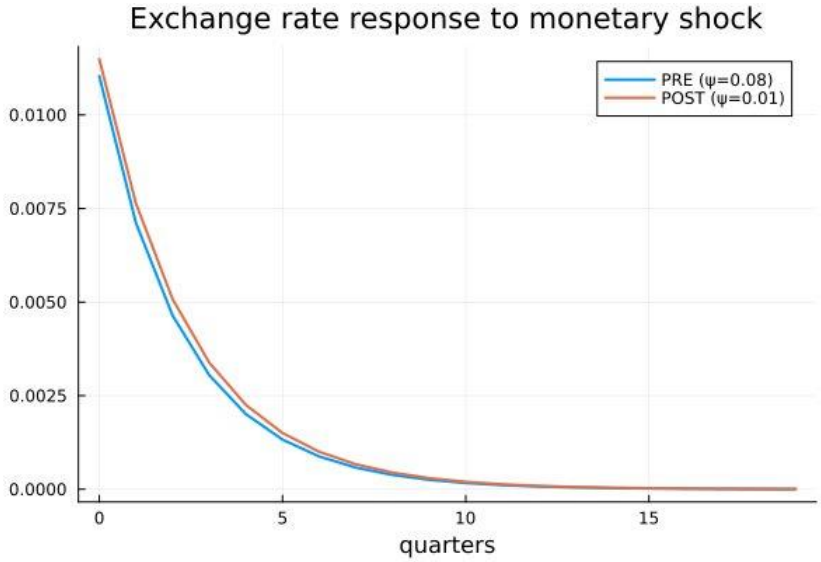



Figure 4. Exchange rate response to monetary shock

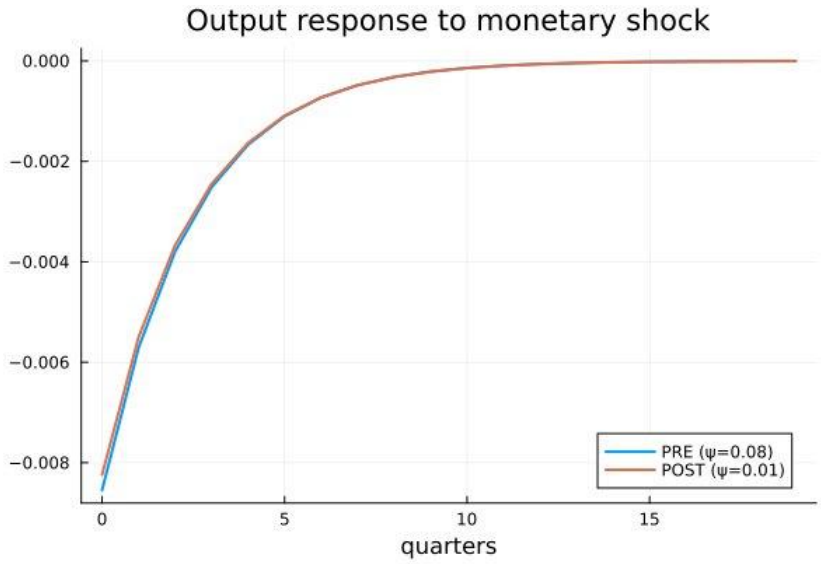



Figure 5. Output response to monetary shock

A domestic monetary tightening causes appreciation, with the peak exchange-rate response increasing from 0.01104 to 0.01149, or by 4.1 percent. It also causes output contraction, but the contraction becomes slightly smaller after liberalization: the peak changes from −0.00855 to −0.00824, or by 3.6 percent in absolute value. The regime differences are more modest than in the case of foreign shocks because monetary shocks operate primarily through the domestic Euler equation rather than through the external financial block. In both regimes, the half-life is 2 quarters.

### 5.1.3 Summary of IRF Analysis

In summary, the impulse responses show that financial openness affects how the economy absorbs shocks. Following liberalization, there is a slightly stronger exchange-rate response to foreign and domestic monetary disturbances in the regime. The respective output responses are smaller in absolute value, especially

for external interest-rate shocks. The disparity is intuitive, as external shocks enter the model directly through the external financial block. Thus, they become more responsive to the degree of financial openness captured by ψ. On the other hand, domestic monetary policy shocks propagate primarily through domestic demand and policy transmission.

