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Measuring Natural Interest Rate in Morocco

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Abstract

This paper estimates Morocco's natural interest rate (NIR) using two approaches: a standard HLW-type framework and an augmented specification that incorporates external factors, namely imported inflation, and movements in the real effective exchange rate. The results point to a downward trend in the natural rate following the Global Financial Crisis and an increase during the post pandemic inflationary episode. The REER-augmented model delivers higher estimates than the baseline, particularly in periods of inflationary pressures. On average, the natural interest rate is estimated to stand at around 2.6 percent over the sample period, implying a negative interest rate gap relative to the policy rate.

Keywords: Natural interest rate, Monetary policy, Small open economy, Bayesian estimation.

JEL: E43, E52, F41, C11.

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Contents

Introduction

The post pandemic inflationary episode prompted a broadly synchronized tightening cycle among central banks, reigniting interest in estimating the natural interest rate (NIR, hereafter). This renewed focus stems from central banks' desire to pursue “a soft-landing” by conducting a well-calibrated monetary policy that will bring inflation back in line with price stability objectives, without undermining economic activity or risking unanchored inflation expectations. The subsequent easing cycle sparked a debate over whether real policy rates will return to their pre-pandemic lows or persist at higher levels.

The concept of NIR can be traced back at least to Wicksell (1898). After more than 100 years, economists have yet to reach a consensus on the definition of the NIR and the terminology. In fact, the NIR is sometimes called the equilibrium real interest rate, the natural real rate or the neutral real rate. The natural interest rate can be defined as “the real short-term interest rate consistent with output converging to potential, where potential is the level of output consistent with stable inflation and is therefore the medium-term real rate” (Bomfim, 1997) or “the equilibrium real rate of interest in the case of flexible prices and wages, given current real factors” (Woodford, 2003). Whereas the neutral interest rate is considered as the “medium to long-term rate prevailing when there are no inflationary or deflationary pressures” (Platzer, Tietz, and Lindé, 2022 and Obstfeld, 2023). The natural interest rate can be equal to the neutral interest rate when all temporary shocks have faded.

In this paper, we consider the natural interest as the short-term real interest rate consistent with, in the long-run, output as its natural level and stable inflation (Holston, Laubach and Williams, 2017).

Our study proposes a useful guidance and a quantitative benchmark for the policy rate to determine Bank Al-Maghrib’s (Central Bank of Morocco, BAM) monetary policy stance as its framework undergoes important adjustments. In fact, Morocco is considered as a small open economy sensitive to foreign demand and international commodity prices. Building on methods used in studies for small open economies, this research provides an estimation of the natural interest rate in Morocco using a baseline model à la Holston, Laubach and Williams (2017) and a modified version that accounts for the real effective exchange rate.

This extension is useful because financial conditions may not reflect the monetary policy stance. Incorporating real monetary conditions into the baseline model—capturing both the real interest rate gap and the real exchange rate gap—provides deeper insight into whether a stronger or weaker policy response to deviations of inflation from target is warranted. Movements in inflation and monetary conditions influence economic agents’ consumption and production behaviors over the long run and may, in turn, affect the natural interest rate.

Furthermore, in the context of the ongoing transition to a flexible exchange rate regime and inflation targeting framework, BAM is making steady progress to strengthen its monetary policy framework and ensure its effectiveness and credibility. To this end, BAM enhanced its analytical and forecasting framework, integrating additional insights in its decision-making process and improving its communication and transparency. It has implemented a broad set of indicators to better assess international and national medium-term risk surrounding the inflation projections.

BAM has also adopted the interest rate as its main policy instrument and set the interbank rate as its operational target to fulfill its price stability mandate. Although the current monetary policy framework is an "exchange-rate anchor", the width of the band (+/- 5 percent) and the partial restrictions on the capital account, limiting capital outflows, provides some autonomy in monetary policy implementation by the Central Bank. Thus, the natural rate of interest plays an important role to appreciate the stance of monetary policy, especially during the transition toward an inflation-targeting framework and a flexible exchange rate regime.

