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ABSTRACT

Türkiye's response to post-pandemic inflation is a cautionary tale of how political pressure for low interest rates can create macroeconomic instabilities. While central banks worldwide raised interest rates to combat inflation in 2021-2023, Turkish authorities pursued the opposite strategy: cutting real rates to deeply negative levels while implementing financial engineering tools, FX interventions, and financial repression to stabilize markets. The centerpiece was a novel FX-protected deposit scheme (KKM) that guaranteed depositors against currency depreciation, shifting exchange rate risk to the government balance sheet. We provide a detailed account of this policy experiment and develop a theoretical model focusing on how KKM functions and creates vulnerabilities. Our model reveals that pressure to keep interest rates below inflation-targeting levels can lead to an interconnected destabilizing sequence. Low rates generate inflation, current account deficits, and exchange rate depreciation. KKM provides partial stabilization by effectively raising rates for savers while maintaining low rates for borrowers. However, this creates growing contingent fiscal burdens and vulnerability to self-fulfilling currency and sovereign debt crises. This explains additional policies adopted including capital flow management, financial repression, and return to orthodox monetary policy. As central banks worldwide face renewed pressure to set lower policy rates, Türkiye's experience illustrates the consequences.

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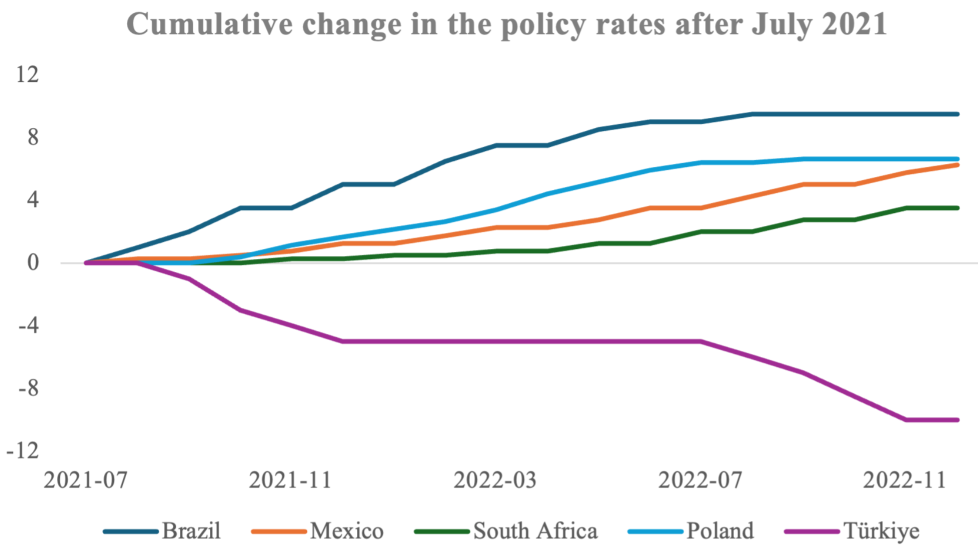

Figure 1: Policy interest rates in Türkiye vs other Emerging Market Economies. Source: BIS.

1. Introduction

Türkiye's response to post-pandemic inflation stands out as one of the most striking departures from conventional monetary policy in recent history. While central banks worldwide raised interest rates to combat inflation in 2021-2023, Turkish authorities pursued an unconventional approach under political pressure: cutting rates while implementing a suite of financial engineering solutions to stabilize markets (see Figure 1). At the heart of this experiment was the novel FX-protected deposit scheme (KKM) that guaranteed depositors against currency depreciation, effectively shifting exchange rate risk to the government balance sheet. What began as an attempt to avoid conventional adjustment ultimately became a cautionary tale about how political constraints for low rates can trap policymakers in increasingly destabilizing policy actions. This experience raises a fundamental question for central banks facing similar political constraints: Is it possible to substitute financial engineering for conventional monetary policy instruments? With central banks globally facing intensifying pressures to lower policy rates, Türkiye's experiment offers a timely case study of the consequences.

To understand Türkiye's policy choices and their broader implications, this paper makes two main contributions. First, we provide a detailed account of how Türkiye's monetary policy framework evolved from the post-2001 crisis reforms to the Great Policy Experiment of 2021-2023. We explain how conventional inflation-targeting policies gradually gave way to increasingly unconventional approaches under political pressure to keep interest rates low. Second, we develop a theoretical model to analyze Türkiye's unconventional policy experiment, with a focus on understanding how FX protection schemes such as KKM function and create vulnerabilities.

Our model reveals that pressure to keep interest rates below inflation-targeting levels trapped

Turkish policymakers in an interconnected destabilizing sequence. Low rates generate inflation, current account deficits, and exchange rate depreciation. FX interventions can temporarily stabilize the exchange rate, but they do not provide a permanent solution, and the depletion of reserves exposes the country to sudden stops that trigger more severe currency crises. FX protection schemes like KKM can temporarily stabilize the crisis by effectively raising interest rates for savers while maintaining low rates for borrowers, with the government absorbing the difference. However, this creates growing contingent fiscal burdens that rise with inflation and exchange rate depreciation. Crucially, KKM's option-like payout structure creates vulnerability to self-fulfilling currency and sovereign debt crises. When depositors lose confidence in the government's ability to honor its obligations, they withdraw from KKM, depreciating the currency and raising fiscal costs, which justifies their initial concerns. The policymakers' *fear* of a crisis along these lines explains various additional policies adopted at the time such as debt monetization, financial repression to control the exchange rate, and ultimately a return to orthodox monetary policy.

Our analysis shows that financial engineering schemes are imperfect and unstable substitutes for conventional monetary policy instruments. These policies create critical vulnerabilities that necessitate further destabilizing interventions, ultimately forcing more painful adjustment than orthodox policies would have required initially. Türkiye's ongoing experience illustrates this clearly: despite the return to a more conventional setup, post-KKM disinflation program faced amplified costs—prolonged inflation with large output sacrifices along with historically high carry trade returns exceeding 25% in 2024. These costs stem directly from the preceding policy experiment, which entrenched high inflation expectations and eroded policy credibility. As central banks globally face intensifying political pressures to lower policy rates, Türkiye's costly experiment provides stark evidence of the consequences.

Related Literature. This paper is part of a growing literature analyzing Türkiye's recent unorthodox monetary policy experiment (e.g., Kara (2021); Gürkaynak et al. (2023a); Kara and Sarıkaya (2024); Gürkaynak et al. (2023b)). We contribute to this literature by developing a small open economy New-Keynesian model that captures how artificially low interest rates generate inflation, current account deficits, and currency depreciation, and how the FX-protected deposit scheme (KKM) partially addresses these imbalances while creating fiscal burdens and fragility.[1]

Another related literature examines the history of financial crises in Türkiye (e.g., Celasun (1998); Özatay and Sak (2002); Üçer and Rijckeghem (2017); Kibritçioğlu (2001); Akyüz and Boratav (2003); Ozkan (2005); Cömert and Yeldan (2018); Özatay (2020); Orhangazi and Yeldan (2021)). Previous Turkish crises have been driven by a combination of sudden stops of

[1] Türkiye's experiment provides evidence against "Neo-Fisher effects"—theoretical predictions that under some conditions permanent decreases in nominal rates can reduce long-run inflation (Cochrane (2016); Uribe (2022); Schmitt-Grohé and Uribe (2022)). Türkiye's persistently low rates driven by political pressures led to higher inflation and depreciation, as standard New-Keynesian models predict, casting doubt on the relevance of Neo-Fisher theories in emerging market contexts.

capital flows, balance of payment problems, sovereign debt sustainability issues, banking sector weaknesses, and unsustainable exchange rate policies. We emphasize that the recent episode was different because the Turkish economy initially did not suffer from the symptoms of traditional past crises. Instead, the vulnerabilities were mainly driven by a politically motivated monetary policy experiment.

Beyond Türkiye, this paper relates to the broader literature on unsustainable government policies and crises in emerging markets (see, e.g., Kaminsky and Reinhart (1999); Calvo and Végh (1999); Dornbusch and Fischer (2003); Reinhart and Rogoff (2009)). Some of these episodes share commonalities with the Turkish experience: political constraints can prevent conventional policy responses and lead to innovative financial schemes to postpone the eventual adjustment, especially until after elections (see Dornbusch (2001)). However, Türkiye's episode was distinctive in being a largely self-inflicted monetary policy experiment in a period of relative macroeconomic stability and sound fundamentals, rather than a response to external shocks or inherited fiscal and financial imbalances that characterize most historical cases.

Finally, our modeling of KKM confidence crises is related to amplification mechanisms emphasized in the international finance literature (see Lorenzoni (2014) for a survey). Since KKM creates FX liabilities for the government, it naturally creates vulnerability to currency and balance sheet crises (e.g., Calvo (1998); Krugman (1999); Aghion et al. (2001); Burnside et al. (2001); Céspedes et al. (2004)). KKM crises have distinctive features: (i) the government rather than the private sector has currency exposure, and (ii) KKM plays a key role in stabilizing the currency. These features allow for self-fulfilling KKM crises even without external FX shocks, although capital flow reversals would likely amplify any crisis in practice. The logic of KKM crises extends to other products offered by some emerging market governments during crises to insure agents against exchange rate or inflation risk (see Section 3.3.5).

The remainder of the paper proceeds as follows. Section 2 provides a historical account of Türkiye's monetary policy transformation, from the post-2001 crisis reforms through the unorthodox policy experiment of 2021-2023. Section 3 develops our theoretical framework, revealing how Türkiye's policy responses formed a destabilizing sequence where each intervention created vulnerabilities that necessitated the next, ultimately forcing a return to orthodoxy. Section 4 concludes.

2. Türkiye's monetary policy evolution: From orthodox reform to unorthodox experimentation

Türkiye's monetary policy since 2001 is closely related to its broader political transformation. A severe financial crisis that year reshaped both economic policies and the political landscape. The crisis led to a new political movement that dominated Turkish politics for the next two decades.

The 2001 Crisis and Political Change. The 2001 crisis was the culmination of decades of macroeconomic instability marked by high inflation, volatile growth, and recurring balance of payments problems. The crisis was triggered by a combination of factors: an unsustainable exchange rate regime, banking system weaknesses, and hidden fiscal burdens. The damage was large: GDP contracted by 5.8%, the lira depreciated by more than 70%, public debt increased by 30 percentage points, and inflation doubled to 70%.

The crisis led to comprehensive reforms under an IMF-backed program. Key changes included a new central bank law establishing independence, transition to a floating exchange rate regime, comprehensive fiscal adjustment, and major reforms in banking regulation and supervision. However, the economic pain from the crisis and the consequent costly reforms eroded the public support for the existing coalition government and traditional political parties.

The Rise of AK Party and the Initial Orthodox Period (2002-2008). The Justice and Development Party (AK Party), led by Recep Tayyip Erdoğan, came to power in late 2002 with a strong electoral mandate. The new government initially embraced the post-crisis reform agenda. This commitment to orthodox policies, combined with European Union accession prospects and favorable global conditions, produced impressive results (see Acemoglu and Ucer (2015)). Inflation fell from around 70% in 2002 to single digits by 2005 (see Figure 2). The economy grew rapidly, averaging over 7% annually between 2002-2007.

The central bank successfully implemented inflation targeting during this period. It started with implicit targeting in 2002 and moved to full inflation targeting in 2006. The bank built credibility by demonstrating its independence, maintaining tight policy despite occasional criticism from the government. Fiscal policy significantly helped the central bank in its fight against inflation: a comprehensive fiscal consolidation resulted in an average primary surplus of 4% during the disinflation process.

Growing Tensions and Policy Innovations (2008-2013). The Global Financial Crisis marked a turning point in Türkiye's monetary policy approach. The crisis coincided with AK Party's growing political dominance and confidence. After securing a third consecutive electoral victory in 2011, the government began challenging orthodox economic policies and openly favoring low interest rates. This pressure, together with unconventional policies by advanced economies and their effects on capital flows, encouraged the central bank to explore alternative policy toolkits.

The central bank responded by deploying innovative tools, which over time evolved into a complex framework to pursue multiple objectives. The cornerstone of this approach was the "interest rate corridor"—a wide band between the bank's overnight borrowing and lending rates that allowed for significant flexibility in setting effective funding costs (see Figure 3). This was supplemented by an array of macroprudential policies, liquidity management, and reserve requirement adjustments. The goal was to cope with capital flow volatility by achieving separate

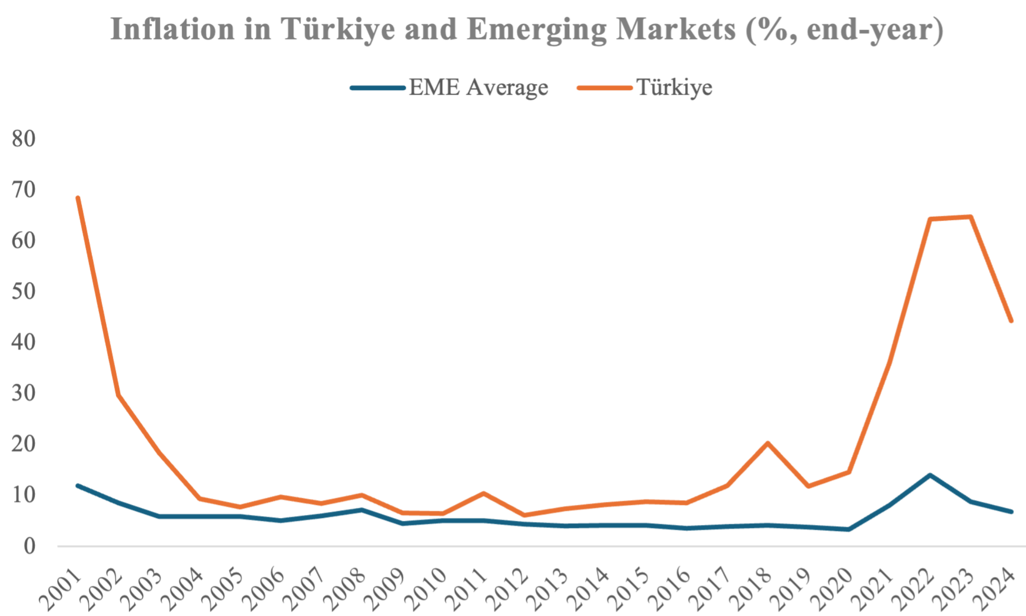

Figure 2: Inflation in Türkiye vs Emerging Market Economies. Source: IMF.

control over its effects on credit and exchange rates (see Alper et al. (2013)).

These innovations were initially successful and gained international attention as a potential model for emerging markets facing complex policy trade-offs. The central bank seemed to have found a way to maintain price stability while addressing financial stability concerns from excessive capital inflows. At the same time, it accommodated political preferences for lower rates. However, over time, the reversal of capital flows and higher global interest rates in an environment with heightened domestic political uncertainty complicated the framework. Politically induced implicit "upper bound" constraint on interest rates has become more binding, undermining the effectiveness of this framework.

Importantly, this period set a precedent with long-term consequences: rather than defending its traditional mandate through clear communication and conventional tools, the central bank increasingly relied on complex technical solutions to navigate political constraints. Using multiple instruments with vague objectives complicated the communication policy, eventually weakening the credibility of the central bank.

Eroding Central Bank Independence (2014-2020). The limits of multiple instrument-multiple target approach became apparent as Türkiye entered a more turbulent period. External conditions became less favorable with the Fed's taper tantrum in 2013 and rising geopolitical tensions. Domestically, 2016 coup attempt led to an increasingly securitized political environment. Türkiye switched to an executive presidency, which further consolidated Ak Party's power.

In this context, political pressure on monetary policy intensified. Weaker capital inflows and

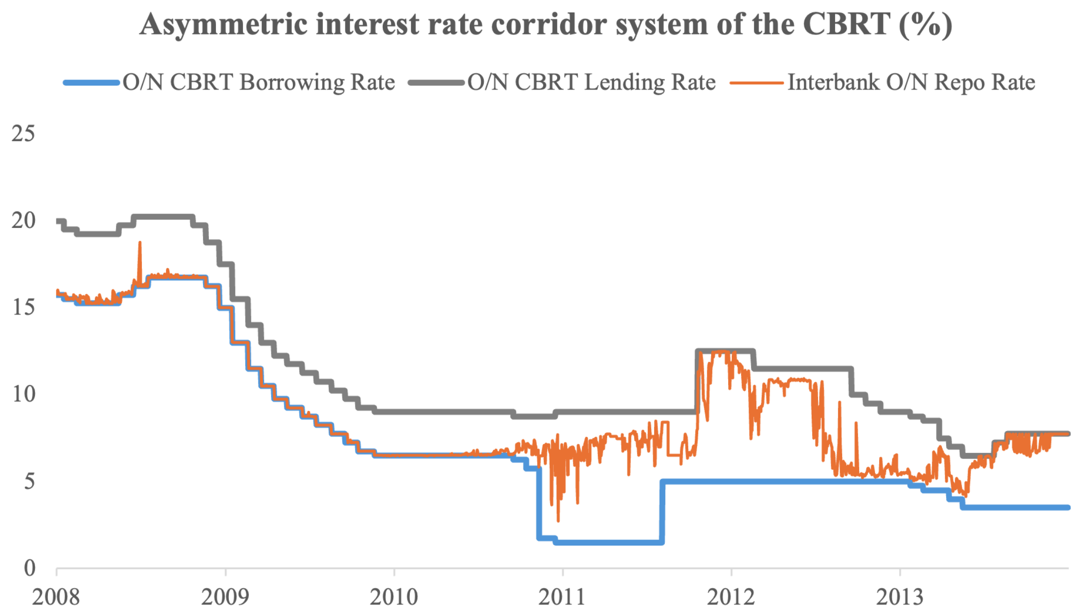

Figure 3: The policy interest rate corridor in Türkiye. Source: CBRT.

higher risk premium have worsened the trade-off between price stability and economic activity. President Erdoğan became increasingly vocal about his unconventional views on interest rates, often arguing that high rates caused rather than cured inflation, which further complicated the policy tradeoffs and added to external risk premia. The central bank's independence was gradually eroded through a combination of formal changes to its law and informal pressure on its leadership. Between 2019-2021, multiple central bank governors were dismissed after failing to keep rates as low as desired by the political authorities (see Figure 4).

Pandemic: Depleted Reserves and Brief Return to Orthodox Policy (2020-2021). During the pandemic, the government predominantly relied on monetary and credit measures rather than direct fiscal transfers as conducted by the rest of the world. The central bank aimed to maintain low interest rates despite capital outflows and encouraged massive domestic credit creation through increasingly complex policies. These included heavy interventions in foreign exchange markets, additional restrictions on banking system balance sheets, and various credit policies implemented through reserve requirements. This loose policy package increased inflation and induced depreciation pressures. To stabilize the exchange rate without a sharp interest rate hike, the authorities engaged in FX interventions in a nontransparent way: central bank reserves were sold by the public banks and then recycled back to the central bank through cross currency swaps. However, these efforts proved insufficient as the reserves net of swaps were eventually depleted, policy credibility deteriorated, and the currency kept depreciating (see Kara (2021)).

In November 2020, amid growing macroeconomic instabilities, the Central Bank governor

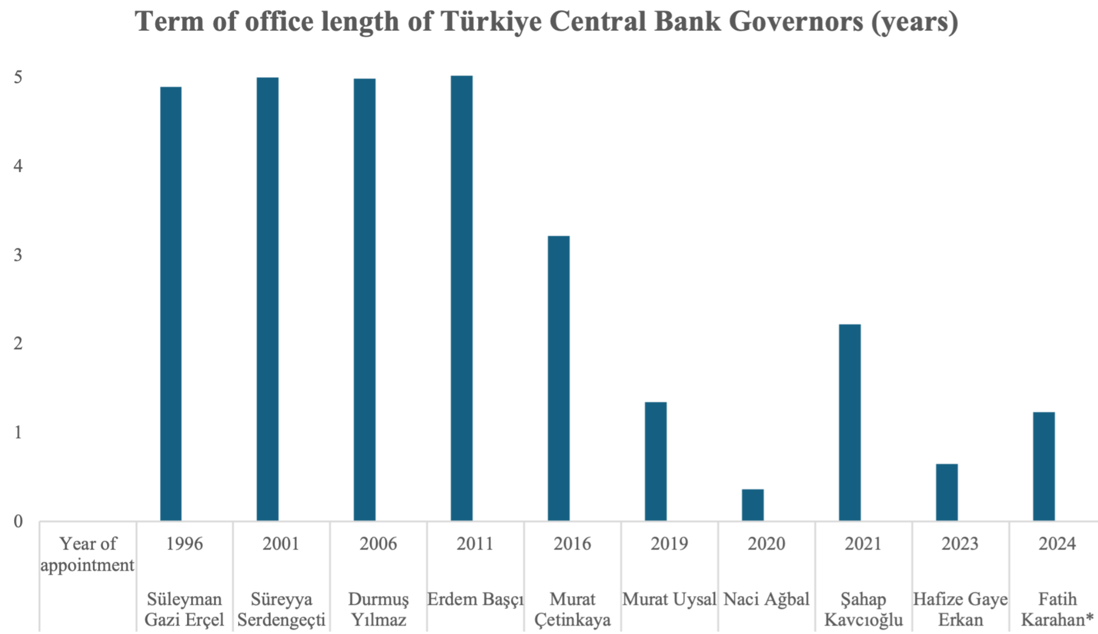

Figure 4: Term length of Türkiye Central Bank Governors after 1995 as of May 2025. Size of the bars shows the total years the respective governor served. Source: Wikipedia.

and finance minister were replaced with more orthodox policy makers. However, this return to orthodoxy and conventional inflation targeting was short lived (less than 5 months). It ended in March 2021 with the dismissal of the central bank governor, who had intended to reintroduce inflation targeting and restore de-facto instrument independence. This change set the stage for an even more dramatic policy experiment.

The Great Policy Experiment (2021-2023). By late 2021, Türkiye made a critical policy choice amid post-pandemic inflationary pressures. The usual response to rising global inflation would have been monetary tightening—indeed, most emerging market central banks had already begun raising rates. However, Turkish authorities embarked on a radically different path that started a unique policy experiment. In September 2021, despite inflation running at 19% and global financial conditions tightening, the central bank began cutting its policy rate (see Figure 5 and also Figure 1).