A lower value of ψ shifts macroeconomic adjustment toward the exchange rate and away from domestic output stabilization. In this sense, greater financial openness makes the exchange rate a more active shock absorber while reducing the cushioning role played by domestic real activity.

### 5.2 Unconditional Volatility Analysis

Table 11 reports the model-implied unconditional volatilities under the pre-liberalization regime and the post-liberalization counterfactual. The comparison shows how a lower value of ψ affects the volatility of output, inflation, exchange-rate changes, and the risk premium.

Table 17. Unconditional Volatilities by Regime

| **Variable** | **ψ=0.08 (PRE)** | **ψ=0.01 (POST)** | **Change** |
|---|---|---|---|
| std(y) | 0.0242 | 0.1260 | +420% |
| std(π_ann) | 0.0577 | 0.2975 | +415% |
| std(Δq) | 0.1427 | 1.0980 | +670% |
| std(rp) | 0.01554 | 0.01554 | 0% |

The model is also simulated under alternative values of $\psi$ to evaluate the effect of financial openness on unconditional macroeconomic volatility. Table 11 displays the model-implied volatilities for the pre-liberalization regime $\psi = 0.08$ and the post-liberalization counterfactual $\psi = 0.01$.

Decrease in $\psi$ significantly impacts macroeconomic volatility. Output volatility and annualized-inflation volatility rise sharply. Volatility due to fluctuations in foreign exchange rates becomes very high. In contrast, there is essentially no change in risk-premium volatility as the calibration ensures that the size of the foreign shock matches the empirical standard deviation of risk premium in the baseline regime.

There is a simple mechanism. As $\psi$ decreases, the risk-premium schedule flattens, meaning that the same change in the external debt produces a smaller response

of the premium. Consequently, the economy becomes highly sensitive to foreign financial conditions. As the external transmission channel strengthens, exchange-rate movements intensify.As financial openness increases, overall macroeconomic volatility rises because exchange-rate fluctuations feed back into aggregate demand and inflation.

The quantitative effects are very large and should be interpreted with caution. They should not be read literally as what actually happened, or would necessarily happen, in post-2019 Ukraine. Rather, they reflect what the model implies under a deliberately strong counterfactual regime shift from $\psi = 0.08$ to $\psi = 0.01$ . In this sense, the results are best interpreted as structural comparative statics, since they show the direction and approximate magnitude of the trade-off implied by a substantially more open financial regime within the logic of the model.

This is consistent with the impulse-response evidence reported above. IRFs show the response to one standardized shock, whereas unconditional volatility reflects repeated shocks over time. A more open regime can therefore generate a smaller output response to an individual foreign shock while still producing greater overall volatility when the economy is repeatedly exposed to external disturbances.

Greater financial openness can change not only how shocks are absorbed, but also how strongly the economy fluctuates over time. In the model, liberalization makes the exchange rate a more active adjustment mechanism, but at the same time aggregate exposure to external shocks increases.

It is worth reconciling two findings that may at first appear contradictory. The impulse responses show only modest regime differences for a single shock — the peak exchange-rate response is about 3.6-4.1 percent larger after liberalization —

whereas the unconditional volatilities in Table 11 rise by several hundred percent. The two are not in tension because they measure different objects. An impulse response traces the effect of one isolated, one-standard-deviation disturbance, holding everything else at the steady state. Unconditional volatility, by contrast, reflects the economy being hit by a continuous stream of shocks, period after period, with the responses accumulating and interacting through the debt–exchange-rate feedback loop. When ψ falls, each individual shock is transmitted only slightly more strongly, but the flatter risk-premium schedule lets external debt and the exchange rate drift further before the premium pulls them back; under repeated exposure these small per-shock differences compound into a much larger steady-state dispersion. The large volatility numbers are therefore a property of repeated exposure interacting with the more open steady-state structure, and they should be read as structural comparative statics rather than as a literal forecast for post-2019 Ukraine.