The remainder of the paper is organized as follows. Section 1 presents the literature review. Section 2 describes the model while Section 3 explains the data. Finally, we present the results in Section 4.

1. Literature review
Methodologies overview of the NIR estimations

The empirical estimation of the NIR can be challenging because it is subject to a significant degree of uncertainty as it is a theoretical concept that is not directly observed. In macroeconomic theory, there is no consensus about a unique methodology allowing the measurement of the NIR. Nonetheless, three main approaches are widely adopted: (i) time-series models, (ii) semi-structural models and (iii) general equilibrium models.

1.1. Time-series models

In time series models, the natural interest rate can be viewed as the long-run trend of real interest rates and is extracted from permanent components of short and long-term interest rate, i.e. nominal bond returns, inflation and their long-run survey expectations using a vector autoregression (VAR) with common trends as in Del Negro and al. (2017, 2019). One alternative framework is the time-varying parameters VAR model, developed by Lubik and Matthes (2015). It explains the evolution of economic variables as a function of their own lagged values and random shocks with parameters (lag coefficients and variances of the economic shocks) that are allowed to vary over time. Another one is the methodology proposed by Brzoza-Berzezina (2003), which consists of a structural VAR model with long-

term restrictions that allow for the identification of the real interest rate gap from observed changes in inflation.

1.2. Semi-structural models

Semi-structural models are widely used among central banks to provide macroeconomic projections and estimate unobservable data. The workhorse model in academic and central banks estimations is the Holston-Laubach-Williams (2017), based on a reduced-form semi-structural model. It is derived from the New Keynesian framework made up of a Phillips curve relationship and an intertemporal IS curve to describe the dynamics governing the output gap and inflation as function of the real rate gap. The unobservable variables are extracted using a multivariate Kalman filter and the natural interest rate is defined as a low-frequency concept.

The Holston-Laubach-Williams (2023) extension was developed to account for the effects of the Covid-19 pandemic by allowing for (i) a time-varying volatility of shocks to the output gap and inflation and (ii) a persistent supply shock during the pandemic. The latter is assessed through an index measuring the severity of restrictions imposed to contain the pandemic produced by the Oxford COVID-19 Government Response Tracker.

Originally designed for advanced economies, it was gradually adapted for small and open economies. One important extension to take into consideration is the introduction of the exchange rate, due to these economies' vulnerabilities to external shocks, such as capital inflows, and implications of commodity prices volatility and geopolitical risks.

In the same category, Berger and Kempa (2014) estimate unobserved component (UC) models. Such models employ information from economic theory in a time-series approach to decompose realizations of observed macroeconomic aggregates into their unobserved equilibrium rates and unobserved transitory components. This methodology is applied to an aggregate demand equation (IS curve) and a New Keynesian Phillips curve, using the specification of HLW regarding the evolution of the natural levels of output and interest rate, as well as the trend growth. They also introduce an equation specifying the interest rate-exchange rate nexus.

1.3. Structural approach

The use of micro-founded models has the advantage of being comprehensive economic frameworks for monetary and fiscal policy analysis simultaneously and yield rich account of the natural rate drivers. The most well-known DSGE application for the NIR is Del Negro and al. (2017, 2019), a model used to extract the estimation of the longer-run equilibrium rate including financial frictions for the US economy. Dorich, and al. (2014)

developed a small open economy with overlapping generation (OLG) model to study the determinants of the neutral interest rate, capturing domestic factors such as declining productivity, rising government debt and inequality, population aging, as well as foreign factors captured by the changes in the global neutral real rates.

Small open economy considerations

In the context of small open economies, it is important to account for external factors by introducing the exchange rate. The movement of the exchange rate is relevant to overall financial conditions because exchange rate regime plays a key role in the orientation of monetary policy and the transmission of policy rate decisions. It is even more informative when the economy is highly dependent on the external sector for imports of raw materials, food, and energy.

Obstfeld (2023) points out that changes in the structure of the trade balance can have consequences for the assessment of equilibrium levels of both the real effective exchange rate (REER) and the interest rate. According to Harrison and Nguyen (2025), the sensitivity of the exchange rate to the differential between domestic and foreign interest rates has an impact on the extent to which the policy rate needs to be lowered or raised in order to change the stance of monetary policy. Such considerations, in both the real and financial spheres, can lead to an adjustment in the level of the natural interest rate in response to savings and investment movements on a global scale.