This unconventional move was driven by political motives and was loosely motivated by a new economic model (Türkiye Ekonomi Modeli). This model prioritized economic growth and exports and required the central bank to support these objectives. The thinking was that weaker domestic currency induced by low interest rates would improve export competitiveness and help to balance the current account, which in turn would stabilize the currency and ultimately reduce inflation. However, the immediate effect was predictably in the opposite direction: as investors changed their portfolio decisions, the lira depreciated sharply and inflation accelerated. This

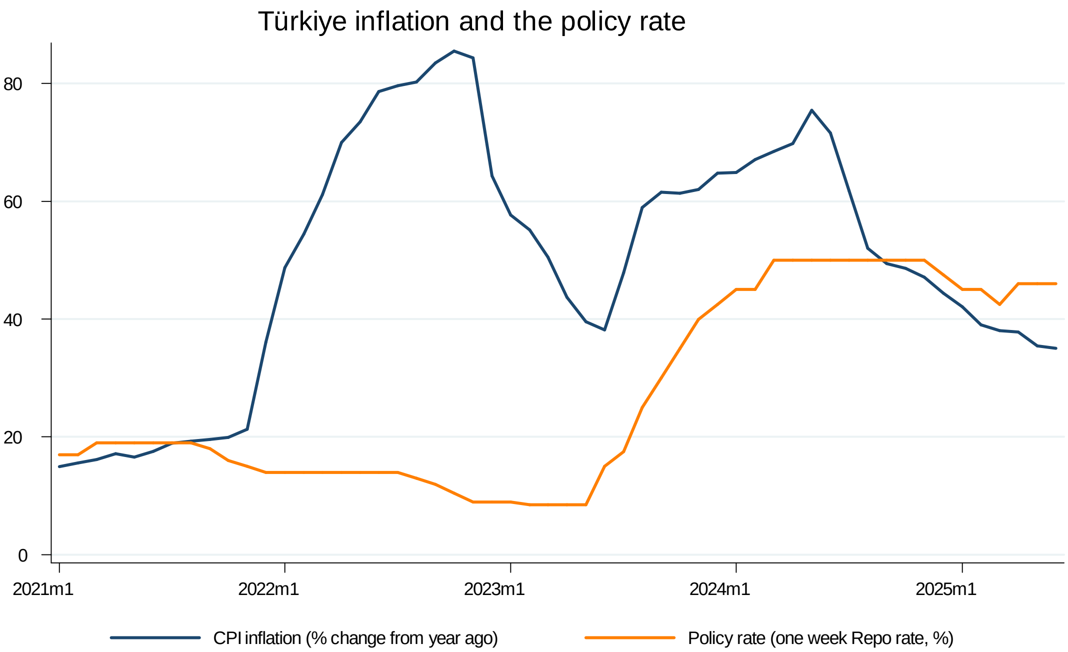

Figure 5: Türkiye's Policy Rate vs. Inflation, 2021-2025. The graph illustrates three phases: (i) the counterproductive rate cut during accelerating inflation (2021-2022), (ii) the eventual forced normalization beginning mid-2023, and (iii) the prolonged period of high policy rates needed to combat persistent inflation. Sources: CBRT, TURKSTAT.

created adverse feedback loops between exchange rates, inflation expectations, price-setting behavior, and deeply negative real rates. Low interest rates also fueled rapid credit growth and increased current account deficits (see Figure 6).

The currency crisis intensified in December 2021 with the Turkish lira/USD dollar exchange rate increasing by %80 in one month, triggering shock waves across the markets (see Figure 7). Rather than reversing course on interest rates, the authorities introduced an innovative but highly controversial solution to prevent the run from lira: the FX-protected deposit scheme (KKM). This scheme, which was fully funded by the government and the central bank, effectively offered depositors a free insurance on the lira deposits, guaranteeing compensation for any depreciation beyond the nominal interest rate. Essentially, this move has shifted the FX risk from private sector to the government. KKM take-up gradually increased over time, by mid-2023 reaching nearly 140 billion USD (about 10% of GDP and 20% of all deposits).

While KKM initially succeeded in stabilizing the exchange rate, over time it created two critical vulnerabilities. First, it increased the dollar liquidity needs by extending the low interest rate environment and thus widening the current account deficit. Second, KKM also increased the government's effective FX liabilities. By mid-2023, the sum of net FX short position of the central bank and the contingent liabilities through KKM has reached about 200 billion USD—over 15% of GDP (see the top panels of Figure 8). While the debt-to-GDP levels did not reach

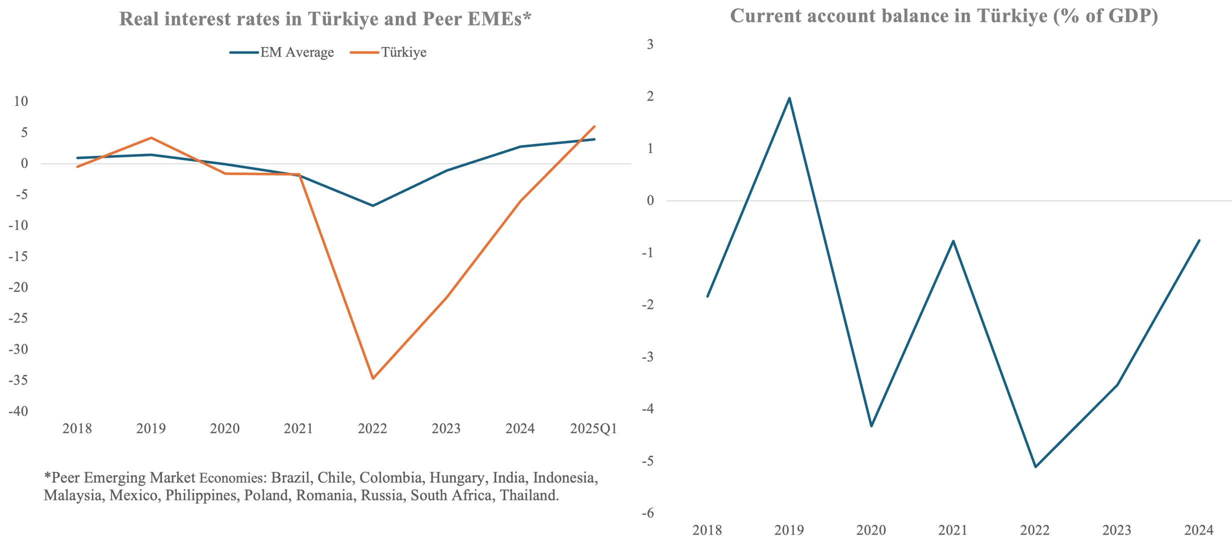

Figure 6: Unintended Consequences of the Experiment: deeply negative real rates (left panel) and rising current account deficits (right panel). Sources: IMF, TURKSTAT, and CBRT.

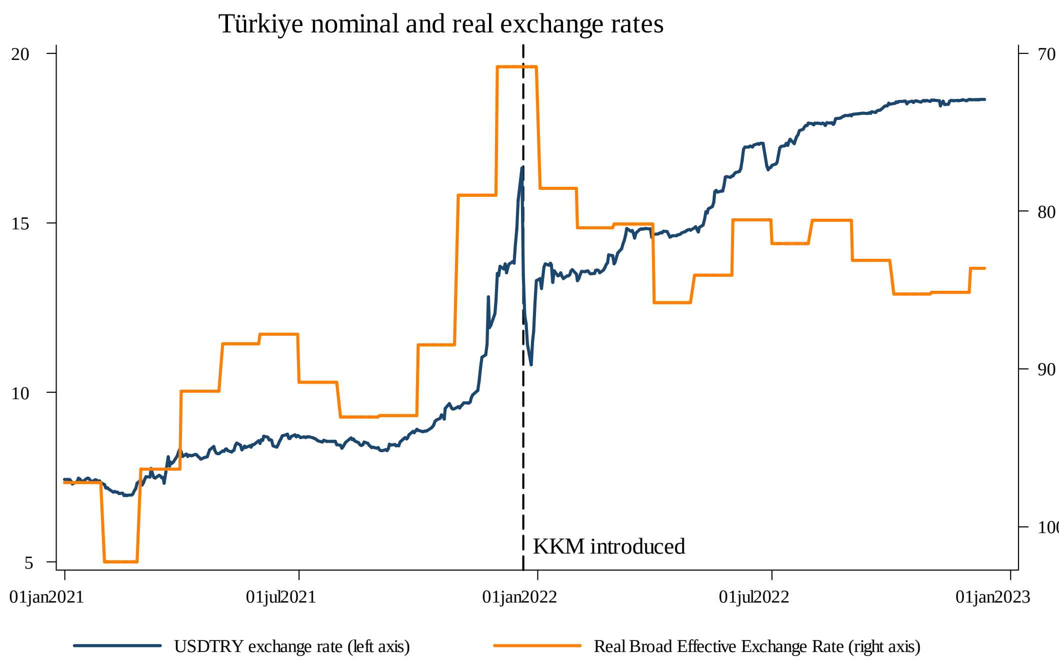

Figure 7: Nominal and real exchange rates for Türkiye. Source Yahoo Finance and BIS. The vertical dashed line marks the date when FX-protected deposit scheme (KKM) was introduced.

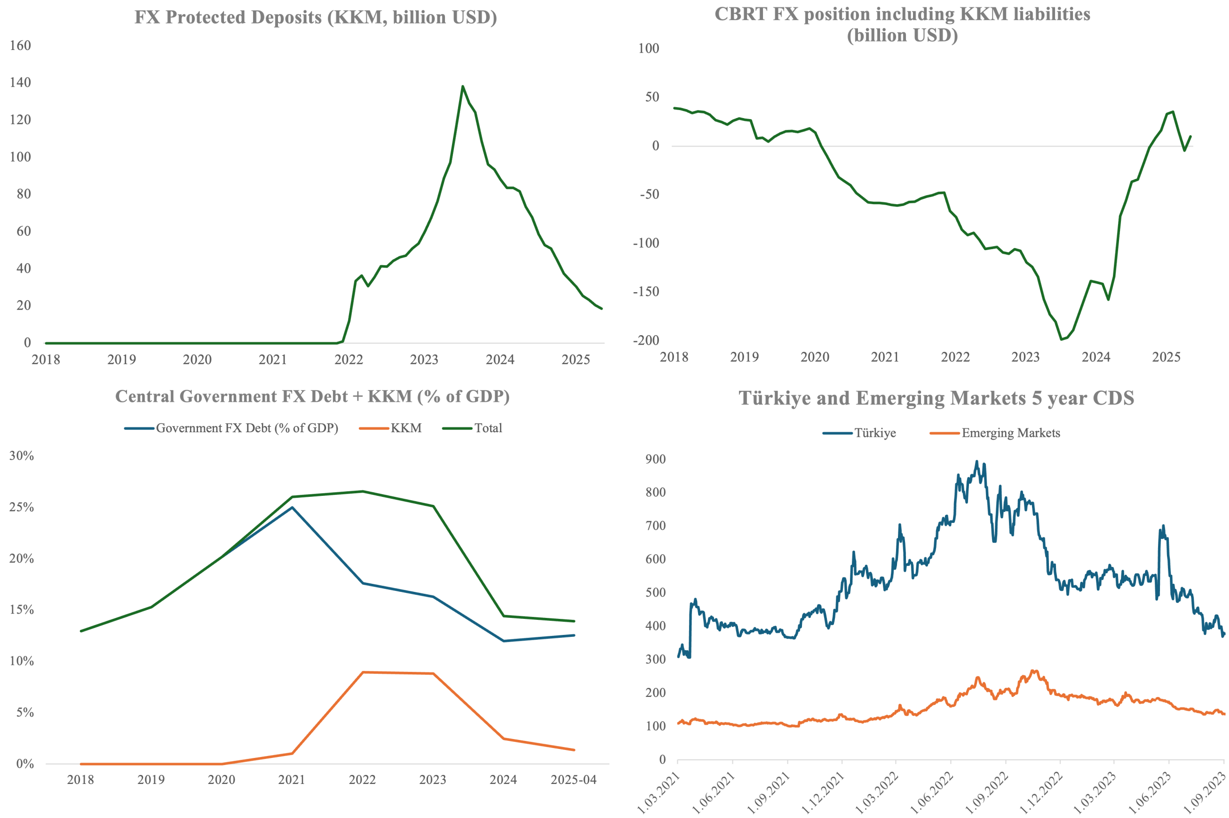

Figure 8: Macroeconomic vulnerabilities induced by KKM: growing dollar liquidity needs (top panels) and sovereign debt sustainability concerns (bottom panels). Top left panel shows the outstanding KKM (billions USD). Top right panel shows the Central Bank's net FX position including KKM liabilities (billions USD). Bottom left panel shows the government's FX debt plus KKM as a fraction of GDP. Bottom right panel shows the 5-year CDS for Türkiye and Emerging Markets. Sources: CBRT, Ministry of Finance and Treasury, and Bloomberg.

unsustainable levels, the trends raised concerns about debt sustainability as reflected in high sovereign risk premiums compared to peer emerging markets (see the bottom panels of Figure 8). Overall, these exposures increased the risk of a sudden stop and a currency crisis.

The broader policy framework extended well beyond KKM. The policymakers introduced various forms of financial repression to control FX, credit flows, and interest rates amid the artificially low interest environment. Banks faced complex rules linking their reserve requirements and security holding obligations to various targets for lira deposits, KKM participation, and loan growth. Bid-ask spread for FX trading was widened. Exporters were required to surrender a portion of their foreign exchange earnings. The central bank purchased the hard currency converted to KKM accounts and used this to intervene heavily in foreign exchange markets despite low official net FX reserves.

This unorthodox policy combination produced mixed results. On one hand, Türkiye became the fastest growing G-20 country between 2019-2023, with GDP exceeding its pre-pandemic level by 27% by mid-2023, despite global headwinds. On the other hand, the growth was highly unequally distributed; nominal wages did not keep up with inflation and the labor's share of income declined (see the left panel of Figure 9). Moreover, macroeconomic imbalances widened dramatically. In 2022, inflation peaked above 85%, the current account deficit expanded to unsustainable levels, and central bank reserves became deeply negative when adjusted for off-balance sheet items and other liabilities. Importantly, financial repression measures and frequently changing regulations distorted resource allocation and complicated business.

The system proved ultimately unsustainable: the rising dollar liquidity needs risked a currency crisis and the rising FX liabilities risked a sovereign debt crisis (see Figure 8). By mid-2023, with current account deficit approaching 6% of GDP, reserves depleted, physical gold demand exploded, and KKM fiscal costs mounting, Türkiye was forced to return to orthodox policies after the presidential elections. The appointment of a new economic team led by Finance and Treasury Minister Mehmet Şimşek and new Central Bank Governors started a policy normalization process.

Aftermath and Costs of the Experiment (2023-2025). Türkiye's policy experiment ultimately proved very costly. The new administration launched an aggressive disinflation program, raising policy rates from 8.5% to 50% by early 2024 (see 5). However, disinflation has been slow, arguably due to the experiment's legacies, which included entrenched inflation, extensive dollarization, and weakened central bank credibility. As of September 2025, almost two and a half years after returning to orthodox policy, the policy rate remained above 40%, inflation was above 30%, inflation expectations remained elevated, and the economy slowed significantly. Growth has remained below potential in 2024-2025. Slow and protracted recovery in credibility prompted the central bank to rely more on currency control to fight inflation. Sharp real appreciation of lira during this process weakened export competitiveness and industrial production. Despite the adoption of more predictable and conventional policies, Türkiye had to provide the international investors with historically high carry trade returns—over 25% in 2024 for USD funded carry trades—at the cost of great hardship to Turkish borrowers and firms (see the right panel of Figure 9). This protracted and painful adjustment shows that attempting to avoid conventional adjustment costs ultimately amplified them.

In sum, this experiment illustrates how political constraints can trap policymakers in a destabilizing sequence where each intervention creates new vulnerabilities requiring further intervention. The fundamental constraint was political opposition to interest rate increases, creating an effective upper bound on monetary policy. Given this constraint, Turkish policymakers faced a series of "forced moves." Political pressure to keep rates low led to currency depreciation and capital outflows, which led to FX interventions to defend the currency, which led to a currency crisis, which led to more radical solutions such as the KKM and financial repression, which eventually escalated the balance of payment risks and fiscal vulnerabilities, ultimately forcing a return to orthodoxy. With the depleted credibility of the authorities and accumulated macro-

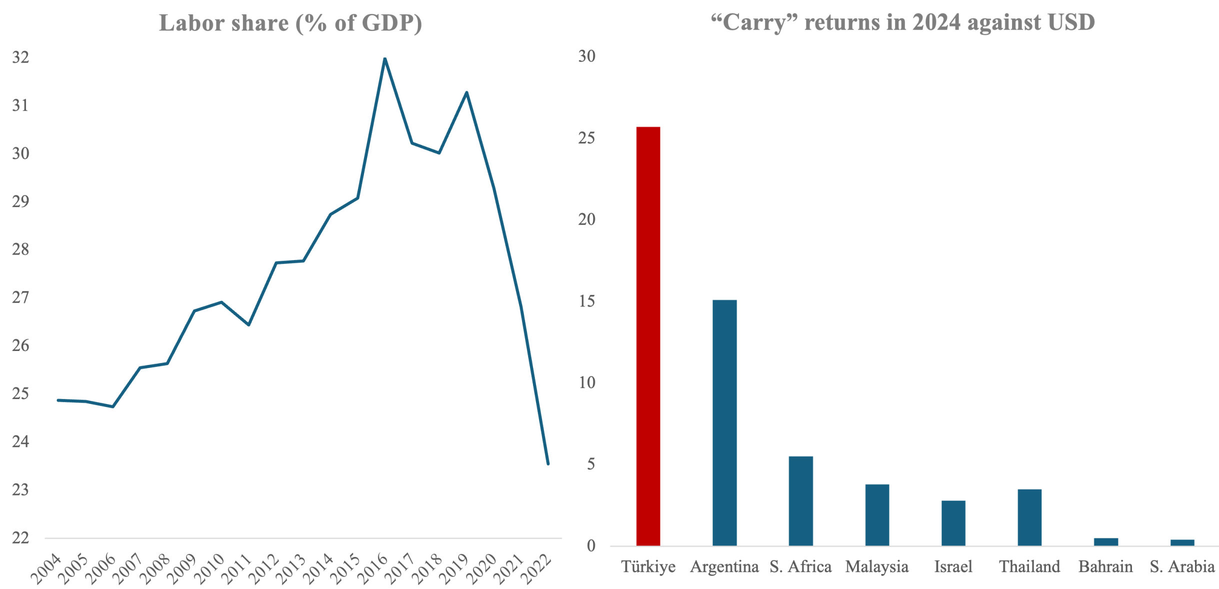

Figure 9: Hidden costs of the experiment included increased inequality (left panel) and large transfers to international investors (right panel). Left panel plots the labor's share of GDP. Right panel plots the carry trade return realized in 2024: the policy interest rate differentials between Türkiye and the US corrected for the USDTRY exchange rate depreciation. Sources: TURKSTAT and Bloomberg.

economic imbalances, eventual adjustment is likely to come at much higher cost than immediate orthodox adjustment would have required in 2021.

3. A model of low interest rates and crises

This historical narrative reveals how Türkiye's policy experiment to avoid rate hikes created a destabilizing sequence of policy interventions that ultimately proved self-defeating. To understand why this approach was inherently unstable, we develop a theoretical framework that captures three key features of Türkiye's experience: politically-constrained interest rates below inflation-targeting levels, the role of FX reserves as temporary buffers, and the effects of currency protection schemes such as KKM. The model builds on the small open economy framework of Bianchi and Lorenzoni (2022) but extends it to capture the Turkish experience. In particular, we include a borrowing sector that generates domestic currency debt, to capture how low interest rates stimulated credit growth and to model the fiscal burden induced by KKM. The model is stylized and abstracts from the institutional complexities described in the previous section; our goal is to isolate the fundamental economic mechanisms that made Türkiye's experiment ultimately unsustainable.

Our theoretical analysis proceeds in three stages. First, we describe the setup and establish a baseline scenario with conventional inflation targeting. Second, we examine the consequences when policy rates are (politically) constrained below levels consistent with inflation targeting. We show that this generates inflation and currency depreciation through both greater spending and credit growth. We demonstrate that FX reserves can *temporarily* mitigate the depreciation, but this policy does not provide a long-lasting solution. Moreover, once the reserves are depleted, the country remains exposed to a sudden stop that can induce a severe currency crisis—similar to what Türkiye experienced at the end of 2021. Third, we analyze whether and how KKM can help to mitigate the imbalances caused by low interest rates. We show that KKM provides partial relief but it also creates growing fiscal burdens. Furthermore, KKM creates vulnerability to a self-fulfilling currency and sovereign debt crisis. Policymakers' concerns with a crisis along these lines helps to understand various policies Türkiye adopted at the time, including an eventual return to monetary policy orthodoxy.

3.1. Baseline model with inflation targeting

Consider a small open economy in discrete time $t \in \{0, 1, ..\}$. In every period, the economy is in one of three aggregate states, $s_t \in \{n, u, k\}$ where n refers to the "normal" regime with inflation targeting, u refers to the "unorthodox" regime with low interest rates, and k refers to the unorthodox regime with FX protected deposits (KKM). We start by describing the baseline model in which the economy is always in the normal regime. We gradually introduce the unorthodox and KKM regimes.

There are two currencies: foreign currency (dollars) and domestic currency (liras). We let $\mathcal{E}_t$ denote the nominal exchange rate at time t, the price of a dollar in liras. There are two goods: tradeables and nontradeables. The price of tradeables is fixed in dollars and normalized to one. Thus, $P_{T,t} = \mathcal{E}_t$ also denotes the lira price of tradeables. The price of nontradeables is endogenous and denoted by P_t. We refer to the relative price of nontradeables $e_t = \mathcal{E}_t / P_t$ as the real exchange rate. We denote inflation in nontradeables by $1 + \pi_t = \frac{P_t}{P_{t-1}}$.