### 5.3 Persistence Analysis

This part looks at first-order autocorrelations of output, inflation and the real exchange rate under the two regimes to see whether financial openness changes not just the size but also the duration of macroeconomic fluctuations. The implied persistence measures for the pre-liberalisation regime (ψ=0.08) and the post-liberalisation regime (ψ=0.01) according to the model are presented in Table 12, which shows that liberalisation leads to only a modest change in persistence. In the pre-liberalization period, output persistence was at 0.688 and in the post-liberalization period, it fell to 0.676. The persistence of inflation falls from 0.678 to 0.674. Exchange-rate persistence increased to 0.790 from 0.775.

Although these variations seem significant, they are actually quantitatively insignificant in relation to macroeconomic volatility changes. The major implication is that more openness does not imply a fundamentally different propagation mechanism in the model but only strengthens the transmission of shocks through the external financial block. In other words, lower $\psi$ affects the strength of fluctuations but not their duration.

This finding makes good economic sense. Liberalisation reduces the steepness of the risk-premium schedule and increases the sensitivity of the exchange rate to external financial conditions. In the meantime, it has very little effect on the intrinsic inertia of domestic output and inflation. In other words, the model implies that the period after liberalization is increasingly dominated by stronger exposure to shocks, rather than by a meaningfully more persistent business cycle.

Table 12 reports the first-order autocorrelations of output, inflation, and the real exchange rate under the two financial-openness regimes.

Table 18. First-order autocorrelations by regime

| **Variable** | **PRE ($\psi$ = 0.08)** | **POST ($\psi$ = 0.01)** | **Change** |
|---|---|---|---|
| Output, $y$ | 0.68798 | 0.67641 | -0.01157 |
| Inflation, $\pi$ | 0.67783 | 0.67444 | -0.00338 |
| Exchange rate, $q$ | 0.77515 | 0.78978 | +0.01464 |

### 5.4 Sensitivity Analysis

Figures 6-8 plot volatilities as functions of $\psi \in \{0.01, 0.02, 0.04, 0.06, 0.08\}$.

Annualized inflation volatility decreases as the risk-premium elasticity parameter ($\psi$) increases. Lower $\psi$ - corresponding to greater financial openness - is associated with higher inflation volatility in the model.