The tradeables output y_T is exogenous and the nontradeables output also has an exogenous component (described below). Our focus is on the endogenous component of the nontradeables output which we denote by y_t. Since only nontradeables are produced, the nontradeables inflation $1 + \pi_t$ is the producer price inflation for this economy.

There are four agents: two–period lived households (borrowers), long-lived households (households), the central bank, and the government. Borrowers' main role is to create a demand for lira debt; they are the model counterpart of the borrowing side of the economy (e.g., firms that borrow and invest). Our focus is on households, whose consumption-savings and portfolio choice decisions play a key role in determining aggregate demand and the exchange rate. The central bank sets the monetary policy and the reserves policy that determines FX interventions. The government collects taxes to finance the KKM expenditures. We next describe these agents' behavior along with the supply side and financial markets.

Borrowers. There are overlapping generations of borrowers. We keep the modeling of borrowers relatively simple because their main role is to create demand for lira credit that responds to interest rates. Therefore, borrowers live for only two periods and are endowed with and consume only nontradeables. These assumptions allow us to focus on how domestic interest rate changes affect domestic credit demand and spending on domestic goods.

Formally, borrowers who are born at date t live for two dates t and $t+1$. They are exogenously endowed with $\overline{y}$ units of nontradeables at date $t+1$ (when they are old). They consume nontradeables at dates t and $t+1$, denoted by $c_{t,t}, c_{t,t+1}$. They issue lira debt with face value B_{t+1} at the safe interest rate i_t to solve

$$\max_{B_{t+1}} b \log c_{t,t} + E_t\left[c_{t,t+1}\right]$$
$$\text{s.t.} \qquad P_t c_{t,t} = \frac{B_{t+1}}{1+i_t} \text{ and } P_{t+1} c_{t,t+1} = \overline{y} P_{t+1} - B_{t+1}.$$

The parameter b controls the amount of debt. In particular, in view of the linear utility, the optimal debt issuance is given by

$$\frac{B_{t+1}}{P_t} = b\left(1+\overline{\pi}_{t,t+1}\right). \tag{1}$$

Here, $1+\overline{\pi}_{t,t+1} = 1/E_t\left[\frac{1}{1+\pi_{t+1}}\right]$ denote the (Harmonic) average expected inflation. That is, borrowers issue constant real (inflation-adjusted) debt on average. This results in spending

$$c_{t,t} = \frac{b\left(1+\overline{\pi}_{t,t+1}\right)}{1+i_t} \text{ and } c_{t,t+1} = \overline{y} - \frac{b\left(1+\overline{\pi}_{t,t+1}\right)}{1+\pi_{t+1}}.$$

Spending when young is decreasing in the the expected *real* interest rate $\frac{1+i_t}{1+\overline{\pi}_{t,t+1}}$. Spending when old is increasing in the inflation surprise $\frac{1+\pi_{t+1}}{1+\overline{\pi}_{t,t+1}}$, which erodes the real debt.[2]

Combining the spending by the young and the old at time t, the total spending by the borrowing sector at time t is given by

$$c_{t,t} + c_{t-1,t} = \overline{y} + \frac{b\left(1+\overline{\pi}_{t,t+1}\right)}{1+i_t} - \frac{b\left(1+\overline{\pi}_{t-1,t}\right)}{1+\pi_t}. \tag{2}$$

Spending increases with expected inflation and inflation surprises, and decreases with interest rates. In addition to these usual relationships, borrowers generate a positive lira debt supply, which is a key driver of the fiscal costs of KKM.

Households. Households supply labor to produce nontradeables. They consume both non-

[2] To derive these expressions, first observe that the optimality condition implies

$$B_{t+1} = \frac{b}{E_t\left[1/P_{t+1}\right]}, c_{t,t} = \frac{b}{\left(1+i_t\right) E_t\left[P_t/P_{t+1}\right]} \text{ and } c_{t,t+1} = \overline{y} - \frac{b}{P_{t+1} E_t\left[1/P_{t+1}\right]}.$$

Then substitute $1+\pi_{t+1} = \frac{P_{t+1}}{P_t}$ along with $1+\overline{\pi}_{t,t+1} = 1/E_t\left[\frac{1}{1+\pi_{t+1}}\right]$.

tradeables, denoted by c_t, and tradeables, denoted by $c_{T,t}$. They have time-separable log utility given by:

$$U_t = \log c_t + \phi(y_t) \log c_{T,t} - \nu \log(l_t) + \beta E_t[U_{t+1}]. \tag{3}$$

Here, the parameter $\phi(y_t)$ controls the tradeables share of spending. We assume $\phi(y_t)$ is increasing in y_t; a higher *aggregate* output increases the demand for tradeables by individual households. This modeling device captures a key feature of the Turkish economy: output booms increase current account deficits.[3] Households maximize (3) subject to the budget constraint

$$\begin{array}{ccc} P_t c_t + \frac{1}{1+i_t} A_{t+1} & = & P_t y_t + A_t \\ \mathcal{E}_t c_{T,t} + \mathcal{E}_t B_t^* & & \mathcal{E}_t y_T - T_t + \frac{1}{1+i_t^*} \mathcal{E}_t B_{t+1}^* \end{array} \tag{4}$$

along with appropriate no-Ponzi-scheme constraints.

The first line in (4) describes the budget terms related to liras and nontradeables. Households start with lira assets denoted by A_t and receive the endogenous component of output y_t. They choose nontradeables consumption c_t and how much to save in lira assets A_{t+1} at the domestic interest rate i_t set by the central bank.

The second line in (4) describes the budget terms related to dollars and tradeables. Households start with dollar debt denoted by B_t^* and are endowed with an exogenous and constant stream of tradeables y_T. Households choose tradeables consumption $c_{T,t}$ and how much new dollar debt to take on B_{t+1}^* at the dollar interest rate i_t^*. Households also pay lump-sum taxes to the government denoted by T_t.[4]

External borrowing constraints. The dollar interest rate i_t^* is determined in global financial markets. We focus on the following specification

$$1 + i_t^* = \begin{cases} 1 + i^* \equiv 1/\beta & \text{if } B_{t+1}^* \leq \overline{B}^* \\ \infty & \text{otherwise} \end{cases} \tag{5}$$

Foreigners supply funds elastically at the interest rate $1 + i^*$ up to a limit $\overline{B}^*$, but they do not supply any funds beyond this limit. We think of the borrowing limit $\overline{B}^*$ as the threshold level that foreigners consider to be safe for lending. This limit is likely to be especially tight for countries like Türkiye that pursue unorthodox policies, which generates macroeconomic uncertainty.[5] For most of our analysis, we take the debt limit as constant and focus on cases where it binds. In

[3] This assumption also captures in reduced form broader mechanisms emphasized in the overborrowing literature (e.g., Caballero and Krishnamurthy (2001); Lorenzoni (2008); Bianchi (2011); Korinek and Simsek (2016)). These papers highlight various channels through which domestic booms generate pecuniary or aggregate demand externalities that lead to excessive external borrowing. We do not explore the normative implications of these externalities but focus on their positive implication that domestic booms tend to increase external borrowing.

[4] We use different sign convention for lira and dollar assets since we will consider $A_t, B_t^* > 0$: in equilibrium households have positive lira assets (claims on borrowers) and the economy has positive external dollar debt.

[5] Kalemli-Özcan (2019); Kalemli-Özcan and Varela (2021) provide empirical evidence that country-specific risks and policy uncertainty play key roles in driving capital inflows and exchange rates in emerging markets.

Section 3.2.3, we model sudden stops as a surprise tightening of this debt limit. We make the simplifying assumption that the interest rate foreigners require is equal to the domestic discount rate, $1 + i^* \equiv 1/\beta$. This ensures that in the normal policy regime current account is balanced and enables us to focus on the current account imbalances caused by unorthodox policies.

Reserves and FX interventions. The central bank starts with an initial balance sheet that features dollar assets (reserves) denoted by A_0^*. The central bank chooses a path of FX interventions and reserves $\left\{F_t^*, A_{t+1}^*\right\}_t$ subject to the dollar budget constraint

$$F_t^* + \frac{A_{t+1}^*}{1+i^*} = A_t^* \text{ with } A_{t+1}^* \geq 0. \tag{6}$$

Here, F_t^* denotes the FX sales (if negative FX purchases) conducted by the central bank. The reserves net of FX sales accumulate at the global interest rate i^*. We assume there is a lower bound on reserves that we normalize to zero. Allowing a limited amount of negative reserves does not change the qualitative results.

Initially, the central bank also has some lira assets denoted by A_0^{CB} . When the central bank conducts FX sales, it converts the proceeds to liras at the market exchange rate $\mathcal{E}_t$. Therefore, the central bank's lira budget constraint evolves according to

$$F_t^{CB} + \frac{A_{t+1}^{CB}}{1+i_t} = \mathcal{E}_t F_t^* + A_t^{CB}.$$

Here, F_t^{CB} denotes the lira rebates by the central bank to the treasury. Selling FX reserves increases the lira balances of the central bank, which can be used either to increase lira assets or the rebates to the treasury. Conversely, buying FX reserves ($F_t^{CB} < 0$) requires liras, which can be obtained by decumulating lira assets or by transfers from the treasury. In our model, all lira rebates or taxes accrue to the households. Since the households are forward looking and do not face any constraints to borrow or lend in lira assets, the model satisfies Ricardian equivalence in the sense that the exact path of lump-sum lira rebates or taxes does not change the equilibrium. To simplify the notation, we focus on the special case in which the central bank does not accumulate lira assets

$$A_t^{CB} = 0 \text{ and } F_t^{CB} = \mathcal{E}_t F_t^*. \tag{7}$$

Government's budget constraint. For simplicity, we assume the government does not issue debt, so it sets lump-sum taxes on households to balance its budget in each period. In the baseline model, this budget-stabilizing tax level is given by

$$T_t = -F_t^{CB} = -\mathcal{E}_t F_t^*. \tag{8}$$

Since the government does not have any expenditures (yet), it simply sends households the rebate it receives from the central bank. When we introduce KKM, the budget-stabilizing tax level will include the expenditures associated with the KKM.

The model can be extended to accommodate lira government debt issued to households or dollar debt issued to foreigners. However, due to the Ricardian features of the model, these extensions would not substantively change our analysis.[6] One exception is Section 3.3.3, where we consider the possibility of government default. We discuss the role of debt in that section.

Supply side and nominal rigidities. Household use labor to produce nontradeables. We assume potential output of nontradeables is constant and denoted by y^n. With nominal rigidities, output y_t is not necessarily equal to its potential and is determined by aggregate demand.[7]

To characterize the aggregate demand, consider the goods market clearing condition

$$y_t + \overline{y} = c_t + c_{t,t} + c_{t-1,t}.$$

Here, $\overline{y}$ is the exogenous supply of nontradeables by the borrowing sector and $c_{t,t} + c_{t-1,t}$ is their total spending at time t characterized earlier. After substituting (2), we obtain

$$y_t = c_t + \frac{b\,(1+\overline{\pi}_{t,t+1})}{1+i_t} - \frac{b\,(1+\overline{\pi}_{t-1,t})}{1+\pi_t}. \tag{9}$$

Output depends on the spending by the households and the *net* spending by the borrowing sector (spending net of their exogenous supply).

We model inflation following the textbook model. In particular, under appropriate assumptions, and up to a first-order approximation, inflation is determined by a standard New-Keynesian Phillips curve (see Galí (2015)):

$$\pi_t = \kappa \frac{y_t - y^n}{y^n} + \beta E_t[\pi_{t+1}]. \tag{10}$$

Here, $\frac{y_t - y^n}{y^n}$ denotes the output gap and $E_t[\cdot]$ denotes rational (forward-looking) expectations. We think of this equation as describing the inflation *gap* relative to the central bank's target. For simplicity we normalize the target to zero so in the model inflation and inflation gap are the same.[8] We focus on the textbook NKPC even though it leads to unrealistic features due to absence of inflation inertia. In Appendix A.2.1, we analyze an alternative setup in which inflation is inertial. We discuss the implications of inflation inertia at the end of Section 3.2.

[6]In particular, since the households are the ultimate owners of government debt (via lump-sum taxes or rebates), lira debt issued to households would "net out" of their lifetime budget constraint. External dollar debt issued to foreigners would appear in the budget constraint as an additional dollar liability issued by households; it would effectively raise raise the household dollar debt B_t^*. Therefore, a model in which government issues dollar debt behaves similarly to a model with higher household debt B_t^* but no government dollar debt.

[7]For simplicity, we do not explicitly microfound the production side. We could do this by assuming that nontradeables are produced according to a linear technology that uses household labor, with a layer of monopolistically competitive firms as in the textbook New-Keynesian model (see Galí (2015)).

[8]We could accommodate a positive inflation target $\pi^n > 0$ by assuming firms automatically index their price changes to the inflation target. This would generalize Eq. (10) as $\pi_t - \pi^n = \kappa \frac{y_t - y^n}{y^n} + \beta E_t[\pi_{t+1} - \pi^n]$.

Asset market clearing. In equilibrium, households' lira assets are equal to the debt issued by the borrowers (see (1)):

$$A_{t+1} = B_{t+1} = P_t b\left(1 + \overline{\pi}_{t,t+1}\right). \tag{11}$$

Balance of payment constraint and the role of FX reserves. The assumptions we have described also imply the following consolidated balance of payment constraint:[9]

$$c_{T,t} + B_t^* = y_T + F_t^* + \frac{B_{t+1}^*}{1+i^*} \text{ where } F_t^* = A_t^* - \frac{A_{t+1}^*}{1+i^*}. \tag{12}$$

Foreigners do not consume any nontradeables or hold any domestic currency assets so the external budget constraint features only tradeables and dollar assets.

This equation also helps to understand the role of reserves and FX interventions. After rewriting, we obtain

$$c_{T,t} + B_t^* - A_t^* = y_T + \frac{B_{t+1}^* - A_{t+1}^*}{1+i^*}. \tag{13}$$

Households' *effective* external debt is given by $B_t^* - A_t^*$: their direct debt B_t^* minus the central bank's reserves. Thus, in this model FX interventions that adjust A_{t+1}^* correspond to attempts by the central bank to control the households' effective dollar debt. FX purchases that raise A_{t+1}^* tend to reduce the effective debt, and FX sales that reduce A_{t+1}^* tend to raise the effective debt. If the households' dollar borrowing constraint never binds, these attempts will be unsuccessful because the households will adjust their dollar debt position B_{t+1}^* to undo the reserves policy. However, when the households' borrowing constraint binds, which is the case we will focus on, then the path of reserves affects the equilibrium allocations and the exchange rate. In particular, FX interventions can be particularly useful in sudden stops in which households are forced to reduce their debt B_{t+1}^* (see Section 3.2.3).

Monetary policy. The central bank sets the policy interest rate $\{i_t\}$ and the reserves policy $\left\{F_t^*, A_{t+1}^*\right\}_t$ subject to the equilibrium and budget constraints we have described. These policies determine the output $\{y_t\}$, inflation $\{\pi_t\}$, and the exchange rate $\{\mathcal{E}_t\}_t$. We will consider different specifications for monetary policy.

We start with the baseline model in which the central bank follows a normal inflation targeting policy ($s_t = n$ throughout): specifically, it sets i_t to target zero inflation gaps $\pi_t = 0$. The model satisfies divine coincidence: there is no a trade-off between stabilizing inflation and output. Therefore, the central bank will achieve zero output gaps in addition to zero inflation gaps. In addition, the central bank follows a passive reserves policy that keeps its reserves and

[9] To derive this, we first substitute (11) and (9) into the households' budget constraint (4) and simplify terms to obtain

$$\mathcal{E}_t B_t^* - \frac{1}{1+i^*}\mathcal{E}_t B_{t+1}^* + \mathcal{E}_t c_{T,t} = \mathcal{E}_t y_T - T_t.$$

We then substitute (8) and cancel $\mathcal{E}_t$ to obtain (12).

FX interventions constant over time:

$$A_t^* = A_0^* \text{ and } F_t^* = A_0^* - \frac{A_0^*}{1+i^*} = (1-\beta)\, A_0^*. \tag{14}$$

The following result characterizes the equilibrium in the baseline model and provides a benchmark. In later sections, we will consider the role of unconventional interest rate policies and more active reserves policies and compare the outcomes with this benchmark.

Proposition 1 (Inflation Targeting Stabilizes Inflation and Current Account)**.** *Consider the setup described above with inflation targeting and passive reserves policy. Output, inflation, and household consumption are constant over time and given by*

$$\begin{aligned} y_t &= y^n, \quad \pi_t = 0, && (15)\\ c_t &= y^n + (1-\beta)\, b. && (16) \end{aligned}$$

Nominal and real interest rates are equal to the discount rate

$$r_t^n = i_t^n = i^* = 1/\beta - 1. \tag{17}$$

Current account is balanced and household debt and reserves remain constant over time. Tradeables consumption is also constant and given by

$$c_T = y_T - (1-\beta)\left(B_t^* - A_t^*\right) \text{ where } A_t^* = A_0^* \text{ and } B_t^* = B_0^*. \tag{18}$$

The real and nominal exchange rates are both constant over time and given by:

$$\mathcal{E}_t/P_t = e_t = \phi^n \frac{y^n + (1-\beta)b}{y_T - (1-\beta)\left(B_0^* - A_0^*\right)} \text{ where } \phi^n = \phi\left(y^n\right). \tag{19}$$

With inflation targeting, the central bank achieves zero output and inflation gaps. The central bank implements these outcomes by setting the nominal and real interest rate equal to the discount rate, because consumption remains constant over time. Households' nontradeables spending is equal to their nontradeables production plus the interest payment on their lira bonds issued by the borrowers. Households' tradeable spending is equal to their tradeable endowment minus the interest payment on their net external debt. The current account is balanced and external debt remains constant over time in view of our simplifying assumptions ($1/\beta = 1 + i^*$).

The exchange rate is determined by (19). Here, recall that the function $\phi\left(y_t\right)$ captures the households' relative preference for tradeables consumption (see (3)). The parameter $\phi^n = \phi\left(y^n\right)$ captures this preference when output is at its natural level. So the equation says the real exchange rate is larger (more depreciated) when households prefer tradeables relatively more, when the relative supply of nontradeables y^n/y_T is larger (trade-related factors), or when the net external debt is greater (financial factors). Since there is no inflation, the nominal interest is the same as the real interest rate.

3.2. Unorthodox regime with low interest rates

The Turkish central bank faced political constraints to keep rates low despite inflationary pressures. This created the unorthodox regime we analyze next, where policy rates are constrained below the inflation-targeting level.

Our analysis proceeds in three steps. First, we characterize how low rates create overheating and exchange rate depreciation when reserves policy remains passive (Section 3.2.1). Second, we show that active FX interventions provide temporary relief but create sudden stop vulnerability (Sections 3.2.2-3.2.3). This vulnerability motivates the adoption of fiscal interventions such as KKM that we analyze in the next section.

3.2.1. Low interest rates induce overheating and exchange rate depreciation

Formally, we consider an unorthodox state $s_t = u$ in which the central bank sets the policy interest rate below the level required for inflation stabilization $i_t = i^u < i^*$. The economy starts in the unorthodox state $s_0 = u$ and transitions to the normal state probabilistically. As long as $s_t = u$, the economy stays in the unorthodox regime in the next period $s_{t+1} = u$ with probability χ and transitions to the normal regime with probability $1 - \chi$. Once the economy transitions to the normal regime, it stays there forever. The parameters (i^u, χ) capture the deviations from inflation targeting: how low the policy interest rate is and how long this regime will continue. We treat χ as a fixed parameter known by all agents (in practice, there was much uncertainty about whether and when policy would revert to normal). For now, we assume the central bank keeps the passive reserves policy in all states: that is, (14) applies also at state $s_t = u$.

We adapt our notation to reflect the uncertainty: c_t^u denotes consumption at time t if the economy is in the unorthodox state, $c_t^{\tilde{n}}$ to denote the consumption if the economy has just transitioned to normal regime ($s_{t-1} = u$ and $s_t = n$), and c_t^n to denote consumption at least one period after transition ($s_{t-1} = s_t = n$). We adapt a similar convention for other variables. The following result characterizes the equilibrium.

Proposition 2 (Low Interest Rates Create Overheating and Currency Depreciation)**.** *Low interest rates create a reinforcing overheating cycle: they increase spending and inflation, which reduces real interest rates further, amplifying the overheating. This overheating also induces currency account deficits and depreciates the currency.*

Formally, consider the setup described above. If there is no debt limit $\overline{B}^* = \infty$, then in the unorthodox state the country runs current account deficits and B_t grows. Thus, the debt limit eventually binds. Suppose the debt limit binds initially $B_0^* = \overline{B}^*$. Then:

- *One period after transition to normalcy the equilibrium is the same as in Proposition 1. In particular, $y_t^n = y^n, c_t^n = c^n, \pi_t^n = 0$ and the exchange rate is given by (19).*

- *At the first period during transition, inflation falls to zero* $\pi_t^{\tilde{n}} = 0$. *Consumption and interest rate are characterized by* $(A.23 - A.24)$ *in the appendix and they satisfy* $c^{\tilde{n}}(\overline{\pi}^u) > c^n$ *and* $1 + i^{\tilde{n}} < 1 + i^*$. *The real exchange rate is given by Eq.* $(A.30)$ *in the appendix.*

- *In the unorthodox state, the expected real rate is lower than the inflation stabilizing level* $1 + i^*$ *and given by*

$$1 + r^u = \chi \frac{1 + i^u}{1 + \pi^u} + (1 - \chi)(1 + i^u) = \frac{1 + i^u}{1 + \overline{\pi}^u}. \tag{20}$$

Consumption, output, and inflation are overheated, $c_t^u = c^u > c^n, y_t^u = y^u > y^n, \pi_t = \pi^u > 0$. *They solve the following system*

$$\frac{1}{c^u} = \chi\beta \frac{1 + i^u}{1 + \pi^u} \frac{1}{c^u} + (1 - \chi)\beta(1 + i^u) \frac{1}{c^{\tilde{n}}(\overline{\pi}^u)} \tag{21}$$

$$y^u - y^n = c^u - c^n + b \left[\frac{1 + \overline{\pi}^u}{1 + i^u} - \frac{1}{1 + i^*} + \frac{\pi^u - \overline{\pi}^u}{1 + \pi^u} \right] \tag{22}$$

$$\pi^u = \kappa \frac{y^u - y^n}{y^n} + \beta\chi\pi^u. \tag{23}$$

Tradeables consumption is constrained ($B_{t+1}^* = \overline{B}^*$) *and the real exchange rate is given by*

$$(\mathcal{E}_t / P_t)^u = e^u = \phi(y^u) \frac{c^u}{y_T + \left(A_0^* - \overline{B}^*\right)(1 - \beta)}. \tag{24}$$

The real exchange rate is more depreciated than in the normal state, $e^u > e^{\tilde{n}} > e^n$. *The nominal exchange rate depreciates at the same rate as inflation in the unorthodox state.*

The overheating operates through two reinforcing channels. First, households substitute toward current consumption since real interest rates fall below their discount rate—standard intertemporal substitution (see Eq. (21)). Second, borrowers increase spending because low rates reduce financing costs while higher inflation erodes their real debt burden (see the bracketed term in (22)). As the economy overheats and the interest rate remains constant, a vicious cycle sets in where initial overheating leads to inflation, which reduces real rates further, inducing greater overheating and more inflation.

This overheating translates into external imbalances by raising the demand for tradeables, captured by the preference parameter $\phi(y^u) > \phi^n = \phi(y^n)$. When there is no debt limit, households increase their external debt and the country runs current account deficits. When there is a debt limit, it eventually binds. The real exchange rate is more depreciated than in the normal regime, both because households prefer tradeables and because tradeables become scarce relative to the overproduced nontradeables (see (24)). The nominal rate keeps depreciating at the same rate as inflation as long as the economy remains in the unorthodox regime.

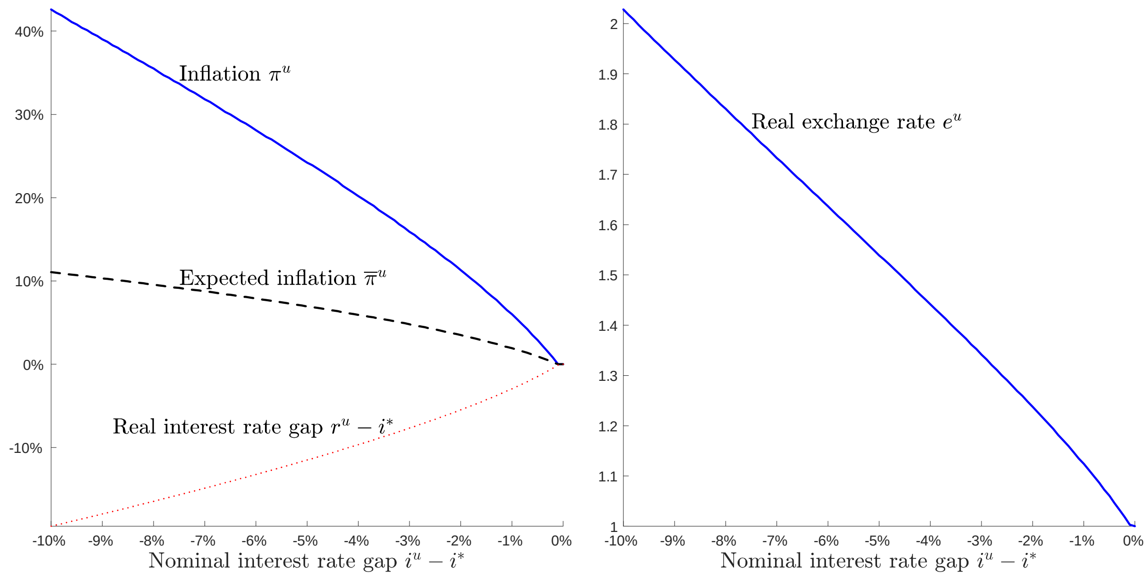

Figure 10: Equilibrium in the unorthodox regime across different policy rate gaps $i^u - i^*$ (see the appendix for the remaining parameters). The left panel plots inflation π^u (solid line), expected inflation $\overline{\pi}^u$ (dashed line), and the expected real rate gap, $r^u - i^*$ (dotted line). The right panel plots the exchange rate.

Figure 10 illustrates the inflation and the exchange rate depreciation that results from artificially low interest rates for a numerical example. The x-axes show the nominal interest rate gap: the difference between the policy rate i^u and its inflation stabilizing level i^*. We calibrate the transition probability χ so that the policy remains in this unorthodox regime for approximately 1.5 years. The figure shows that unorthodox policy can increase inflation (the left panel) and depreciate the exchange rate (the right panel) dramatically. In this example, when the nominal rate is 10 percentage points below its inflation targeting level, inflation rises 40 percentage points above its target (normalized to zero) and the real value of lira falls by more than half. The left panel illustrates that the unanchoring of inflation expectations contributes to overheating. As inflation rises, expected inflation also increases (black dashed line). This reduces the real interest rate even more than the nominal rate (red dotted line), which exacerbates the overheating and and inflation.

Remark 1 (Inflation inertia makes disinflation costly, and more so when the unorthodox regime lasts longer)**.** *In Proposition 2, disinflation is not very costly: after transition to normal policy, the central bank brings inflation to target in one period without sacrificing any output. This feature is driven by the simplifying assumption that inflation is purely forward looking (see (10)). In Appendix A.2.1, we consider a more realistic setup in which inflation has an inertial component. In that setup, as the economy remains in the unorthodox regime, inflation becomes entrenched and self-generating. Therefore, the more time the economy spends in the unorthodox regime, the greater the overheating and the resulting inflation (see Figure A.1). Moreover, after* *transition to the normal regime, disinflation is costly and takes time—and more so if the starting inflation is greater. These results reinforce that unconventional policy schemes that delay rather than solve underlying imbalances amplify eventual inflation and the subsequent adjustment costs.*

In sum, Proposition 2 establishes that low rates create structural overheating and depreciation. Faced with currency pressure, Turkish policymakers turned to FX reserves for stabilization, which we analyze next.

3.2.2. FX interventions provide only temporary relief

When the Turkish Central Bank set low interest rates, it also used a more active reserves policy and FX interventions to support the exchange rate. We next show that in this model active FX interventions can *temporarily* appreciate the exchange rate, but this policy eventually results in a *more depreciated* exchange rate.

To analyze FX intervention effects, suppose we replace (14) with

$$\begin{aligned} A_1^* &< A_0^*, F_0^* = A_0^* - \beta A_1^* > (1-\beta)\, A_0^* \\ \text{and } F_t^* &= (1-\beta)\, A_1^* \text{ for each } t \geq 1. \end{aligned} \tag{25}$$

The central bank deviates from the passive reserves policy at date 0 by selling reserves and increasing its FX interventions. Starting date 1 onward, the central bank reverts to the passive reserves policy. We think of A_1^* as being close to zero—the central bank depletes most of its reserves to address the depreciation induces by low interest rates.

In this case, under appropriate parameters, households' borrowing constraint at date 0 still binds. Therefore, the FX intervention increases their tradeables consumption and the exchange rate at date 0 is more appreciated (lower) than in Proposition 2

$$e_0^{u,f} = \phi\,(y^u)\,\frac{c^u}{y_T + F_0^* - \overline{B}^*\,(1-\beta)} < e^u.$$

The inequality follows since FX interventions are higher than their normal level, $F_0^* > (1-\beta)\, A_0^*$.

On the other hand, starting date 1 onward, the exchange rate depreciates again—in fact, it depreciates even more than in Proposition 2. The equilibrium for periods $t \geq 1$ is the same as before with A_0^* replaced by $A_1^* < A_0^*$. Since reserves are lower, the exchange rate is more depreciated.

Intuitively, the decumulation of reserves provides temporary relief by relaxing households borrowing constraints, which increases the dollar supply and appreciates the exchange rate. However, the benefits are short-lived; once reserves are depleted, the weak exchange rate driven by the low policy rate reemerges.

In practice, FX interventions affect the exchange rate also through mechanisms outside our model, e.g., FX supply and demand directly influences the exchange rate when the currency markets are segmented (see, e.g., Gabaix and Maggiori (2015); Itskhoki and Mukhin (2021)). In Turkey's case, given the limited presence of foreign investors in domestic markets especially after 2021, such supply-demand effects in FX markets would primarily operate through domestic households' portfolio choices, rather than through international investors' capital flows. The main insight of this section survives these realistic extensions: While depleting reserves can be useful to address a temporary shock to the exchange rate, it cannot address the depreciation caused by structural factors such as abnormally low interest rates. Moreover, this temporary relief comes at a strategic cost: it leaves the country exposed to sudden stops precisely when reserves are most needed to buffer external shocks, as we demonstrate next.

3.2.3. Depleted FX reserves exposes the country to sudden stops

In emerging market countries like Türkiye, FX reserves play a critical function by providing a buffer against sudden stops in which foreign investors withdraw financing. Since Türkiye used its reserves to temporarily mitigate the exchange rate depreciation caused by low interest rates, it lost this key buffer and it was exposed to a sudden stop. We now analyze how the depletion of reserves creates vulnerability to sudden stops and severe currency crises similar to Türkiye experienced at the end of 2021.

To illustrate the effects of a sudden stop, suppose the economy is initially in the equilibrium characterized in the previous section with a passive reserves policy. Suppose also that the initial reserves A_0^* are close to zero, capturing the situation after which the central bank engaged in active FX interventions. At date 0, a surprise (unanticipated) sudden stop shock hits the economy so the borrowing limit is now given by $\overline{B}^{*,s} < \overline{B}^*$. In response to the sudden stop, the central bank uses all of its reserves and chooses $F_0^* = A_0^*$ and $A_1^* = 0$. How does the economy adjust to this sudden stop?

We conjecture that the domestic equilibrium is unchanged, while the external debt adjusts to the new limit in one period. Thus, from date 1 onward, the equilibrium is the same as in Proposition 2 with $\overline{B}^*$ replaced by $\overline{B}^{*,s}$ and A_0^* replaced by 0. At date 0, the tradeables consumption is different than before and given by

$$c_{T,0}^{u,s} = y_T + A_0^* - \overline{B}^* + \beta \overline{B}^{*,s}.$$

The sudden stop forces a downward adjustment of tradeable consumption (since $\overline{B}^{*,s} < \overline{B}^*$) and reserves provide some cushion (since $A_0^* \geq 0$). When the reserves are low so that $A_0^* + \overline{B}^{*,s} < \overline{B}^*$, the cushion is too small and tradeables' consumption declines. This in turn depreciates the exchange rate

$$e_0^{u,s} = \phi\left(y^u\right) \frac{c^u}{c_{T,0}^{u,s}} > e^u.$$

Note also that if the sudden stop is sufficiently large and the reserves buffer is thin, then the resulting depreciation can be very severe.

A sudden stop of FX funding naturally induces a large exchange rate depreciation. The reserves provide a potential defense against this shock, but they were depleted previously to address the depreciation induced by low interest rates. This narrative is broadly consistent with the severe depreciation Türkiye experienced at the end of 2021. This episode induced the government of Türkiye to adopt FX protected deposits, which we turn to next.[10]

3.3. FX protected deposits (KKM)

The sudden stop analysis demonstrates how depleted reserves leave countries vulnerable to severe currency crises. Faced with this vulnerability and continued political constraints against raising rates, Türkiye adopted FX-protected deposits (KKM) in December 2021. We now analyze whether this approach can address the structural imbalances identified in Proposition 2.

Our analysis of KKM shows how FX protection schemes like KKM provide partial relief while creating new vulnerabilities. We proceed in four steps. First, we introduce KKM and demonstrate that its payout structure resembles a free option provided by the government. Second, we show that KKM partially mitigates inflation and depreciation by effectively raising rates for savers, but creates growing fiscal burdens (Section 3.3.2). Third, we show that the option-like FX exposures generated by the KKM create vulnerability to self-fulling crises with sovereign default and currency depreciation (Section 3.3.3). Finally, we discuss how policymakers' *fear* of a crisis along these lines helps to understand various policies Turkish policymakers adopted along with KKM. Throughout, we simplify the analysis by assuming reserves are depleted ($A_t^* = F_t^* = 0$), reflecting the reality that Türkiye adopted KKM after nearly exhausting its FX buffers.

3.3.1. KKM's payout structure resembles a free call option on foreign currency

Under KKM, depositors receive the higher of either the lira interest rate or the percentage increase in the dollar exchange rate. To formalize this, suppose in the unorthodox regime the central bank sets the same interest rate $i_t = i^u$ but there is also a new product, KKM, that pays

$$1 + i_{t,t+1}^{kkm} = \max(1 + i^u, \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}) \text{ where } \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} = (1 + \pi_{t+1}) \frac{e_{t+1}}{e_t}. \tag{26}$$

We assume competitive intermediaries offer this product, borrowing from households at rate $i_{t,t+1}^{kkm}$ and lending to the borrowers at the unchanged policy rate i^u. The government pays for the difference in interest rates $i_{t,t+1}^{kkm} - i^u$. Therefore, the government's cost per deposit is

$$g_{t+1} = i_{t,t+1}^{kkm} - i^u = \max\left(0, \Delta\mathcal{E}_{t+1} - i^u\right) \text{ where } \Delta\mathcal{E}_{t+1} \simeq \pi_{t+1} + \Delta e_{t+1}. \tag{27}$$

[10] In practice, reserve depletion likely undermined FX intervention effectiveness even before December 2021's severe depreciation. Since depleting reserves increases sudden stop vulnerability, forward-looking markets could demand higher risk premiums on lira assets when reserves are depleted. Incorporating these endogenous risk premium effects suggests that FX interventions might not even provide the temporary exchange rate relief demonstrated in our model. This reinforces our conclusion that FX interventions cannot substitute for addressing the fundamental currency pressure from artificially low interest rates.

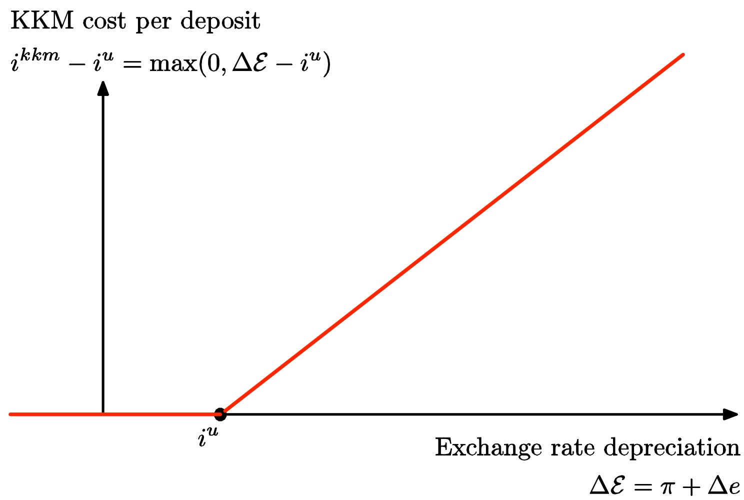

Figure 11: KKM payoffs resemble those of a call option on the dollar exchange rate.

Here, $\Delta\mathcal{E}_{t+1} = \frac{\mathcal{E}_{t+1}-\mathcal{E}_t}{\mathcal{E}_t}$ and Δe_{t+1} denote the percent exchange rate depreciation.

Figure 11 illustrates the government's cost per deposit. Government effectively provides a free *call option on the dollar exchange rate* with strike price determined by the policy rate i^u. Households that invest with the KKM effectively receive the policy rate i^u plus the payoff from the call option. The payoff is increasing with the nominal exchange rate depreciation, which is driven by inflation and the real exchange rate depreciation. We will see that this option-like payoff structure of KKM creates substantial macro-financial fragility.

To calculate the *total* fiscal burden induced by the KKM, we let $\frac{A^{kkm}_{t+1}}{1+i_t}$ denote the total KKM amount lent by intermediaries at time t. In equilibrium, the take-up of KKM is equal to the lira asset supply $\frac{A^{kkm}_{t+1}}{1+i_t} = \frac{P_t b(1+\overline{\pi}_{t,t+1})}{1+i_t}$ (see (11)). Combining this with the unit cost (27) and the budget constraint (8), we calculate the fiscal burden as a fraction of potential output as

$$\begin{aligned} \tau_{t+1} &\equiv \frac{T_{t+1}}{P_{t+1}y_n} = g_{t+1}\frac{A^{kkm}_{t+1}}{1+i^u}\frac{1}{P_{t+1}y^n} \\ &= \underbrace{\left((1+\pi_{t+1})\frac{e_{t+1}}{e_t} - (1+i^u)\right)}_{\text{cost per KKM deposit}} \underbrace{\frac{b/y^n}{1+i^u}\frac{1+\overline{\pi}_{t,t+1}}{1+\pi_{t+1}}}_{\text{KKM deposit per output}} \quad \text{if } \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} > 1+i^u. \end{aligned} \tag{28}$$

When the KKM option is "in the money" its total costs increase with the lira asset supply b/y^n along with inflation and exchange rate depreciation. Otherwise (if $\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} < 1+i^u$), the KKM costs are zero.

Remark 2 (KKM and Arbitrage Concerns)**.** *Our modeling approach assumes that KKM is only available to households, which rules out potential arbitrage strategies where borrowers might borrow at the policy rate and redeposit at the higher KKM rate. This assumption reflects the practical reality that KKM was accompanied by extensive financial regulations designed to prevent such* *arbitrage. Turkish authorities implemented strict limits on foreigners' access to cross-currency swaps, making it difficult to short the lira. Domestically, regulations prevented companies or households from borrowing in lira and investing in foreign exchange deposits or KKM accounts. To the extent that arbitrage opportunities remain despite these restrictions, KKM would generate even greater vulnerabilities and fiscal costs than those emphasized in our analysis. In this sense, our theoretical framework can be viewed as presenting a best-case scenario for the KKM policy.*

3.3.2. KKM provides partial relief at the cost of fiscal vulnerabilities

We denote by $s_t = k$ the policy regime combining low interest rates ($i_t = i^u$) with available KKM deposits. As before, the economy starts at $s_0 = k$ and transitions to the normal state n with probability $1 - \chi$ if it has not transitioned before. Hence, the relevant states are now $s_t \in \{k, n\}$. The following result characterizes the equilibrium.

Proposition 3 (KKM Provides Partial Stabilization at Fiscal Cost)**.** *KKM effectively raises interest rates for savers while maintaining low rates for borrowers, partially mitigating overheating. However, this creates growing fiscal burdens.*

Formally, consider the setup with KKM. Suppose the debt limit binds initially $B_0^* = \overline{B}^*$ and the parameters are such that the unorthodox regime without KKM features $\pi^u > i^u$. This ensures KKM is not redundant (otherwise, the equilibrium is the same as in Proposition 2). Then:

- *After transition to the normal regime, the equilibrium is the same as in Proposition 2. KKM does not create a fiscal burden $(T_t/P_t)^{\tilde{n}} = (T_t/P_t)^n = 0$.*
- *In the unorthodox regime, KKM is not redundant and its payoff is given by*

$$1 + i_{t,t+1}^{kkm} = \begin{cases} \left(1 + \pi_{t+1}^k\right) \frac{e_{t+1}^k}{e_t^k} = 1 + \pi^k > 1 + i^u & \text{if } s_{t+1} = u \\ 1 + i^u > \left(1 + \pi_{t+1}^{\tilde{n}}\right) \frac{e_{t+1}^{\tilde{n}}}{e_t^k} & \text{if } s_{t+1} = n \end{cases}. \tag{29}$$

The expected real rate for households is higher than the rate for borrowers

$$\underbrace{\chi \frac{1 + \pi^k}{1 + \pi^k} + (1 - \chi)(1 + i^u)}_{1 + r^{k,h}} \quad > \quad \underbrace{\chi \frac{1 + i^u}{1 + \pi^k} + (1 - \chi)(1 + i^u)}_{1 + r^{k,b}}. \tag{30}$$

Consumption, output, and inflation remain constant and overheated, $c_t^k = c^k > c^n, y_t^k =$

$y^k > y^n, \pi_t = \pi^k > 0$. They solve the following system

$$\begin{aligned}
\frac{1}{c^k} &= \chi\beta\frac{1+\pi^k}{1+\pi^k}\frac{1}{c^k} + (1-\chi)\,\beta\,(1+i^u)\,\frac{1}{c^{\tilde{n}}\left(\overline{\pi}^k\right)} && (31)\\
y^k - y^n &= c^k - c^n + b\left[\frac{1+\overline{\pi}^k}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^k - \overline{\pi}^k}{1+\pi^k}\right] && (32)\\
\pi^k &= \kappa\frac{y^k - y^n}{y^n} + \beta\chi\pi^k. && (33)
\end{aligned}$$

Tradeables consumption is constrained ($B^*_{t+1} = \overline{B}^*$) and the real exchange rate satisfies

$$e^k = \phi\left(y^k\right)\frac{c^k}{y_T - \overline{B}^*(1-\beta)}. \tag{34}$$

The real exchange rate is more depreciated than in the normal state, $e^k > e^{\tilde{n}} > e^n$, but not as much as in the unorthodox regime without the KKM, $e^k < e^u$. The fiscal burden induced by KKM is positive and given by

$$\tau^k = \left(\pi^k - i^u\right)\frac{b/y^n}{1+i^u}\frac{1+\overline{\pi}^k}{1+\pi^k}. \tag{35}$$

KKM expenditures increase with inflation π^k and the lira debt supply b.

This result shows that KKM mitigates the overheating because it effectively hikes the interest rate households receive in the unorthodox state. In particular, the KKM payoff in the unorthodox state is equal to inflation π^k, which drives the nominal exchange rate depreciation (see (29)). As long as KKM is not redundant, this payoff exceeds the policy interest rate $\pi^k > i^u$. KKM dominates investing in lira deposits and all depositors immediately switch their lira deposits into this product.[11] Since households earn a higher interest rate in the unorthodox state than before, $\frac{1+\pi^k}{1+\pi^k} > \frac{1+i^u}{1+\pi^k}$, they reduce their consumption through a standard intertemporal substitution channel (see (31)). Hence, KKM mitigates the overheating induced by low interest rates. This also mitigates the exchange rate depreciation caused by lower interest rates (see (34)).