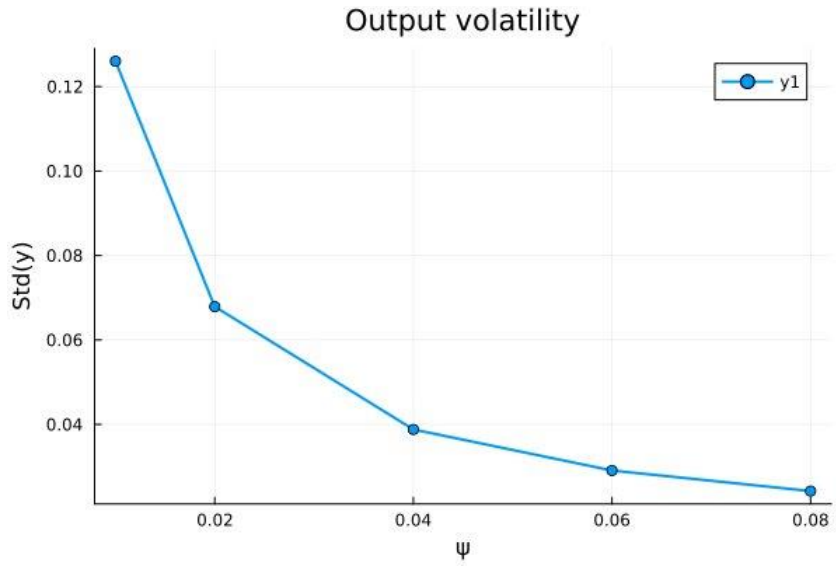



Figure 6. Output volatility vs. $\psi$

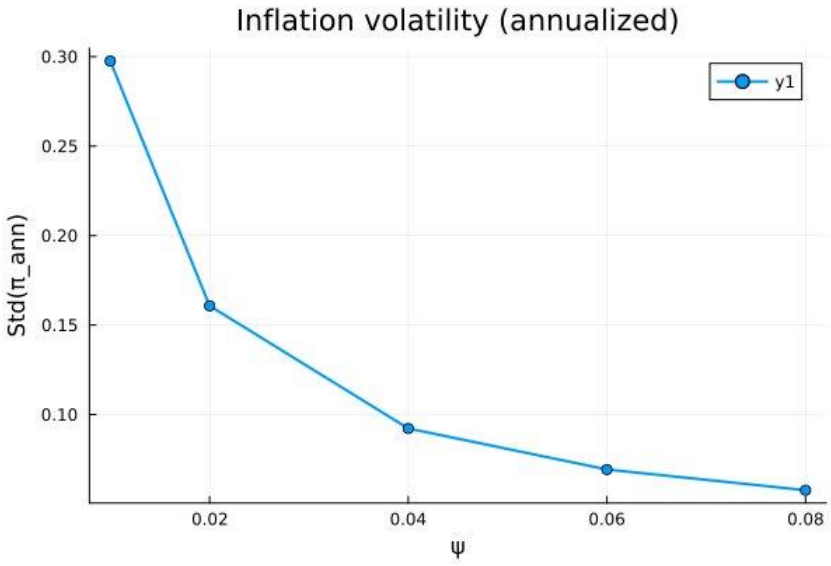



Figure 7. Inflation volatility vs. ψ

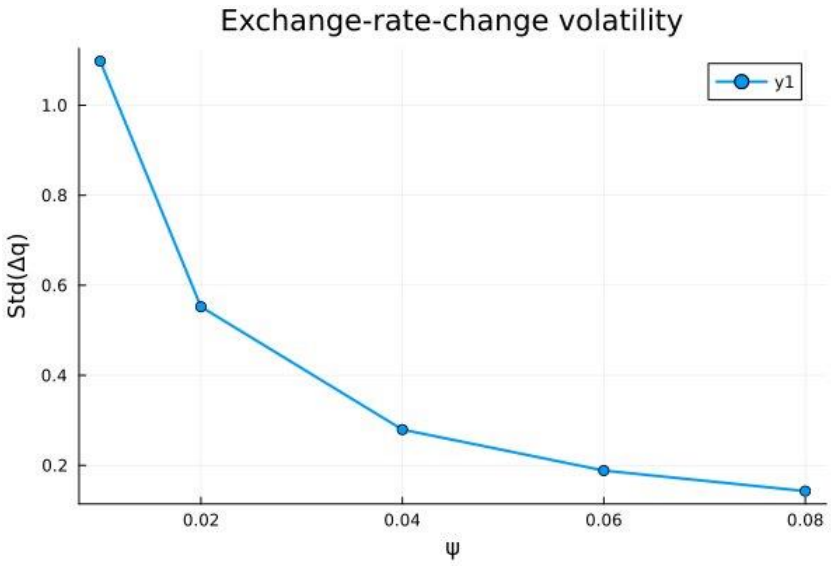



Figure 8. Exchange rate change volatility vs. ψ

The sensitivity check uses a wider range of values for ψ to determine whether the comparison of the baseline regimes reflects a more general pattern. The plots showing the variation of model-implied volatilities as ψ varies from 0.08 to 0.01 are shown in Figures 6-8.

The findings show evidence of a monotonic relationship between financial openness and macroeconomic instability. A reduction in ψ leads to increases in output, inflation, and exchange-rate-change volatility. As the economy shifts closer to very low values of ψ, volatility rises more sharply, showing that the relationship is also nonlinear. The macroeconomic costs of liberalization may therefore rise at an increasing rate once the risk-premium schedule becomes sufficiently flat.

This trend is important from the policy perspective because partial liberalisation may involve moderate macroeconomic costs, whereas very high openness can strongly amplify external disturbances, which points to a nonlinear trade-off between greater financial openness and macroeconomic stability.