On the other hand, the result shows that KKM is an incomplete solution to the overheating problem. While KKM raises the real interest rate that depositors expect to get, it does *not* hike the real interest rate borrowers expect to pay (see (30)). The government pays the difference. Since borrowers are still able to borrow at the relatively low (expected) real interest rate, $\frac{1+i^u}{1+\overline{\pi}^k}$, they continue to induce substantial overheating (see the bracketed term in (32)).

Moreover, while being only a partial remedy, KKM increases the fiscal burden in the unorthodox state (see (35)). KKM costs rise with inflation (because depositors receive higher payouts when the lira depreciates faster) and with the lira debt supply (because more deposits are covered by the guarantee).

[11] In practice, the take-up was more gradual and incomplete for reasons that are outside the model.

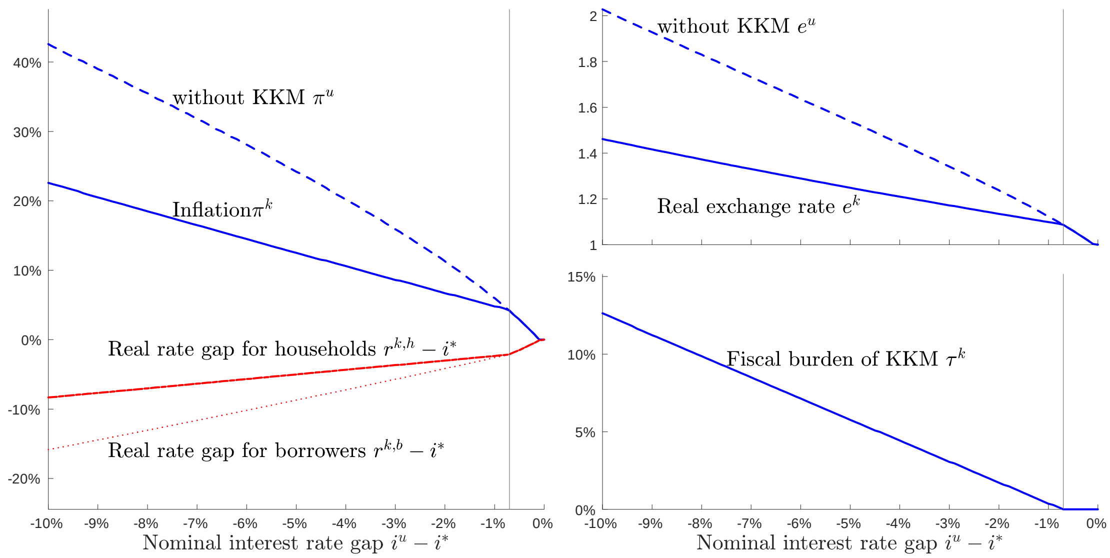

Figure 12: Equilibrium in the KKM regime across different policy rate gaps $i^u - i^*$. The left panel plots inflation with and without KKM π^k and π^u (solid and dashed lines), the real rate for households $r^{k,h}$ (dash-dotted line), and the real rate for borrowers $r^{k,b}$ (dotted line). The right top panel plots the exchange rate with and without KKM e^k and e^u. The right bottom panel shows the KKM expenditures as a fraction of potential output.

Figure 12 illustrates the limited stabilizing role of KKM in the numerical example. The left panel shows KKM reduces inflation by raising the real interest rate households expect to receive. However, the impact on inflation is limited since borrowers still expect to pay a low real interest rate. When the nominal rate is 10 percentage point below its inflation targeting level, inflation is still quite elevated although not as much as without the KKM. The top right panel shows that KKM also partially mitigates the exchange rate depreciation that results from artificially low interest rates. The bottom right panel shows that the fiscal burden of KKM can be substantive. We set $b/y^n = 0.5$, which implies deposits correspond to about half of annual potential output. When all depositors switch to KKM, this results in a large fiscal burden—more than 10% of potential output when the nominal rate gap is -10 percentage points. As we will see in the next section, the costs can be even higher in case of a shock that depreciates the exchange rate.

In sum, even when KKM works as intended, it provides only partial stabilization. Moreover, KKM raises the fiscal burden because the nominal exchange rate keeps depreciating in the KKM regime due to inflation. To make matters worse, KKM opens the door to much larger fiscal losses because it exposes the government balance sheet to exchange rate risk. This exposure creates the possibility of a severe crisis that we illustrate next.

Remark 3 (Alternative Mechanisms for KKM's Exchange Rate Effects)**.** *Our analysis focuses on how KKM affects the exchange rate through its impact on the effective interest rate offered to depositors. In practice, additional mechanisms likely contributed to both the severe December 2021 depreciation and KKM's subsequent stabilizing effects. Kalemli-Özcan and Varela (2021)* *shows that risk premiums on emerging market currencies (the UIP premia relative to dollar) tend to increase with policy uncertainty. This suggests Türkiye's unorthodox policies likely amplified the risk premium on the lira and contributed to the depreciation pressures. KKM might have reduced this risk premium by shifting FX risk to the government balance sheet. Moreover, behavioral factors such as extrapolative expectations could have amplified both the initial depreciation spiral and KKM's subsequent stabilizing effects. While these mechanisms operate outside our model, they work in the same qualitative direction as our main results—KKM provides temporary relief but at the cost of creating fiscal vulnerabilities.*

3.3.3. KKM creates vulnerability to twin currency and sovereign debt crises

KKM convinces the depositors to hold liras by providing them with a free option that protects them against FX depreciation (see Figure 11). However, this does not eliminate the FX risk induced by artificially low interest rates: it shifts the risk to the government balance sheet. This dormant risk creates vulnerability to a severe crisis in which the government defaults and the currency depreciates. We next demonstrate the possibility of these crises and subsequently discuss its implications.

To analyze how KKM can create concerns with fiscal sustainability, suppose there is a capacity constraint on the real (inflation-adjusted) taxes the government can raise, $T_t/P_t \leq \overline{\tau} y^n$, where $\overline{\tau}$ represents the maximum feasible tax capacity. If the fiscal costs of KKM exceed this capacity, the government faces a sustainability crisis. In principle, the government could issue external debt to finance temporary KKM expenditures. However, for emerging markets like Türkiye, rapid debt accumulation to fund currency guarantees would likely trigger concerns about debt sustainability, potentially precipitating a sovereign debt crisis. We therefore model $\overline{\tau}$ as the fiscal threshold beyond which markets lose confidence in the government's ability to honor its KKM obligations, triggering default with high probability. While this type of fiscal crisis is an extreme outcome, analyzing its possibility serves an important purpose: the anticipation of a potential crisis can undermine the effectiveness of KKM even before the crisis occurs, as we demonstrate below. Moreover, policymakers' fears of triggering such a crisis can force a return to orthodox policies to avoid this extreme outcome. At the end of this section, we discuss alternative policy responses the government might pursue to avoid reaching this threshold, including monetary financing, financial repression, and orthodox policy adjustment.

Formally, we assume that if the fiscal burden of KKM exceeds the limit $\overline{\tau}$, then the government defaults on its liabilities. We also need to specify what happens when the government defaults. We assume that in the default period households receive the policy rate $1 + i^u$ instead of the higher amount they were promised $\max\left(1 + i^u, \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right)$. Importantly, households lose trust in the government's ability to honor its KKM obligations. Therefore, after default households stop participating in the KKM, so the product becomes effectively redundant. Consequently, the economy reverts to the unorthodox economy in Section 3.2.1 without the KKM.[12]

This setup creates the possibility of a confidence crisis that induces a severe depreciation along with sovereign default. We start by assuming that the crisis comes as a surprise to the agents. We then discuss the implications of the agents anticipating this type of crisis.

To state the result, suppose at date $t-1$ the real exchange rate was $e_{t-1} = e^k$ and borrowers took on debt expecting the KKM inflation $\overline{\pi}_{t-1,t} = \overline{\pi}^k$ as in Proposition 3. Then, we can view Eq. (28) as describing the fiscal burden induced by KKM as a function the *realized* real exchange rate $e = e_t$ and realized inflation $\pi = \pi_t$ at date t:

$$\tau(e,\pi) = \underbrace{\left((1+\pi)\frac{e}{e^k} - (1+i^u)\right)}_{\text{cost per KKM deposit}} \underbrace{\frac{b/y^n}{1+i^u}\frac{1+\overline{\pi}^k}{1+\pi}}_{\text{KKM deposit per output}}. \tag{36}$$

KKM costs rise with the realized exchange rate e: a surprise depreciation raises KKM costs. Less obviously, all else equal KKM costs also increase with the realized inflation π. While an inflation surprise reduces the real value of KKM deposits (captured by $\frac{1+\overline{\pi}^k}{1+\pi}$), it also induces nominal depreciation that increases the cost per KKM deposit. The second force dominates because KKM payoffs resemble a call option, so they increase more than one-to-one with realized inflation (see Figure 11). These observations lead to the following result.

Proposition 4 (KKM can induce twin sovereign debt and currency crises)**.** *Consider the setup with government default and suppose the government's tax capacity is in an intermediate range*

$$\tau^k = \tau\left(e^k,\pi^k\right) < \overline{\tau} < \tau(e^u,\pi^u). \tag{37}$$

Here, $\tau(\cdot)$ is the cost function given by (36), and (e^u,π^u) and (e^k,π^k) are the exchange rate and inflation levels characterized in Propositions 2 and 3, respectively. Suppose agents think the government will not default so they choose the allocations described in Proposition 3. Then, at any time t and state $s_t = k$, there are multiple equilibria:

(i) A "stable" equilibrium in which the exchange rate and inflation are realized as in Proposition 3, the fiscal burden of KKM is relatively low $\tau^k < \overline{\tau}$, and the government does not default on its KKM liabilities.

(ii) A "crisis" equilibrium in which the exchange rate and inflation are both realized higher. In particular, $e_t = e^{k,c} > e^u > e^k$ and $\pi_t = \pi^{k,c} > \pi^u > \pi^k$ at time t (where $e^{k,c},\pi^{k,c}$ are characterized in the appendix) and they are equal to the unorthodox equilibrium values from time $t+1$ onward. The fiscal burden of KKM at time t exceeds the government's tax capacity

[12] Formally, we assume that once the government defaults, the government and households switch to a punishment Nash equilibrium where households never invest with the KKM since they assume the government will default on the KKM obligations, and the government always defaults on KKM the obligations. Along the equilibrium path, these decisions are weakly optimal, and strictly so if households have a small cost of investing with KKM and the government incurs small costs from collecting taxes. These technical assumptions are stronger than necessary: Our results qualitatively hold as long as a default on the KKM reduces households' expected return from reinvesting with the KKM.

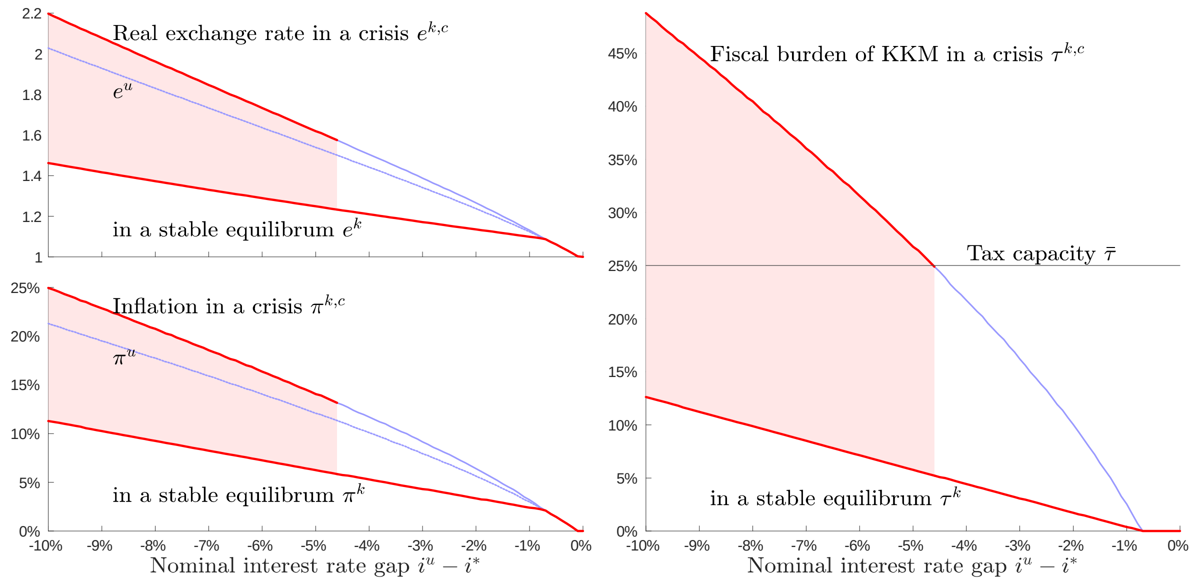

Figure 13: Multiple equilibria with KKM across different policy rate gaps $i^u - i^*$. Left panels show exchange rates and inflation under crisis and stable equilibria, with dotted lines showing the unorthodox regime without KKM for comparison. The right panel shows fiscal burdens under both equilibria. The horizontal line marks the tax capacity above which the government defaults. The red shaded areas show regions where multiple equilibria exist. Red solid lines indicate the actual equilibria realized in each region.

$\tau^{k,c} > \bar{\tau}$, *the government defaults on its KKM liabilities, and the households stop participating in the KKM, justifying the higher exchange rate and the higher inflation.*

Intuitively, KKM creates a dangerous feedback loop through its option-like payoff structure. When depositors trust the government's guarantee, they hold lira KKM deposits, supporting the currency and keeping the government's fiscal costs manageable. However, if confidence wavers and depositors expect the government might default on KKM obligations, they stop participating in the KKM. This depreciates the real exchange rate and increases inflation. Both effects raise the government's KKM liabilities (see Figure 11). This can trigger the very fiscal crisis that depositors fear, making the "crisis" equilibrium self-fulfilling.[13]

Figure 13 illustrates multiple equilibria for the numerical example from the earlier figures. The left panel shows that in a crisis equilibrium where households stop participating in the KKM, the exchange rate and inflation both rise considerably—even above the levels that obtain in the unorthodox regime without the KKM. The right panel shows that this dramatically increases the fiscal burden from KKM—up to 50% of potential output when the nominal rate gap is 10 percentage points. Such high levels of fiscal burden would raise questions about debt sustainability. In this example, we assume the threshold fiscal burden that triggers default is

[13] Multiplicity is driven by a complementarity in households' decisions to participate in KKM. When a household withdraws from KKM, she contributes to depreciating the exchange rate and raising the inflation. This weakens the government's balance sheet and incentivizes other households to withdraw from the KKM.

25%—illustrated as the horizontal vertical line. This leads to a large range for equilibrium multiplicity illustrated by the red shaded area in the figure. In this range, a depreciation of the exchange rate becomes self-fulfilling by forcing the government into default on its KKM liabilities and inducing households to stop participating in the KKM.

Anticipation of the KKM crisis can undermine the effectiveness of KKM. Proposition 4 made the simplifying assumption that the crisis arrives as a surprise to the agents. Appendix A.2 generalizes this analysis to the case where agents anticipate the crisis with some probability. When agents believe the government might not honor its KKM obligations, they effectively perceive a lower return from KKM deposits. This unleashes the same overheating and exchange rate depreciation dynamics that KKM was designed to address. Thus, the possibility of crisis reduces KKM's stabilizing effects *even before the crisis is realized.*

In Türkiye's case, CDS spreads on external debt increased substantially when KKM was introduced, suggesting markets anticipated the possibility of sovereign stress (see Figure 8). Our model reveals that these anticipation effects likely reduced KKM's effectiveness while simultaneously raising the government's external financing costs and further deteriorating its balance sheet. Beyond our specific model, this framework helps explain why KKM take-up was limited in practice—remaining less than half of lira deposits and less than a quarter of total deposits (see Kartal (2024))—even though KKM theoretically dominated regular lira deposits due to its embedded option value.[14] The anticipation of a severe currency crisis by policymakers arguably also drove the various policies that were adopted at the time, as we discuss next.

3.3.4. Policy implications of a potential KKM crisis

We next discuss how policymakers' fears of a crisis along the lines we have formalized can force significant policy changes to avoid this extreme outcome. This discussion sheds some light on the various policies adopted by Turkish policymakers during the policy experiment of 2021-2023.

Monetizing the KKM liabilities is tempting but it is unlikely to avoid the crisis in our model. In practice, governments might be tempted to monetize their liabilities to avoid outright default. In fact, Turkish policymakers relied on the central bank's printing press rather than taxes to cover the KKM liabilities. We can approximate the effects of debt monetization with a one-time change in the price level. Suppose that, as a surprise, the price level and inflation are realized higher than expected, $P_t^{new} > P_t, \pi_t^{new} > \pi_t$. Eq. (36) shows that this policy would further *increase* the real fiscal burden of KKM. On the one hand, a higher-than-expected inflation reduces the real value of KKM liabilities—capturing the logic of debt monetization. On the other hand, it also induces nominal exchange rate depreciation and raises the cost per KKM liability.

[14] In our model, since households are symmetric, the take-up of KKM is complete even when investors anticipate default with some probability. However, with heterogeneity in default perceptions, there would naturally be heterogeneity in take-up, with investors perceiving greater default risks choosing not to invest with KKM.

The second force dominates due to the call-option like payoff structure of KKM. Hence, debt monetization is unlikely to avoid the crisis. The broader insight is that KKM effectively creates *foreign-currency (dollarized)* liabilities that are difficult to cover by printing domestic currency.

Financial repression can prevent the crisis at the cost of large distortions. In practice, the governments could deploy financial repression policies to prevent the currency depreciation that triggers KKM crises. As an extreme example, closing the capital account and prohibiting lira-dollar conversion would eliminate the exchange rate risk, mitigating the crisis vulnerability emphasized in Proposition 4. However, this would sever integration with global markets and substantially reduce long-term growth.

Türkiye employed less extreme versions of such policies, as documented in Section 2: raising reserve requirements for foreign currency deposits, requiring exporters to convert foreign exchange earnings to liras, and implementing complex regulations linking bank operations to lira deposit and KKM targets. The authorities also restricted credit access through lending quotas and administrative controls to mitigate overheating and inflation. While these policies prevented a currency crises, they create substantial economic distortions by interfering with market-based resource allocation and discouraging investment. This chaotic policy approach also increased policy uncertainty and eroded policymakers' credibility, compounding the damage.

The broader insight is that KKM makes exchange rate and inflation control critical for macro-financial stability, naturally leading governments toward distortionary policies regardless of their economic costs. This illustrates another example of Türkiye's destabilizing policy sequence: KKM raises the stakes for exchange rate and inflation control, necessitating financial repression that reduces the dynamism of the economy that low interest rates were meant to promote.

A return to orthodox monetary policy avoids the crisis in our model. Proposition 4 assumes that the government insists on pursuing the unorthodox monetary policy even after forced into default. This stark assumption helps to illustrate the fragility of the KKM regime but it is unrealistic. If we instead assume the government "normalizes" monetary policy when it is faced with rising fiscal burdens that can trigger default (say the government reverts to state $s_t = n$ when $\tau > \overline{\tau}$), this would avoid default. A policy normalization would appreciate the exchange rate and reduce inflation, which would decrease the fiscal burden of KKM and stabilize government finances.

The broader insight is that the combination of low interest rates and KKM is not a sustainable regime. It could come to an end either due to an outright crisis, or more realistically, due to the fear of a crisis. In Türkiye's case, the combination of rising KKM costs, elevated sovereign premiums, and mounting external imbalances created pressure for policy normalization even before fiscal limits were reached; that is, the fear of a crisis in the horizon was arguably sufficient to force a return to orthodoxy.

3.3.5. Discussion: Historical parallels and broader implications

The vulnerability to self-fulfilling crises demonstrated in our model has historical precedents. Mexico's tesobonos in the lead-up to the 1994 crisis provide a particularly instructive historical parallel. Like Turkey's KKM, tesobonos were introduced as a response to dollarization pressures and capital flight concerns. These dollar-indexed peso bonds initially helped stabilize the peso and reduce capital flight by providing exchange rate protection to investors. However, they ultimately amplified the crisis when confidence collapsed—as the peso depreciated rapidly in late 1994, the government's debt burden soared in peso terms, creating difficulties in rolling over tesobono debt. This created a vicious cycle where peso weakness worsened fiscal dynamics, which in turn justified further peso weakness (see Whitt (1996); Meza (2018)). Similar mechanisms and outcomes were observed in Brazil in the 1970s and 1980s, where the currency risk of the private external debt was transferred to the central bank and government through a special deposit mechanism at the central bank (Dalto (2019)).

These episodes illustrate how FX-protected products create vulnerability to self-fulfilling sovereign debt and currency crises. Our theoretical analysis extends beyond KKM to any product that: (i) exposes the government balance sheet to excessive exchange rate or inflation risk, (ii) serves as a key instrument to control exchange rates or inflation, and (iii) attempts to substitute for interest rate policy. Under these conditions, a "crisis" where agents lose confidence in the government's ability to honor the product can be self-fulfilling. As agents withdraw from the product, exchange rates or inflation rise, which deteriorates the government's financial health and justifies the decision to withdraw.

4. Concluding remarks

Türkiye's journey through the first quarter of the 21st century offers key lessons about monetary policy under political constraints. After a period of central bank independence that produced successful disinflation in the early 2000s, Türkiye's monetary policy over the past two decades has been increasingly driven by political preference for low interest rates. Central bankers responded by developing innovative tools to navigate the economy while accommodating political preferences. This unconventional approach and the gradual erosion in central bank instrument independence culminated in the Great Policy Experiment of 2021-2023, where Turkish authorities lowered interest rates despite inflationary pressures and used financial engineering, FX interventions, and financial repression to stabilize markets. The most dramatic innovation was KKM, launched in late 2021, where the government used its balance sheet to provide full protection against exchange rate risk. The experiment ultimately failed and lies at the root of the large macroeconomic adjustment costs Türkiye is currently incurring through its protracted and painful disinflation process.