### 5.5 Heterogeneity and the Redistribution Channel

The second hypothesis (H2) states that the presence of liquidity-constrained households amplifies the effects of the reform through redistribution. Tables 6-10 provide the evidence. Table 7 shows that the reform's effect differs across household types: the consumption of Ricardian households moves by roughly 10-17 percent more than that of hand-to-mouth households, both at the peak and cumulatively. The gap is real but moderate, and its size is informative. It is moderate mainly because the income share of hand-to-mouth households, $\mu = 0.0891$, is calibrated well below their population share, $\lambda = 0.5$: liquidity-constrained households are numerous but receive only a small fraction of

aggregate income, so the first-order aggregate effect of the reform still operates mainly through the interest-rate and exchange-rate channels rather than through redistribution. In addition, the redistribution channel is governed by the direct exposure parameter θ, which is calibrated to a small value; a larger θ would widen the cR-cH gap. The gap is therefore best read as evidence that redistribution is present and economically meaningful, but is bounded by the low income share of hand-to-mouth households in the Ukrainian calibration.

The sensitivity of the reform effect to the hand-to-mouth share λ (Tables 8 and 9) provides a more direct test of H2. As λ rises from 0.2 to 0.8, the reform's peak and cumulative effects on both output and the exchange rate increase monotonically — for example, the cumulative exchange-rate effect grows from −0.0194 at λ = 0.2 to −0.0322 at λ = 0.8. This monotone amplification pattern is precisely what H2 anticipates: an economy with a larger presence of liquidity-constrained households propagates the same regime shift more strongly, as a larger share of agents responds to current income and financial conditions, rather than smoothing consumption through asset markets. Findings in Table 10 (regarding the robustness check on θ) point in a similar direction, with larger direct exposure generating somewhat larger reform effects. Heterogeneity results support the redistribution hypothesis, although in a qualified form. H2 postulates that redistribution amplifies the macroeconomic impact of the reform. In essence, this amplification increases with both the share of hand-to-mouth households and their exposure to financial conditions. This is true even though the calibrated income share in the Ukrainian baseline is low, and so the level of amplification is contained.

*Chapter 6*

# CONCLUSIONS AND POLICY RECOMMENDATIONS

This thesis examines how the 2019 currency liberalization reform may alter the transmission of macroeconomic shocks in Ukraine. The analysis is motivated by two features of the Ukrainian economy. First, the 2019 reform represented a meaningful change in the degree of financial openness. Second, the post-2019 period does not permit clean empirical identification of the reform's effects because it was dominated by the COVID-19 pandemic and the full-scale war. For this reason, the thesis adopts a structural counterfactual approach based on a small open economy New Keynesian model with household heterogeneity and an endogenous country risk premium.

The model combines two-agent heterogeneity with an open-economy external block. Ricardian households smooth consumption intertemporally, while hand-to-mouth households consume out of current income and are directly exposed to interest-rate changes. On the external side, imperfect capital mobility is modeled through a debt-elastic risk premium, following the standard approach in the small open economy DSGE literature. Currency liberalization is interpreted as a permanent reduction in the sensitivity of the risk premium to external debt, that is, as a fall in the parameter $\psi$. This specification makes it possible to compare two institutional regimes in a transparent way: a less open pre-liberalization regime and a more open post-liberalization counterfactual.

The calibration intends to correspond with Ukraine's unconditional data moments for 2016-2019. The years in question serve as the benchmark pre-

liberalization period under inflation targeting against which we assess the impact of currency liberalization.

The model closely aligns with the desired moments of output, inflation, exchange-rate-change, and risk-premium volatility. The counterfactual exercises mentioned above serve as a quantitative reference.