In this study, we make two main contributions that shed light on Türkiye's policy experiment and help to draw broader lessons. First, we provide a detailed historical narrative of how Türkiye's monetary policy framework evolved from orthodox inflation targeting to increasingly unconventional approaches under political pressure to maintain low rates. Second, we develop a theoretical model to analyze Türkiye's experiment, with a focus on understanding the FX protection schemes such as KKM.

Our analysis reveals that Türkiye's policies formed an interconnected destabilizing sequence. Low rates generate inflation and depreciate the currency. Using FX reserves to address currency depreciation exposes the country to sudden stops and severe currency crises. Using KKM to arrest the crisis provides partial relief by effectively raising interest rates for savers while maintaining low rates for borrowers. However, this creates growing contingent fiscal burdens and exposes the country to an even more severe twin sovereign debt and currency crisis. Policymakers' fear of a major crisis explains additional policies adopted at the time: debt monetization, financial repression, and ultimately the return to orthodox policy. Each policy makes some sense in isolation but proves costly dynamically, both because it creates new vulnerabilities requiring further adjustments and because it delays the eventual return to orthodoxy. This delay is costly because the longer the economies remain overheated, the more inflation becomes entrenched and the harder it becomes to reverse (see Remark 1) and the central bank credibility suffers greater damage.

Our findings have implications for ongoing debates about central bank independence. We started with a fundamental question: Can financial engineering substitute for conventional monetary policy instruments when interest rates are determined by political priorities? Our analysis of Türkiye's experience demonstrates that such attempts face significant challenges and may ultimately prove unsustainable. As central banks worldwide confront intensifying political pressures to lower policy rates, Türkiye's costly experiment demonstrates the consequences.

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A. Appendix

Appendix A.1 presents the details of the numerical examples plotted in the figures. Appendix A.2 presents the extensions omitted from the main text. Appendix A.3 presents omitted proofs.

A.1. Details of the numerical exercise

In the numerical examples, we use the following parameterization

$$
\begin{aligned}
\chi &= 1/3, \\
i^* &= 5\%, \beta = \frac{1}{1+i^*}, \kappa = 0.5, \\
y^n &= 1, b = 0.5, y^T = 0.5, \\
\phi(y) &= \phi^n + \alpha\left(\frac{y-y^n}{y^n}\right) \text{ with } \alpha = 0.4 \text{ and } \phi^n \text{ calibrated to achieve } e^n = 1, \\
\overline{B}^* &= 0.4 \text{ and } A_0^* = 0.
\end{aligned}
$$

We assume each period lasts for a year. The first line sets the probability the economy remains in the unorthodox regime in the next year. This value implies that the economy reverts to the normal regime in 1.5 years in expectation ($1/(1-\chi) = 3/2$). The parameters in the second line are relatively standard in the literature. We set the Phillips curve coefficient κ at the higher end of the standard values since the higher level of inflation in Türkiye implies that prices are adjusted more frequently than usual. The third line normalizes potential output to one, sets the lira debt supply to be 50% of potential output, and sets tradeables endowment (exports) to be 50% of potential output. The fourth line posits that the relative preference for tradeables increases linearly with potential output. We set the intercept ϕ^n to normalize the real exchange rate in the normal regime to be one and we set $\alpha = 0.4$ to target a reasonable range for the real exchange rate given the rest of the model. The last line sets the external debt limit to 40% of potential output and sets reserves to zero.

The unorthodox equilibrium values (c^u, y^u, π^u, e^u) is characterized as the solution to the system of equations

$$
\begin{aligned}
\frac{1}{c^u} &= \chi\beta\frac{1+i^u}{1+\pi^u}\frac{1}{c^u} + (1-\chi)\beta(1+i^u)\frac{1}{c^{\tilde{n}}(\overline{\pi}^u)} \\
y^u - y^n &= c^u - c^n + b\left[\frac{1+\overline{\pi}^u}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^u - \overline{\pi}^u}{1+\pi^u}\right] \\
\pi^u &= \kappa\frac{y^u-y^n}{y^n} + \beta\chi\pi^u \\
e^u &= \phi(y^u)\frac{c^u}{y_T + \left(A_0^* - \overline{B}^*\right)(1-\beta)} \\
&\text{where} \\
c^{\tilde{n}}(\overline{\pi}^u) &= c^n\frac{y^n + b(1+\overline{\pi}^u)}{y^n+b} \\
1+\overline{\pi}^u &= \left(\frac{\chi}{1+\pi^u} + 1 - \chi\right)^{-1}.
\end{aligned}
\tag{A.1}
$$

When KKM is available, we solve the modified system in $\left(c^k, y^k, \pi^k\right)$ along with e^k which is the same as in ($A.1$) except that the Euler equation is replaced with

$$\frac{1}{c^k} = \chi\beta \max\left(\frac{1+i^u}{1+\pi^k}, \frac{1+\pi^k}{1+\pi^k}\right)\frac{1}{c^k} + (1-\chi)\beta(1+i^u)\frac{1}{\tilde{c^n}\left(\overline{\pi}^k\right)}.$$

For the crisis equilibrium in Proposition 4, we first solve the unorthodox equilibrium as well as the KKM equilibrium without crisis. We then solve for the following system of equations (see the proof of Proposition 4)

$$\begin{aligned}
y^{k,c} - y^n &= c^u - c^n + b\left[\frac{1+\overline{\pi}^u}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^{k,c} - \overline{\pi}^k}{1+\pi^{k,c}}\right] \\
\pi^{k,c} &= \kappa\frac{y^{k,c} - y^n}{y^n} + \beta\chi\pi^u \\
e^{k,c} &= \phi\left(y^{k,c}\right)\frac{c^u}{y_T + \left(A_0^* - \overline{B}^*\right)(1-\beta)}.
\end{aligned}$$

A.2. Omitted extensions

A.2.1. Inflation inertia increases the costs of unorthodox policies

In the main text, we assumed inflation is purely forward looking and determined via a New-Keynesian Phillips curve. While this assumption simplifies the exposition, it does not capture the inflation inertia that we often observe in practice. We next characterize the equilibrium in the unorthodox regime in a modified model with inertial inflation. Inflation inertia can substantially increase the costs of unorthodox policies. When inflation becomes entrenched, disinflation takes a long time even after transition to orthodoxy—consistent with the ongoing experience of Türkiye with its disinflation program. Moreover, if the economy starts with a relatively low level of inflation, the more time it spends in the unorthodox regime, the higher its inflation, and the longer it takes to disinflate after transition to the orthodox regime. This illustrates that policies such as FX interventions and KKM that delay the eventual adjustment ultimately induce larger macroeconomic costs.

To analyze the effects of inflation inertia, consider the model in Section 3 with the only difference that inflation is determined by an inertial Phillips curve as in Caballero and Simsek (2023):

$$\pi_t = \kappa\frac{y_t - y^n}{y^n} + \phi\pi_{t-1}. \tag{A.2}$$

Here, $\phi \in (0,1)$ is a parameter that captures the strength of inflation inertia. In this case, divine coincidence no longer applies and the central bank might face a trade-off between stabilizing inflation and output. For simplicity, we assume that the central bank fully prioritizes output and sets the output to its natural level. In particular, in the normal state where the central bank is not constrained, it targets zero output gap:

$$y_t = y^n \tag{A.3}$$

In the following, we analyze the equilibrium properties under this inertial Phillips curve and zero output gap central bank policy in each regime.

As a benchmark, consider the normal regime where the central bank is always unconstrained and sets policy according to ($A.3$). As long as there is no inherited inflation, $\pi_{-1} = 0$, the equilibrium is the same as the baseline model with a forward-looking Phillips curve. This implies the central bank achieves zero output gaps and inflation equal to target (normalized to zero) throughout. In particular, the equilibrium in Proposition 1 remains an equilibrium with the inertial Phillips curve in ($A.2$).

Next consider the unorthodox regime where in state $s_t = u$ the central bank is constrained to set the policy rate below its inflation stabilizing level, $i^u < i^*$. In this case, the analysis is different because there might be inherited inflation due to unorthodox policy in the past, $\pi^u_{t-1} > 0$. Given the initial π^u_{-1}, which is a state variable, we conjecture an equilibrium in which consumption and inflation in the unorthodox regime, denoted by $\{c^u_t, \pi^u_t\}$, converge monotonically to a steady state level (c^u, π^u). In particular, starting with inflation below the steady state, inflation increases over time as long as the economy remains in the unorthodox regime. After transition to the normal regime, inflation gradually declines toward zero.

We solve for the equilibrium backward, starting with the normal regime. Consider state n where the economy has been in the normal state for at least one period, $s_t = s_{t-1} = n$. Using the policy rule ($A.3$), we obtain

$$\pi^n_t = \phi \pi_{t-1}$$

This implies the real and nominal interest rates are given by

$$\begin{aligned} 1 + r^n_t &= 1 + i^* \\ 1 + i^n_t &= (1 + i^*)\left(1 + \pi^n_{t+1}\right) = (1 + i^*)\left(1 + \phi^2 \pi_{t-1}\right). \end{aligned}$$

The real allocations are as in Proposition 1; in particular, households' consumption is $c^n_t = c^n$. Inflation and policy interest rate remain elevated for some time after transition to normal policy. Note also that a higher initial inflation π_{t-1} translating into a longer disinflation period.

Next consider state $\tilde{n}$ where the economy has just transitioned to the normal regime, $s_t = n$ and $s_{t-1} = u$. Inflation still satisfies

$$\pi^{\tilde{n}}_t = \phi \pi_{t-1}.$$

However, the real interest rate as well as the real allocations are different due to the transition dynamics induced by the borrowers. Combining the goods market clearing condition (9) with the policy rule ($A.3$), we obtain

$$\begin{aligned} y^n &= c^{\tilde{n}}_t + \frac{b}{1 + r^{\tilde{n}}_t} - \frac{b\left(1 + \bar{\pi}^u_{t-1,t}\right)}{1 + \pi_t} \\ &= c^{\tilde{n}}_t + \frac{b}{1 + r^{\tilde{n}}_t} - \frac{b\left(1 + \bar{\pi}^u_{t-1,t}\right)}{1 + \phi \pi^u_{t-1}} \\ \text{where } 1 + \bar{\pi}^u_{t-1,t} &= \left(\frac{\chi}{1 + \pi^u_t} + \frac{1 - \chi}{1 + \phi \pi^u_{t-1}}\right)^{-1}. \end{aligned}$$

Note also that the Euler equation implies

$$\frac{1}{c^{\tilde{n}}_t} = \beta\left(1 + r^{\tilde{n}}_t\right)\frac{1}{c^n} \Longrightarrow \frac{1}{1 + r^{\tilde{n}}_t} = \frac{\beta c^{\tilde{n}}_t}{y^n + b(1 - \beta)}.$$

Here, we have used $c^n = y^n + b\,(1-\beta)$. Combining these observations, we solve

$$c_t^{\tilde{n}} = c^n \frac{y^n + \tilde{b}_t}{y^n + b} \text{ where } \tilde{b}_t = b\frac{1+\bar{\pi}_{t-1,t}^u}{1+\phi\pi_{t-1}^u}. \tag{A.4}$$

Along the equilibrium path, we have $\pi_t^u > \phi\pi_{t-1}^u$, which implies $\bar{\pi}_{t-1,t}^u > \phi\pi_{t-1}^u$ (see (A.2)). That is, if there is a surprise transition to the normal regime, borrowers' consumption is lower than expected (since lower-than-expected inflation raises their real debt). Households pick up the slack spending, $c_t^{\tilde{n}} > c^n$. Eq. (A.4) describes the households' consumption adjustment.

Next consider the unorthodox state u before transition. Using (9) and (A.2), inflation satisfies

$$\pi_t^u = \kappa\frac{y_t^u - y^n}{y^n} + \phi\pi_{t-1}^u. \tag{A.5}$$

$$\text{where } y_t^u = c_t^u + b\left[\frac{1+\bar{\pi}_{t,t+1}^u}{1+i^u} - \frac{1+\bar{\pi}_{t-1,t}^u}{1+\pi_t^u}\right]. \tag{A.6}$$

We also have the Euler equation (A.18), which implies

$$\frac{1}{c_t^u} = \chi\beta\frac{1+i^u}{1+\pi_{t+1}^u}\frac{1}{c_{t+1}^u} + (1-\chi)\beta\frac{1+i^u}{1+\phi\pi_t^u}\frac{1}{c_{t+1}^{\tilde{n}}} \tag{A.7}$$

where $c_{t+1}^{\tilde{n}}$ is given by (A.4).

The equilibrium path $\{c_t^u, \pi_t^u\}_t$ is characterized as the solution to Eqs. (A.5 – A.7) given the initial state π_{-1}^u and a transversality condition. We next characterize the steady state. We then approximate the system of equations around this steady state, characterize the transition dynamics, and establish our main results in this section.

Steady state. The steady state (c^u, y^u, π^u) corresponds to the solution to the system of equations

$$\begin{aligned}
\frac{1}{c^u} &= \chi\beta\frac{1+i^u}{1+\pi^u}\frac{1}{c^u} + (1-\chi)\beta\frac{1+i^u}{1+\phi\pi^u}\frac{1}{c^{\tilde{n}}} \\
y^u &= c^u + b\left[\frac{1+\overline{\pi}^u}{1+i^u} - \frac{1+\bar{\pi}^u}{1+\pi^u}\right] \\
\pi^u &= \kappa\frac{y^u - y^n}{y^n} + \phi\pi^u \\
&\quad \text{where} \\
1+\bar{\pi}^u &= \left(\frac{\chi}{1+\pi^u} + \frac{1-\chi}{1+\phi\pi^u}\right)^{-1} \text{ and } c^{\tilde{n}} = c^n\frac{y^n + \frac{b(1+\bar{\pi}^u)}{1+\phi\pi^u}}{y^n+b}.
\end{aligned}$$

Linearized system and transition dynamics. We next linearize the system around the steady state and solve the linearized system. Since the solution is saddle-path stable around the steady state, the linearized system characterizes the transition dynamics in a neighborhood of the steady state.

We define linearized variables as follows:

$$
\begin{aligned}
\hat{\pi}^u_t &\equiv \pi^u_t - \pi^u \\
\hat{y}^u_t &\equiv \frac{y^u_t - y^u}{y^n} \\
\hat{c}^u_t &\equiv \ln c^u_t - \ln c^u \simeq \frac{c^u_t - c^u}{c^u} \\
\hat{c}^{\tilde{n}}_t &\equiv \ln c^{\tilde{n}}_t - \ln c^{\tilde{n}} \simeq \frac{c^{\tilde{n}}_t - c^{\tilde{n}}}{c^{\tilde{n}}}.
\end{aligned}
$$

Here, the approximation holds in view of a first-order Taylor expansion around the steady state value. We conjecture a solution in which these linearized variables are a linear function of last period's inflation;

$$
\begin{aligned}
\hat{\pi}^u_t &= \lambda_p \hat{\pi}^u_{t-1} \\
\hat{y}^u_t &= \lambda_y \hat{\pi}^u_{t-1} \\
\hat{c}^u_t &= \lambda_c \hat{\pi}^u_{t-1}.
\end{aligned} \tag{A.8}
$$

Here, $\lambda_p, \lambda_y, \lambda_c$ are unknown coefficients.

We next linearize the system ($A.5 - A.7$) and characterize the conditions the unknown coefficients must satisfy. Linearizing the Phillips curve relation ($A.5$),we obtain

$$
\hat{\pi}^u_t = \kappa \hat{y}^u_t + \phi \hat{\pi}^u_{t-1}.
$$

This implies the conjectured parameters satisfy

$$
\Rightarrow \lambda_p = \kappa \lambda_y + \phi. \tag{A.9}
$$

Next consider the expected inflation $1 + \bar{\pi}^u_{t-1,t} = \left(\frac{\chi}{1+\pi^u_t} + \frac{1-\chi}{1+\phi\pi^u_{t-1}} \right)^{-1}$, which affects the market clearing relation. Taking the logarithm of both sides of the definition of $\bar{\pi}^u_{t-1,t}$ and performing a first-order Taylor expansion around the steady state, we arrive at:

$$
\frac{1}{1+\bar{\pi}^u}\left(\bar{\pi}^u_{t-1,t} - \bar{\pi}^u\right) = \left(1+\bar{\pi}^u\right)\left[\frac{\chi}{1+\pi^u}\frac{1}{1+\pi^u}\hat{\pi}^u_t + \frac{1-\chi}{1+\phi\pi^u}\frac{\phi}{1+\phi\pi^u}\hat{\pi}^u_{t-1}\right]
$$

Substituting the conjectured policy functions into the expression, we can simplify this to:

$$
\frac{1}{1+\bar{\pi}^u}\left(\bar{\pi}^u_{t-1,t} - \bar{\pi}^u\right) = \left(\psi_{p_1}\lambda_p + \psi_{p_2}\right)\hat{\pi}^u_{t-1} \tag{A.10}
$$

where

$$
\begin{aligned}
\psi_{p_1} &\equiv \frac{\chi}{1+\pi^u}\frac{1+\bar{\pi}^u}{1+\pi^u} \\
\psi_{p_2} &\equiv \frac{1-\chi}{1+\phi\pi^u}\frac{\phi\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}
\end{aligned}
$$

Next consider the market clearing relation ($A.6$). Taking the logarithm of both sides of the equation and performing a first-order Taylor expansion around the steady state, we arrive at:

$$y^n \hat{y}^u_t = c^u \hat{c}^u_t + b\left\{\frac{1+\bar{\pi}^u}{1+i^u}\frac{1}{1+\bar{\pi}^u}\left(\bar{\pi}^u_{t,t+1}-\bar{\pi}^u\right)-\frac{1+\bar{\pi}^u}{1+\pi^u}\left[\frac{1}{1+\bar{\pi}^u}\left(\bar{\pi}^u_{t-1,t}-\bar{\pi}^u\right)-\frac{1}{1+\pi^u}\hat{\pi}^u_t\right]\right\}$$

Substituting the conjectured policy functions along with ($A.10$) and rearranging terms yields:

$$c^u\lambda_c = y^n\lambda_y - b\left\{\frac{1+\bar{\pi}^u}{1+i^u}\psi_{p_1}(\lambda_p)^2+\left[\frac{1+\bar{\pi}^u}{1+\pi^u}\left(-\psi_{p_1}+\frac{1}{1+\pi^u}\right)+\frac{1+\bar{\pi}^u}{1+i^u}\psi_{p_2}\right]\lambda_p-\frac{1+\bar{\pi}^u}{1+\pi^u}\psi_{p_2}\right\}$$

Substituting equation (A.9) yields:

$$\begin{aligned} c^u\lambda_c &= h_1(\lambda_p)^2 - h_2\lambda_p - h_3 \\ &\text{where} \\ h_1 &\equiv -b\frac{1+\bar{\pi}^u}{1+i^u}\psi_{p_1} \\ h_2 &\equiv b\left[\frac{1+\bar{\pi}^u}{1+\pi^u}\left(-\psi_{p_1}+\frac{1}{1+\pi^u}\right)+\frac{1+\bar{\pi}^u}{1+i^u}\psi_{p_2}\right]-\frac{y^n}{\kappa} \\ h_3 &\equiv -b\frac{1+\bar{\pi}^u}{1+\pi^u}\psi_{p_2}+\frac{y^n}{\kappa}\phi. \end{aligned} \tag{A.11}$$

Next consider $c^{\tilde{n}}_t$ defined in ($A.4$), which affects the Euler equation. Taking the logarithm of both sides of ($A.4$) and performing a first-order Taylor expansion around the steady state, we arrive at:

$$\hat{c}^{\tilde{n}}_t = \left[y^n + \frac{b\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}\right]^{-1}\frac{b\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}\left[-\frac{\phi}{1+\phi\pi^u}\hat{\pi}^u_{t-1}+\frac{1}{1+\bar{\pi}^u}\left(\bar{\pi}^u_{t-1,t}-\bar{\pi}^u\right)\right]$$

Substituting the conjectured policy functions into the expression, we can simplify this to:

$$\begin{aligned} \hat{c}^{\tilde{n}}_t &= \left(\psi_{c_1}\lambda_p+\psi_{c_2}\right)\hat{\pi}^u_{t-1} \\ &\text{where} \\ \psi_{c_1} &\equiv \left[y^n + \frac{b\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}\right]^{-1}\frac{b\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}\psi_{p_1} \\ \psi_{c_2} &\equiv \left[y^n + \frac{b\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}\right]^{-1}\frac{b\left(1+\bar{\pi}^u\right)}{1+\phi\pi^u}\left(-\frac{\phi}{1+\phi\pi^u}+\psi_{p_2}\right). \end{aligned} \tag{A.12}$$

Finally consider the Euler equation ($A.7$). Taking the logarithm of both sides of the equation and performing a first-order Taylor expansion around the steady state, we arrive at:

$$\hat{c}^u_t = \frac{\chi\beta\frac{1+i^u}{1+\pi^u}\frac{1}{c^u}}{\frac{1}{c^u}}\left(\frac{1}{1+\pi^u}\hat{\pi}^u_{t+1}+\hat{c}^u_{t+1}\right)+\frac{(1-\chi)\beta\frac{1+i^u}{1+\phi\pi^u}\frac{1}{c^{\tilde{n}}}}{\frac{1}{c^u}}\left(\frac{1}{1+\phi\pi^u}\phi\hat{\pi}^u_t+\hat{c}^{\tilde{n}}_{t+1}\right).$$

Substituting the conjectured policy functions along with ($A.12$) into the expression, we obtain

$$\begin{aligned}
\frac{1}{c^u}\lambda_c &= d_1\frac{1}{1+\pi^u}(\lambda_p)^2 + d_1\lambda_c\lambda_p + d_2\left(\frac{\phi}{1+\phi\pi^u} + \psi_{c_1}\lambda_p\right)\lambda_p + d_2\psi_{c_2}\lambda_p \\
&\text{where} \\
d_1 &\equiv \chi\beta\frac{1+i^u}{1+\pi^u}\frac{1}{c^u} \\
d_2 &\equiv (1-\chi)\beta\frac{1+i^u}{1+\phi\pi^u}\frac{1}{c^{\tilde{n}}}.
\end{aligned} \tag{A.13}$$

The unknown coefficients $(\lambda_p, \lambda_y, \lambda_c)$ must satisfy Eqs. ($A.9$), ($A.11$) and ($A.13$). To solve this system, we substitute Eq. (A.11) into Eq. (A.13) and rearrange terms to obtain a cubic equation in λ_p

$$\begin{aligned}
F(\lambda_p) &\equiv f_3(\lambda_p)^3 + f_2(\lambda_p)^2 + f_1\lambda_p + f_0 = 0 \\
&\text{where} \\
f_3 &\equiv \frac{d_1}{c^u}h_1 \\
f_2 &\equiv d_1\left(\frac{1}{1+\pi^u} - \frac{h_2}{c^u}\right) - \frac{h_1}{(c^u)^2} + d_2\psi_{c_1} \\
f_1 &\equiv d_2\left(\frac{\phi}{1+\phi\pi^u} + \psi_{c_2}\right) - \frac{d_1}{c^u}h_3 + \frac{h_2}{(c^u)^2} \\
f_0 &\equiv \frac{h_3}{(c^u)^2}.
\end{aligned} \tag{A.14}$$

Solving ($A.14$) numerically yields the value of λ_p. The solution corresponds to the real root that falls inside the interval $(0, 1)$. We can then obtain λ_c from equation (A.11) and λ_y from equation (A.9). These values allow us to compute the transition dynamics toward the unorthodox regime steady state. Furthermore, from the definition of the linearized variables, we have:

$$\begin{aligned}
\pi_t^u &= \hat{\pi}_t^u + \pi^u \\
y_t^u &= y^n\hat{y}_t^u + y^u \\
c_t^u &= c^u\hat{c}_t^u + c^u
\end{aligned} \tag{A.15}$$

This completes the characterization of the transition dynamics around the steady state.