The evidence supports the main hypotheses of the study. First, greater financial openness changes the way the economy absorbs shocks. In response to foreign interest-rate shocks, the exchange-rate response is stronger in the post-liberalization regime, while the output response is weaker. In simpler terms, the exchange rate bears a larger part of the adjustment burden instead of domestic output. The qualitative pattern is similar in the case of domestic monetary policy shocks, but the regime differences are much smaller. This is consistent with the model structure: foreign shocks enter directly through the external financial block, where $\psi$ matters most, while monetary shocks operate primarily through the domestic Euler equation and the policy rule. Household heterogeneity also shapes macroeconomic transmission. Although a significant share of consumers are hand-to-mouth households, their share of total income is relatively low, which limits their direct effect on aggregate dynamics. At the same time, their presence means that shocks are transmitted not only through intertemporal substitution, as in a representative-agent benchmark, but also through changes in current income and its distribution across household types. This illustrates the quantitative importance of the interaction between financial openness and household heterogeneity. The model further suggests that financial openness can significantly increase unconditional macroeconomic volatility.

The output, inflation, and exchange-rate volatility all increase as $\psi$ falls. The mechanism is explicit: a lower $\psi$ flattens the risk-premium schedule, so a given

movement in external debt requires a smaller premium adjustment; this strengthens the external transmission channel and feeds larger exchange-rate movements back into aggregate demand and inflation. The magnitude of the implied volatility increase is, however, very large, and it should be read as a property of the model structure under a deliberately strong counterfactual change in $\psi$ rather than as a realistic point prediction for post-2019 Ukraine. In the model, liberalization appears to amplify disturbances rather than create a fundamentally new propagation mechanism. The large magnitude of the quantitative effects calls for caution in interpreting them. The best way to understand them is as model-based implications of a strong counterfactual regime shift , not as literal forecasts of what happened in Ukraine from 2019 on.

It is not the case that liberalization is, in itself, a bad thing and should be avoided. The point is rather that the macroeconomic costs of deeper financial opening may increase disproportionally as an economy adopts very high levels of financial openness. In addition, financial openness and volatility are related non-linearly. The flattening of the risk-premium schedule further contributes to volatility rising at an increasing rate. According to the logic of the model, this implies a convex trade-off between financial openness and macroeconomic stability. The message is therefore not that liberalization should necessarily be avoided, but that its macroeconomic costs may rise disproportionately at very high levels of openness. There are various restrictions and limitations.

The model applies a TANK framework rather than a full HANK model, which means that it only captures a reduced-form manifestation of household heterogeneity. More precisely, the two-agent structure captures the aggregate redistribution channel and the sensitivity of the reform's effects to the hand-to-mouth share $\lambda$, but it abstracts from the endogenous wealth distribution and its

dynamics, from marginal-propensity-to-consume heterogeneity beyond the binary Ricardian/hand-to-mouth split, and from income heterogeneity within the hand-to-mouth group. These are precisely the dimensions a full HANK model would add. The model does not explicitly model direct exchange-rate pass-through into inflation. Also, the fiscal sector is absent. The post-liberalization regime is not estimated from realized post-2019 outcomes, but is structurally imposed. The previous simplifications have been made on purpose, since the goal of the thesis is to isolate the transmission effects of greater financial openness in a tractable framework. Nonetheless, the numerical results should be interpreted as indicative rather than definitive.

One extension would be to incorporate explicit exchange-rate pass-through into the price-setting block. A fiscal sector and public debt dynamics extension can also be included. This is especially relevant for Ukraine: the wartime surge in public debt and the economy's heavy reliance on external official financing make the interaction between fiscal dynamics, the risk premium, and the exchange rate a first-order concern for any post-war evaluation of the reform. This may be particularly relevant for an emerging market economy with exposure to external financing conditions. A more ambitious extension would be to replace the TANK structure with a HANK framework featuring an endogenous wealth distribution. Ultimately, once there is a long enough post-war sample, it may become possible to evaluate the reform in the data and compare realized outcomes with the counterfactuals of the model. On the whole, this thesis shows that the macroeconomic consequences of currency liberalization are determined not only by the degree of financial openness but also by the structure of households as well as the external transmission mechanism. In Ukrainian case, the model suggests that greater financial openness makes the exchange rate a

more active shock absorber, while at the same time increasing the economy's overall exposure to external disturbances. This trade-off lies at the center of the policy debate surrounding liberalization in emerging economies.

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