Numerical illustration of transition dynamics. We solve the steady-state and the linearized equilibrium numerically for the parameters in A.1 along with $i^u = i^* - 0.1$. In particular, the policy rate is 10 percentage points below the inflation-stabilizing level and this unorthodox policy is expected to mean revert in 1.5 years (since $\chi = 1/3$). We also set the inflation inertia to a conservative value $\phi = 0.3$: meaning that all else equal only 30% of the past inflation (measured as gaps relative to target) persist into the next period (see ($A.2$)). For these parameters, the cubic in ($A.2$) has a unique real root in $(0, 1)$. The corresponding linearized solution coefficients are given by

$$\lambda_p = 0.45, \lambda_y = 0.29, \lambda_c = 0.11.$$

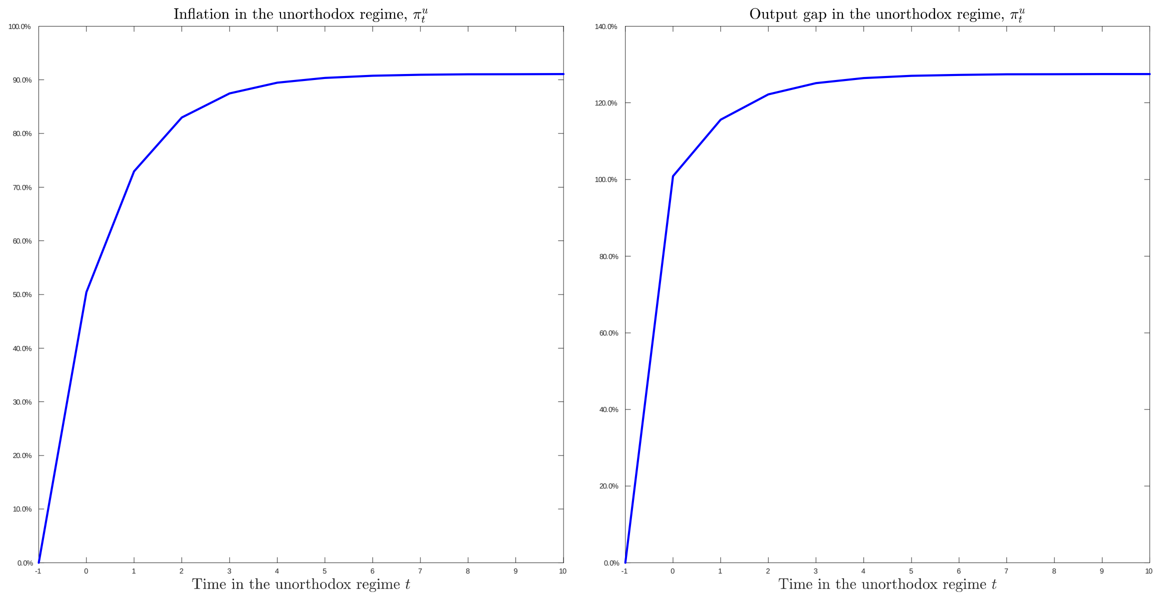

Figure A.1: Simulated equilibrium path in the model with inflation inertia, along the realization in which the economy remains in the unorthodox regime. The left panel shows inflation and the right panel shows the output gap.

Given these coefficients, the steady state values (π^u, y^u, c^u), and the initial inflation gap $\hat{\pi}_{-1} = \pi^u_{-1} - \pi^u$, Eq. ($A.8$) characterizes the approximate deviations from the steady state $(\hat{\pi}^u_t, \hat{y}^u_t, \hat{c}^u_t)$. Eq. ($A.15$) characterizes the approximate equilibrium path (π^u_t, y^u_t, c^u_t).

We assume that the economy is initially in the normal regime with inflation inflation, output, and consumption given by $\pi_{-1} = 0, y_{-1} = y^n, c_{-1} = c^n$. At date 0, the economy transitions to the unorthodox regime, so the inherited inflation is initially given by $\pi^u_{-1} = 0$.

Figure A.1 illustrates the inflation and the output gap along the realized path in which the economy remains in the unorthodox regime, $\left(\pi^u_t, \frac{y^u_t - y^n}{y^n}\right)$. Inflation and output gap monotonically increase and eventually converge to their steady state values. This shows that, with inertial inflation, staying in the unorthodox regime longer results in greater overheating and inflation. Recall also that, after transition to normal regime, a higher inherited inflation makes disinflation longer and costlier. It follows that paths in which the unorthodox regime lasts longer feature higher inflation and costlier disinflation compared to when the unorthodox regime ends sooner.

A.2.2. Anticipation of a KKM crisis reduces the effectiveness of KKM

Proposition 4 in the main text showed the possibility of a crisis equilibrium in the KKM regime when agents did *not* anticipate such a crisis. In practice, when a fragile regime such as KKM is in place, agents can also anticipate the possibility of a crisis. The following result extends the analysis to construct equilibria in which agents anticipate the crisis with positive probability.

Proposition 5 (Anticipation of a KKM Crisis Depreciates the Currency and Raises Inflation)**.** *Consider the setup in Proposition 4. There are equilibria in which crises happen with positive probability* and agents have rational expectations about the likelihood of crises. *An increase in the probability of the crisis undermines the effectiveness of the KKM even when the crisis is not realized..*

For sufficiently small $\zeta \in (0,1)$, there are equilibria with the following feature: As long as the economy is in the KKM regime $s_t = k$ and the government has not defaulted before, with probability ζ the agents coordinate on a "crisis" equilibrium in which government defaults on the KKM and KKM is no longer available. Otherwise, they coordinate on a "stable" equilibrium in which there is no default and KKM is still available (unless there is a transition to state n). Consumption, output, inflation in crisis and stable equilibria are jointly characterized as the solution to the system

$$\begin{aligned}
c^{k,c} &= c^u \qquad \text{(A.16)}\\
\frac{1}{\beta c^{k,s}} &= \chi(1-\zeta)\frac{1}{c^{k,s}} + \chi\zeta\frac{1+i^u}{1+\pi^k}\frac{1}{c^u} + (1-\chi)(1+i^u)\frac{1}{c^{\tilde{n}}\left(\overline{\pi}^{k,s}\right)}\\
y^{k,c} - y^n &= c^u - c^n + b\left[\frac{1+\overline{\pi}^u}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^{k,c} - \overline{\pi}^{k,s}}{1+\pi^{k,c}}\right]\\
y^{k,s} - y^n &= c^{k,s} - c^n + b\left[\frac{1+\overline{\pi}^{k,s}}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^{k,s} - \overline{\pi}^{k,s}}{1+\pi^{k,s}}\right]\\
\pi^{k,c} &= \kappa\frac{y^{k,c} - y^n}{y^n} + \beta\chi\pi^u\\
\pi^{k,s} &= \kappa\frac{y^{k,s} - y^n}{y^n} + \beta\chi\left((1-\zeta)\pi^{k,s} + \zeta\pi^{k,c}\right)\\
&\textit{where}\\
1+\overline{\pi}^{k,s} &= 1/\left(\frac{\zeta\chi}{1+\pi^{k,c}} + \frac{(1-\zeta)\chi}{1+\pi^{k,s}} + \frac{1-\chi}{\pi^n}\right) \ \textit{and}\ c^{\tilde{n}}\left(\overline{\pi}^{k,s}\right) = c^n\frac{y^n + b\left(1+\overline{\pi}^{k,s}\right)}{y^n + b}.
\end{aligned}$$

The real exchange rates in crisis and stable equilibria are given by

$$e^{k,c} = \phi\left(y^{k,c}\right)\frac{c^{k,c}}{y_T - \overline{B}^*(1-\beta)} \ \textit{and}\ e^{k,s} = \phi\left(y^{k,s}\right)\frac{c^{k,s}}{y_T - \overline{B}^*(1-\beta)}$$

Assuming parametric conditions that ensure the solution is monotonic in ζ over the range $[0,1]$, the solution satisfies $\frac{dc^{k,s}}{d\zeta} > 0$, $\frac{dy^{k,s}}{d\zeta} > 0$, $\frac{d\pi^{k,s}}{d\zeta} > 0$, $\frac{de^{k,s}}{d\zeta} > 0$: In the stable equilibrium, a greater perceived likelihood of crisis induces greater overheating and greater depreciation of the exchange rate.

When agents anticipate a KKM crisis, this anticipation undermines the effectiveness of the KKM, *even before the crisis arrives (in the stable equilibrium)*. Intuitively, when households anticipate that the government might not honor its KKM obligations, they perceive a lower interest rate ($\frac{1+i^u}{1+\pi^k} < \frac{1+\pi^k}{1+\pi^k} = 1$), which induces them to spend more. In addition, both households and borrowers anticipate greater future inflation, which induces them to spend more. Likewise, price setters anticipate higher inflation and set higher prices. All of these forces push toward greater overheating and higher inflation. In fact, the proof in the appendix shows that as $\zeta \to 1$,the system of equations in ($A.16$) converges to the system of equations for the unorthodox regime: when crisis is perceived to be very likely, it is as if KKM does not exist and low interest rates induce the destabilizing spirals we have discussed in Proposition 2.

A.3. Omitted proofs

Proof of Proposition 1. In view of the Phillips curve (10), the baseline model satisfies divine coincidence: there is no a trade-off between stabilizing inflation and output. Therefore, the central bank implements zero output gaps along with zero inflation gaps; that is, Eq. (15)

$$y_t = y^n \text{ and } \pi_t = 0.$$

We conjecture the central bank implements these outcomes by setting the interest rates according to (17)

$$1 + r_t^n = 1 + i_t^n = 1/\beta = 1 + i^*.$$

In particular, the real and nominal interest rates are equal to each other and the discount rate, which is equal to the dollar interest rate by assumption. Combining this with the goods market clearing $y_t = c_t + \beta b - b = y^n$, we obtain (16)

$$c_t = c^n \equiv y^n + (1 - \beta)\, b.$$

In equilibrium, households spend their nontradeables production plus the interest payment on their lira bonds issued by the borrowers.

The remaining equilibrium conditions are the households' optimality conditions:

$$\begin{aligned} \lambda_t &= \frac{1}{P_t c_t} = \frac{\phi(y_t)}{\mathcal{E}_t c_{T,t}}, \qquad \text{(A.17)} \\ \lambda_t &= \beta(1 + i_t) E_t[\lambda_{t+1}], \\ \lambda_t &\geq \beta E_t[(1 + i^*) \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} \lambda_{t+1}] \end{aligned}$$

with equality if $B_t^* < \overline{B}^*$. Here, λ_t captures the value of one more lira at date t. These equations imply standard Euler equations for nontradeables and tradeables and a risk-adjusted UIP condition.

First consider the nontradeables consumption. The Euler equation is given by

$$\frac{1}{c_t} = \beta E_t \left[\frac{1 + i_t}{1 + \pi_{t+1}} \frac{1}{c_{t+1}} \right]. \tag{A.18}$$

Substituting $c_t = c^n$ and $\pi_{t+1} = 0$ we verify our conjecture that the central bank sets $1 + i_t = 1/\beta$. This ensures households optimally keep their nontradeable consumption constant.

Next consider the tradeables consumption. The Euler equation and $\beta(1 + i^*) = 1$ implies

$$\frac{\phi(y_t)}{c_{T,t}} \geq E_t \left[\frac{\phi(y_{t+1})}{c_{T,t+1}} \right], \tag{A.19}$$

with equality if $B_{t+1}^* < \overline{B}^*$. The balance of payment constraint (13) implies

$$E_t \left[\sum_{h=0}^{\infty} \beta^h c_{T,t+h} \right] = \frac{y_T}{1 - \beta} + A_t^* - B_t^*. \tag{A.20}$$

The path of tradeables is determined by Eqs. (A.19)- (A.20) given the path of output $\{y_t\}$ and the reserves policy $\{F_t^*, A_{t+1}^*\}$. For the baseline model where output $y_t = y^n$ and reserves

$A_t^* = A_0^*$ are both constant, it is easy to check that the Euler equation holds with equality. In particular, $c_{T,t} = c_{T,t+1} = c_T$ and the solution is given by (18)

$$c_T = y_T + (1-\beta)\left(A_t^* - B_t^*\right) \text{ with } A_t^* = A_0^* \text{ and } B_t^* = B_0^*.$$

Households spend their net tradeables endowment plus the interest earned on reserves minus the interest payment on external debt. Households' debt B_t^* and their effective debt $B_t^* - A_t^*$ remain constant over time; that is, current account is balanced.

Next consider the real exchange rate. Combining Eqs. (16), (18) and (A.17) we obtain (19):

$$\mathcal{E}_t/P_t = e_t = \phi^n \frac{y^n + (1-\beta)b}{y_T + (1-\beta)\left(A_0^* - B_0^*\right)} \text{ where } \phi^n = \phi\left(y^n\right).$$

The real exchange rate is larger (more depreciated) when households prefer tradeables relatively more, when the relative supply of nontradeables y^n/y_T is larger (trade-related factors), or when the net external debt is greater (financial factors).

Since there is no inflation, we also have $P_{t+1} = P_t$, which implies the nominal exchange rate remains constant over time. More generally, the nominal exchange rate grows at the same rate as the inflation target (which we have normalized to zero). This completes the characterization of the equilibrium □

Proof of Proposition 2. It is easy to check that at least one period after transition the equilibrium is the same as in the previous section, in particular, $y_t^n = y^n, c_t^n = c^n, \pi_t^n = 0$. During the transition state, the central bank also implements $y_t^{\tilde{n}} = y^n$ and $\pi_t^{\tilde{n}} = 0$ since it follows inflation targeting and inflation is purely forward looking. For the unorthodox state, we conjecture (and verify) an equilibrium in which consumption, output, and inflation remain constant and overheated as long as the economy stays in the unorthodox regime, $c_t^u = c^u > c^n, y_t^u = y^u > y^n, \pi_t = \pi^u > 0$. We further conjecture that this overheating increases the current account deficits and depreciates the (real and nominal) exchange rate. We first characterize the equilibrium for nontradeables and then turn to the equilibrium for tradeables.

We start by characterizing the behavior of the borrowers. In the unorthodox state $s_t = u$, the goods market clearing condition (9) implies

$$y^u = c^u + \frac{b\left(1+\overline{\pi}^u\right)}{1+i^u} - \frac{b\left(1+\overline{\pi}^u\right)}{1+\pi^u}. \tag{A.21}$$

where $1+\overline{\pi}^u = \left(\frac{\chi}{1+\pi^u} + 1 - \chi\right)^{-1}$. After subtracting $y^n = c^n + \frac{b}{1+i^*} - b$ from both sides, we obtain Eq. (22) that describes the output gap

$$y^u - y^n = c^u - c^n + b\left[\frac{1+\overline{\pi}^u}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^u - \overline{\pi}^u}{1+\pi^u}\right].$$

The bracketed term shows that low interest rates and high expected inflation raise borrowers' spending above their normal level. The surprise inflation $\pi^u > \overline{\pi}^u$ further raises the borrowers' spending above their normal level by effectively reducing their debt. Therefore, as the economy remains in the unorthodox regime, the borrowing sector contributes to overheating and output gaps.

Next consider the transition to the normal state $s_t = n$ and $s_{t-1} = u$. In this case, we have

$\overline{\pi}_{t,t+1} = 0$ and $\overline{\pi}_{t-1,t} = \overline{\pi}^u$. Therefore, the goods market clearing (9) now implies

$$y^{\tilde{n}} = c^{\tilde{n}} + \frac{b}{1+i^{\tilde{n}}} - b\left(1+\overline{\pi}^u\right). \tag{A.22}$$

In this state, borrowers' spending is lower both because the policy has normalized and because inflation surprises on the downside, raising the borrowers' real debt.

Next consider the behavior of households. Consider first the transition to the normal state $s_t = n$ and $s_{t-1} = u$. Since there is no inflation and no further uncertainty, the Euler equation gives

$$1/c^{\tilde{n}} = \beta\left(1+i^{\tilde{n}}\right)/c^n.$$

Here, $c^n = y^n + b\left(1-\beta\right)$ is the steady state consumption we characterized earlier. Combining the last two displayed equations and using $y^{\tilde{n}} = y^n$, implied by optimal policy, we solve for the interest rate and consumption as

$$1+i^{\tilde{n}} = \frac{1}{\beta}\frac{y^n+b}{y^n+b\left(1+\overline{\pi}^u\right)} \tag{A.23}$$

$$c^{\tilde{n}}\left(\overline{\pi}^u\right) = c^n\frac{y^n+b\left(1+\overline{\pi}^u\right)}{y^n+b}. \tag{A.24}$$

After transition to the normal state, households' consumption is temporarily higher than usual as they (partly) pick the slack spending induced by the increase in borrowers' real debt burden.

Next consider the unorthodox state $s_t = u$. The Euler equation (A.18) now implies (21)

$$\frac{1}{c^u} = \chi\beta\frac{1+i^u}{1+\pi^u}\frac{1}{c^u} + (1-\chi)\beta(1+i^u)\frac{1}{c^{\tilde{n}}\left(\overline{\pi}^u\right)}.$$

Since $i^u < i^*$ and $\pi^u > 0$, we have $c^u > c^{\tilde{n}}\left(\overline{\pi}^u\right) > c^n$. Low interest rates and high inflation increase the households' spending above their normal level. Therefore, households contribute to the overheating via a standard intertemporal substitution channel.

Next recall that inflation is characterized by the Phillips curve (10)

$$\pi^u = \kappa\frac{y^u-y^n}{y^n} + \beta\chi\pi^u.$$

This implies the equilibrium triple (c^u, y^u, π^u) solve the system of equations $(22-23)$. The solution satisfies $c^u > c^n, \pi^u > 0, y^u > y^n$. In the unorthodox regime, consumption, output, inflation all exceed their natural levels. The expected real interest rate is given by (20).

We next turn to the tradeables block of the model. The Euler equation (A.19) can be written as

$$\frac{\phi\left(y^u\right)}{c^u_{T,t}} \geq \beta\left(1+i^*\right)\left[\chi\frac{\phi\left(y^u\right)}{c_{T,t+1}} + (1-\chi)\frac{\phi\left(y^n\right)}{y_T + (1-\beta)\left(A^*_{t+1} - B^*_{t+1}\right)}\right] \tag{A.25}$$

with equality if $B^*_{t+1} < \overline{B}^*$. Here, we have used the observation that after transition to normal regime the tradeables consumption is the same as before.

As a benchmark, first consider the case without borrowing constraints $\overline{B}^* = \infty$. Then, the Euler equation holds as equality and we have the following closed form solution

$$c^u_{T,t} = \left(1-\beta+\mu\left(y^u\right)\right)\left(\frac{y_T}{1-\beta} + A^*_t - B^*_t\right). \tag{A.26}$$

Here, $\mu(y^u) > 0$ is a derived function that depends on the parameters according to

$$\mu(y^u) = \frac{(\phi(y^u) - \phi^n)\frac{\beta(1-\chi)}{1-\chi\beta}}{(\phi(y^u) - \phi^n)\frac{1}{1-\chi\beta} + \phi^n \frac{1}{1-\beta}}.$$

This is increasing in y^u: overheating increases tradeables consumption. In particular, note that $c^u_{T,t} > c^{\tilde{n}}_{T,t}$: households spend more in the unorthodox regime than in the normal regime. This also raises households' debt over time,

$$\begin{aligned} B^*_{t+1} &= \frac{B^*_t + c^u_{T,t} - (y_T + A^*_0(1-\beta))}{\beta} \\ &= B^*_t + \frac{\mu(y^u)\left(\frac{y_T}{1-\beta} + A^*_t - B^*_t\right)}{\beta}. \end{aligned} \tag{A.27}$$

Since reserves are kept constant, $A^*_t = A^*_0$, the country runs current account deficits and the net external debt, $B^*_t - A^*_t$, also grows over time.

Next consider the case with $\overline{B}^* < \infty$. We just showed that absent the constraint B^*_t grows over time without bound. This implies that the borrowing constraint binds after a period of transition. Suppose the transition is complete so the initial debt is at the constraint $B^*_0 = \overline{B}^*$.

Next consider the main case in which $\overline{B}^* < \infty$. Since without constraints debt grows over time, in this case debt would eventually reach $\overline{B}^*$ after a period of adjustment. Once the debt is at the limit, the tradeables consumption is constant and given by

$$c^u_{T,t} = y_T + \left(A^*_0 - \overline{B}^*\right)(1-\beta). \tag{A.28}$$

This ensures that the households' debt and the current account also remains constant over time

$$B^*_{t+1} = \overline{B}^*. \tag{A.29}$$

In this case, households would like to borrow more and raise their tradeables consumption but are constrained.

Finally, we characterize the exchange rate. Suppose households have already reached the constraint, $B^*_0 = \overline{B}^*$. Combining (A.17) with tradeables and nontradeables spending, we obtain (24)

$$(\mathcal{E}_t/P_t)^u = e^u_t = \phi(y^u)\frac{c^u}{y_T + \left(A^*_0 - \overline{B}^*\right)(1-\beta).}.$$

When the economy first transitions to normalcy, $s_t = n$ and $s_{t-1} = u$, we instead have

$$(\mathcal{E}_t/P_t)^{\tilde{n}} = e^{\tilde{n}}_t = \phi^n \frac{c^{\tilde{n}}(\overline{\pi}^u)}{y_T + \left(A^*_0 - \overline{B}^*\right)(1-\beta)}. \tag{A.30}$$

Finally, at least one period after transition the real exchange rate is the same as before

$$(\mathcal{E}_t/P_t)^n = e^n_t = \phi^n \frac{c^n}{y_T + \left(A^*_0 - \overline{B}^*\right)(1-\beta)}.$$

Comparing this expressions, we see that in the unorthodox regime, the real exchange rate is more depreciated (higher) than in the normal regime, $e_t^u > e_t^{\tilde{n}} > e_t^n$. This is because the output boom in nontradeables makes tradeables relatively scarce while also shifting the preferences toward tradeables. Note also that as long as the economy stays in the unorthodox regime, the nominal exchange rates keep *depreciating* over time at the same rate as inflation. Hence, the low interest rate policy causes not only an increase in current account deficits (when households are unconstrained) but also a depreciation of the currency. $\square$

Proof of Proposition 3. First consider the case in which the parameters are such that the equilibrium characterized in Proposition 2 without the KKM features $\pi^u \leq i^u$. Then, we conjecture that this allocation remains an equilibrium also with the KKM. To see this, recall that the payoff from KKM is given by (29)

$$1 + \pi_{t,t+1}^{kkm} = \max\left(1 + i^u, \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right) \text{ where } \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} = (1 + \pi_{t+1}) \frac{e_{t+1}}{e_t}.$$

In the equilibrium characterized in Proposition 2, if there is a transition to the normal regime then $\pi_{t+1} = 0$ and $\frac{e_{t+1}}{e_t} < 1$, which implies the KKM payoff is equal to $1 + i^u$. If there is a continuation of the unorthodox regime, then $\pi_{t+1} = \pi^u$ and $\frac{e_{t+1}}{e_t} = 1$. When $\pi^u \leq i^u$, this implies the KKM payoff is once again $\max(1 + i^u, 1 + \pi^u) = 1 + i^u$. Since KKM payoff is always equal to the policy rate, KKM is redundant. This verifies the conjecture that the equilibrium in Proposition 2 remains an equilibrium with KKM.

Next consider the main case in which the parameters are such that $\pi^u > i^u$. In this case, we conjecture an equilibrium with the same structure as in Proposition 2 but with the difference that KKM is not redundant. In the KKM state, consumption, output, and inflation are constant and overheated $c^k > c^n, y^k > y^n, \pi^k > 0$. Once the economy switches to the normal regime, output and inflation fall to their natural levels $y_t^{\tilde{n}} = y^n, \pi^{\tilde{n}} = 0$ and consumption falls to the level in (A.24). The real exchange rate is constant as long as the economy remains in the KKM regime, $e_t^k \equiv e^k$, and appreciates after transition to the normal regime at time t, $e_t^{\tilde{n}} = e^{\tilde{n}} < e^k$. We further claim that $\pi^k \in (i^u, \pi^u)$: inflation is lower than in the unorthodox regime—which ensures that KKM mitigates the overheating—but higher than the policy rate—which ensures KKM is non-redundant.

In the conjectured allocation, KKM's payoff along is given by (29)

$$1 + i_{t,t+1}^{kkm} = \begin{cases} \left(1 + \pi_{t+1}^k\right) \frac{e_{t+1}^k}{e_t^k} = 1 + \pi^k > 1 + i^u & \text{if } s_{t+1} = u \\ 1 + i^u > \left(1 + \pi_{t+1}^{\tilde{n}}\right) \frac{e_{t+1}^{\tilde{n}}}{e_t^k} & \text{if } s_{t+1} = n \end{cases}.$$

As long as the economy remains in the KKM regime, KKM's realized rate is equal to inflation—since the real interest rate remains constant in this regime $e_t^k = e_{t+1}^k = e^k$. After transition to the normal regime, KKM's realized rate is equal to the policy interest rate—since after transition inflation falls $\pi_{t+1}^{\tilde{n}} = 0$ and the real exchange rate appreciates $e^{\tilde{n}} < e^k$.

Observe that KKM dominates holding lira deposits since its interest rate weakly exceeds i^u in all states and strictly so if the unorthodox state continues. Therefore, all depositors immediately switch their lira deposits into this product. The total investment in the new product is then equal to the lira asset supply by the private sector: that is, the lira asset market clearing is now given by (see (11))

$$A_{t+1}^k = B_{t+1} = P_t b \left(1 + \overline{\pi}_{t,t+1}\right). \tag{A.31}$$

These observations also imply that the expected real rate for depositors is given by

$$1+r^{k,h}=\chi\frac{1+\pi^{k}}{1+\pi^{k}}+(1-\chi)\left(1+i^{u}\right).$$

The expected real rate for borrowers is still given by the same expression as before,

$$1+r^{k,b}=\chi\frac{1+i^{u}}{1+\pi^{k}}+(1-\chi)\left(1+i^{u}\right)=\frac{1+i^{u}}{1+\overline{\pi}^{k}}.$$

Since KKM is not redundant ($\pi^k > i^u$), we have $r^{k,h} > r^{k,b}$, proving (30). We see that KKM amounts to an interest rate hike for depositors but not for borrowers. While savers receive a higher interest rate than before, borrowers do not pay a higher rate—the government pays the difference. Note also that both $r^{k,h}$ and $r^{k,b}$ are still below i^*, the real interest rate for all agents is still below the inflation targeting level.

Next note that households' Euler equation now implies Eq. (31)

$$\frac{1}{c^{k}}=\chi\beta\frac{1+\pi^{k}}{1+\pi^{k}}\frac{1}{c^{k}}+(1-\chi)\,\beta\left(1+i^{u}\right)\frac{1}{c^{\tilde{n}}\left(\overline{\pi}^{k}\right)}$$

where $c^{\tilde{n}}(\cdot)$ is defined in (A.24). In the unorthodox state, households receive a gross real interest rate equal to one, $\frac{1+\pi^k}{1+\pi^k}=1$ (they are compensated for inflation through the FX adjustment). If there is a transition to the normal regime, they receive a gross real interest rate $1+i^u$. These rates are still less than $1+i^*=1/\beta$, which implies households still spend more in the unorthodox regime $c^k > c^{\tilde{n}}\left(\overline{\pi}^k\right)$.

Borrowers' consumption is similar to before. In particular, output is given by (see Eq. (*A*.21))

$$y^{k}=c^{k}+\frac{\left(1+\overline{\pi}^{k}\right)b}{1+i^{u}}-\frac{\left(1+\overline{\pi}^{k}\right)b}{1+\pi^{k}},$$

and the output gap is given by Eq. (32)

$$y^{k}-y^{n}=c^{k}-c^{n}+b\left[\frac{1+\overline{\pi}^{k}}{1+i^{u}}-\frac{1}{1+i^{*}}+\frac{\pi^{k}-\overline{\pi}^{k}}{1+\pi^{k}}\right].$$

Since KKM does not increase the interest rate for borrowers, they still induce significant overheating.

Recall also that the Phillips curve(10) still holds

$$\pi^{k}=\kappa\frac{y^{k}-y^{n}}{y^{n}}+\beta\chi\pi^{k}.$$

It follows that the equilibrium triple (c^u, y^u, π^u) solve the system of equations $(32-33)$. As before, it can be checked that the solution satisfies $c^k > c^n, y^k > y^n, \pi^k > 0$ and decreasing i^u increases $\left(c^k, y^k, \pi^k\right)$.

It remains to verify that the solution satisfies $\pi^k \in (i^u, \pi^u)$. To this end, we first observe that $i^u = \pi^u$, the equation system becomes identical to the equation system for the unorthodox regime characterized in Proposition 3. Therefore, the solution also becomes identical, $\left(c^k, y^k, \pi^k\right)|_{i^u=\pi^u} = (c^u, y^u, \pi^u)$. Since decreasing i^u raises $\left(c^k, y^k, \pi^k\right)$, we have $\pi^k > \pi^u > i^u$ for each $i^u < \pi^u$. This proves that $\pi^k > i^u$ and KKM is not redundant. To prove that $\pi^k < \pi^u$, consider the equilibrium in Proposition 3 with $i^u < \pi^u$ and suppose we introduce the KKM into this equilibrium. This would violate households' Euler equation as follows

$$\begin{aligned}\frac{1}{c^u} &= \chi\beta\frac{1+i^u}{1+\pi^u}\frac{1}{c^u} + (1-\chi)\,\beta\,(1+i^u)\,\frac{1}{c^{\tilde{n}}\,(\overline{\pi}^u)} \\ &< \chi\beta\frac{1+\pi^u}{1+\pi^u}\frac{1}{c^u} + (1-\chi)\,\beta\,(1+i^u)\,\frac{1}{c^{\tilde{n}}\,(\overline{\pi}^u)}.\end{aligned}$$

Since households have greater incentive to save, they would reduce their spending c^u. In view of the monotonicity of equilibrium, this implies the solution with KKM satisfies $c^k < c^u$ along with $y^k < y^u$ and $\pi^k < \pi^u$. KKM mitigates overheating and reduces inflation, but the economy still remains overheated and inflation remains above target.

The equilibrium for tradeables is given by the same expressions as before (A.28) and (A.29) (but without reserves $A_0^* = 0$)

$$c_{T,t}^k = y_T - \overline{B}^*\,(1-\beta) \text{ and } B_{t+1}^* = \overline{B}^*.$$

As before, households would like to increase their tradeables consumption and external debt but they are constrained. Likewise, the exchange rate is given by the analogues of (24) and (A.30): Since $y^k \in (y^n, y^u)$ and $c^k \in (c^n, c^u)$, the exchange rate depreciates relative to the normal regime, but less than without KKM.

Finally, we calculate the fiscal burden of KKM. If the economy transitions to $s_{t+1} = n$ then KKM's payoff is equal to the policy rate $i_{t,t+1}^{kkm} = i^u$, which implies the costs are zero $(T_{t+1}/P_{t+1})^{\tilde{n}} = 0$. If instead the economy remains in the unorthodox regime, KKM's payoff is higher than the policy rate. In this case, the costs are positive and characterized by (28)

$$(T_{t+1}/P_{t+1})^k = \left((1+\pi_{t+1})\,\frac{e_{t+1}}{e_t} - (1+i^u)\right)\frac{b}{1+i^u}\frac{1+\overline{\pi}_{t,t+1}}{1+\pi_{t+1}}$$

After substituting $\pi_{t+1} = \pi^k, e_{t+1} = e^k$ and $\overline{\pi}_{t,t+1} = \overline{\pi}^k$, we obtain (35)

$$\tau^k = \frac{(T_{t+1}/P_{t+1})^k}{y^n} = \left(\pi^k - i^u\right)\frac{b/y^n}{1+i^u}\frac{1+\overline{\pi}^k}{1+\pi^k}.$$

The expenditures rise with inflation, which drives the nominal exchange rate depreciation, as well as the lira debt supply, which determines the take-up of the KKM. This completes the proof. □

Proof of Proposition 4. First suppose the real exchange rate and inflation are realized as expected, $e_t = e^k$ and $\pi_t = \pi^k$. Then, the real fiscal burden of KKM is given by $\tau^k = \tau\left(e^k, \pi^k\right)$ (see (35)). Since $\tau^k < \overline{\tau}$, the equilibrium described in Proposition 3 remains an equilibrium. This verifies the stable equilibrium.

Consider the crisis equilibrium. Suppose as a surprise exchange rate and inflation are realized as a tuple $\left(e^{k,c}, \pi^{k,c}\right)$ which satisfy $e^{k,c} > e^u > e^k$ and $\pi^{k,c} > \pi^u > \pi^k$. Then, the real fiscal burden of KKM is given by

$$\tau^{k,c} = \tau\left(e^{k,c}, \pi^{k,c}\right) > \tau\left(e^u, \pi^u\right) > \overline{\tau}.$$

Here, the inequality follows because the function $\tau(\cdot)$ is increasing in both arguments (see (36)).

Therefore, a surprise realization $\left(e^{k,c},\pi^{k,c}\right)$ forces the government into default. It remains to show that the government default results in $\left(e^{k,c},\pi^{k,c}\right)$ that satisfy $e^{k,c}>e^{u}$ and $\pi^{k,c}>\pi^{u}$.

The crisis equilibrium is similar to the unorthodox equilibrium characterized in Proposition 2 with the difference that there are transition dynamics that last for one period. Starting from time $t+1$ onward the equilibrium is the same as in Proposition 2. In particular, if the unorthodox regime continues then consumption, output, inflation, and exchange rate are given by $(c^{u},y^{u},\pi^{u},e^{u})$. At time t, consumption is the same $c^{k,c}=c^{u}$ but output, inflation, and the exchange rate are higher (even more overheated) than in Proposition 2, $y^{k,c}>y^{u},\pi^{k,c}>\pi^{u},e^{k,c}>e^{u}$.

There is additional overheating at the transition time t because the crisis equilibrium comes as a surprise to the agents, and this surprise inflation raises the borrowers' spending. In particular, Eq. (2) implies borrowers' spending at time t is given by

$$\begin{aligned}
c_{t,t}+c_{t-1,t} &= \overline{y}+\frac{b\left(1+\overline{\pi}_{t,t+1}\right)}{1+i_{t}}-\frac{b\left(1+\overline{\pi}_{t-1,t}\right)}{1+\pi_{t}}\\
&= \overline{y}+\frac{b\left(1+\overline{\pi}^{u}\right)}{1+i^{u}}-\frac{b\left(1+\overline{\pi}^{k}\right)}{1+\pi^{k,c}}\\
&> \overline{y}+\frac{b\left(1+\overline{\pi}^{u}\right)}{1+i^{u}}-\frac{b\left(1+\overline{\pi}^{u}\right)}{1+\pi^{u}}.
\end{aligned}\tag{A.32}$$

Old borrowers had taken on a lower level of debt than in the unorthodox regime, because they expected a lower level of average inflation $\overline{\pi}^{k}<\overline{\pi}^{u}$. Therefore, borrowers' overall spending is higher than in Proposition 2.

The rest of the analysis follows similar steps as before. Since households' behavior is forward looking, their consumption level is the same as in the unorthodox regime $c^{k,c}=c^{u}$. Therefore, output satisfies

$$y^{k,c}=c^{u}+\overline{y}+\frac{b\left(1+\overline{\pi}^{u}\right)}{1+i^{u}}-\frac{b\left(1+\overline{\pi}^{k}\right)}{1+\pi^{k,c}}.$$

This implies the output gap satisfies

$$y^{k,c}-y^{n}=c^{u}-c^{n}+b\left[\frac{1+\overline{\pi}^{u}}{1+i^{u}}-\frac{1}{1+i^{*}}+\frac{\pi^{k,c}-\overline{\pi}^{k}}{1+\pi^{k,c}}\right].$$

Hence, using the Phillips curve, inflation solves the following fixed point problem

$$\pi^{k,c}=\kappa\frac{y^{k,c}-y^{n}}{y^{n}}+\beta\chi\pi^{u}.\tag{A.33}$$

We assume the parameters are such that there is a unique solution to this problem. Recall also that π^{u} solves the same problem after replacing $\overline{\pi}^{k}$ with $\overline{\pi}^{u}$ version (see $(22-23)$)

$$\begin{aligned}
y^{u}-y^{n} &= c^{u}-c^{n}+b\left[\frac{1+\overline{\pi}^{u}}{1+i^{u}}-\frac{1}{1+i^{*}}-\frac{1+\overline{\pi}^{u}}{1+\pi^{u}}\right]\\
\pi^{u} &= \kappa\frac{y^{u}-y^{n}}{y^{n}}+\beta\chi\pi^{u}.
\end{aligned}$$

Since $\overline{\pi}^{k}<\overline{\pi}^{u}$, the solution to ($A.33$) satisfies $\pi^{k,c}>\pi^{u}$ and $y^{k,c}>y^{u}$.

This analysis implies the real exchange rate at time t is given by the following analogue of

(24)

$$e^{k,c} = \phi\left(y^{k,c}\right)\frac{c^u}{y_T - \overline{B}^*(1-\beta)}.$$

Since $y^{k,c} > y^u$, we also have $e^{k,c} > e^u$. This proves $e^{k,c} > e^u$ and $\pi^{k,c} > \pi^u$ and verifies the crisis equilibrium, completing the characterization. □

Proof of Proposition 5. We first verify the system of equations ($A.16$) assuming that the government defaults in the crisis equilibrium but not in the stable equilibrium. We then verify the assumptions regarding government default.

We start by characterizing the crisis equilibrium following similar steps as in the proof of Proposition 4. Since households are forward looking and KKM is no longer available, their consumption is the same as in the unorthodox regime

$$c^{k,c} = c^u.$$

Borrowers' consumption is different than in the unorthodox regime and given by $\overline{y} + \frac{b(1+\overline{\pi}^u)}{1+i^u} - \frac{b\left(1+\overline{\pi}^{k,s}\right)}{1+\pi^{k,c}}$. Therefore, the output gap satisfies

$$\begin{aligned} y^{k,c} - y^n &= c^u + \overline{y} + \frac{b\left(1+\overline{\pi}^u\right)}{1+i^u} - \frac{b\left(1+\overline{\pi}^{k,s}\right)}{1+\pi^{k,c}} \\ &= c^u - c^n + b\left[\frac{1+\overline{\pi}^u}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^{k,c} - \overline{\pi}^{k,s}}{1+\pi^{k,c}}\right]. \end{aligned}$$

Here, we substituted $y^n = c^n + \left(1 - \frac{1}{1+i^*}\right)b$. Given this output gap, inflation is given by the Phillips curve

$$\pi^{k,c} = \kappa\frac{y^{k,c} - y^n}{y^n} + \beta\chi\pi^u.$$

We next characterize the stable equilibrium following similar steps as in the proof of Proposition 3. In this case, there are now three continuation states: the KKM state with stable equilibrium, the KKM state with crisis equilibrium, and the normal state. Therefore, households' consumption satisfies the modified Euler equation

$$\frac{1}{\beta c^{k,s}} = \chi(1-\zeta)\frac{1}{c^{k,s}} + \chi\zeta\frac{1+i^u}{1+\pi^k}\frac{1}{c^u} + (1-\chi)\left(1+i^u\right)\frac{1}{c^{\tilde{n}}\left(\overline{\pi}^{k,s}\right)}.$$

Here, $c^{\tilde{n}}\left(\overline{\pi}^{k,s}\right)$ is the same function that we characterized in the proof of Proposition 3. The output gap satisfies a similar expression as before

$$y^{k,s} - y^n = c^{k,s} - c^n + b\left[\frac{1+\overline{\pi}^{k,s}}{1+i^u} - \frac{1}{1+i^*} + \frac{\pi^{k,s} - \overline{\pi}^{k,s}}{1+\pi^{k,s}}\right].$$

Inflation is still given by the Phillips curve, which now implies

$$\pi^{k,s} = \kappa\frac{y^{k,s} - y^n}{y^n} + \beta\chi\left((1-\zeta)\pi^{k,s} + \zeta\pi^{k,c}\right).$$

Here, we have used the observation that future inflation is $\pi^{k,s}$ in the stable equilibrium but $\pi^{k,c}$ in the crisis equilibrium.

We next view the solution to the system ($A.16$) as a function of the parameter $\zeta \in [0,1]$: in particular, consider the stable equilibrium $c^{k,s}(\zeta), y^{k,s}(\zeta), \pi^{k,s}(\zeta), e^{k,s}(\zeta)$. Observe that when $\zeta = 0$, the equilibrium is the same as in Proposition 4. In particular, since the crisis comes as a surprise, the stable equilibrium is the same as the KKM equilibrium without crisis

$$c^{k,s}(0) = c^k, y^{k,s}(0) = y^k, \pi^{k,s}(0) = \pi^k, e^{k,s}(0) = e^k.$$

Observe also that when $\zeta = 1$, the system of equations become identical to those as in Proposition 2. It is as if KKM does not exist and the states $(k,c), (k,s)$ are identical and the same as state u. In particular, the stable equilibrium is the same as the unorthodox equilibrium

$$c^{k,s}(1) = c^u, y^{k,s}(1) = y^u, \pi^{k,s}(1) = \pi^u, e^{k,s}(1) = e^u.$$

Recall from Proposition 3 that $c^k < c^u, y^k > y^u, \pi^k < \pi^u, e^k < e^u$. Therefore, under regularity conditions that ensure the solution is monotonic in ζ, we have $\frac{dc^{k,s}}{d\zeta} > 0, \frac{dy^{k,s}}{d\zeta} > 0, \frac{d\pi^{k,s}}{d\zeta} > 0, \frac{de^{k,s}}{d\zeta} > 0$. When agents perceive a greater likelihood of a future crisis, the equilibrium moves closer to the unorthodox regime without KKM.

Finally, consider the KKM costs to the government in the crisis and the stable equilibria, $(T_t/P_t)^{k,s}, (T_t/P_t)^{k,c}$. When $\zeta = 0$, the costs are the same as in Proposition 4. Given the parametric restriction (37), which we still assume, they satisfy the inequalities

$$\left.(T_t/P_t)^{k,s}\right|_{\zeta=0} < \overline{\tau} < \left.(T_t/P_t)^{k,c}\right|_{\zeta=0}.$$

The costs are continuous in ζ so these inequalities also hold for sufficiently small ζ. It follows that for sufficiently small ζ, the government defaults in the crisis equilibrium but not in the stable equilibrium. This verifies the equilibrium and completes the proof. □