There are several ways to introduce the REER in the estimates of the natural interest rate within these frameworks. The widely used are the HLW-type model extensions inspired by Berger and Kempa (2014) estimates for the NIR for Canada. They introduced the real effective exchange rate in both Phillips curve (first difference) and IS curve (gap) and close the model by tying the real interest rate gap to the real exchange rate gap (interest rate-exchange rate nexus). Pedersen (2015), Kupkovič (2020), Segura (2024) and Inkhomiddinov (2025) further applied this model to Denmark, Slovakia, Costa Rica and Uzbekistan. In contrast, direct impact is captured by introducing the REER in the natural interest rate law of motion along with potential growth Bulir and Vleck (2024).

In the case of Morocco, to the best of our knowledge, four studies have been conducted to estimate the NIR. In 2016, Bank Al-Maghrib estimated the Moroccan NIR based on a semi-structural model (Laubach and Williams, 2003), followed by an IMF study in 2021. After the various shocks that hit the Moroccan economy since the Covid-19 pandemic, impacting economic structures and relations between macroeconomic aggregates, Bank Al-Maghrib considered it appropriate to review its approach in assessing the natural rate by estimating the Moroccan NIR using the Holston-Laubach-Williams (2023). The most recent is the

estimates by Bulir and Vleck (2024), accounts for the bilateral effective exchange rate, in the context of a semi-structural model with monetary policy rule and expectations. Our contribution to the literature is estimating an HLW-extension inspired by Berger and Kempa (2014) specification to introduce the real effective exchange rate vis-à-vis trading partners using Bayesian approach.

2. Methodology

We suggest an estimation for the natural interest rate using the baseline semi-structural model proposed by HLW (2017). This methodology, inspired by Berger and Kempa (2014), is then modified to consider the small open economy structure of Morocco.

2.1. HLW-type model specification

The HLW (2017) model aims to estimate the natural interest rate as a time-varying process that is potentially subject to permanent changes. The authors relax the restrictions imposed by the New Keynesian model by working with reduced-form equations and allowing for shocks that affect the output gap and inflation but not the natural interest rate. This model includes two central equations, relating observed variables to unobserved ones.

Eq.1 is a dynamic IS curve representation in which the output gap $\tilde{y}_t$ is influenced by its own lags as well as the real interest rate gap, represented by the deviation of the real key interest rate r_t from its natural level r_t^*.

$$\tilde{y}_t = a_1\tilde{y}_{t-1} + a_2\tilde{y}_{t-2} + a_3 \sum_{j=1}^{2}\left(r_{t-\mathrm{j}} - r_{t-\mathrm{j}}^*\right) + \varepsilon_{\tilde{y},\mathrm{t}} \; ; (1)$$

$\tilde{y}_t$ is defined as the difference between the observed output and its potential level y_t^*:

$$\mathrm{y_t^*} = \mathrm{y_{t-1}^*} + \mathrm{g_{t-1}} + \eta_{\mathrm{y*,t}} \; ; (2)$$

$$\text{with: } \mathrm{g_t} = \mathrm{g_{t-1}} + \varepsilon_{\mathrm{g,t}} \; ; (3)$$

As shown by Eq. 2, the potential level of output $\mathrm{y_t^*}$ is specified as a random walk with a stochastic drift and the potential growth $\mathrm{g_t}$ which follows a random walk (see Eq. 3).

The Phillips curve is defined as:

$$\pi_t = c_1\pi_{t-1} + (1 - c_1 - c_2)\pi_t^{\mathrm{e}} + c_2\,\pi_t^{\mathrm{EZ}} + c_3\tilde{y}_{t-1} + \varepsilon_{\pi,t} \; ; (4)$$

It describes the inflation dynamic π_t as a function of past inflation, backward-looking expectations of the economic agents π_t^{e}, the inflation in the Eurozone π_t^{EZ} as the main trading partner, and the output gap. The expected inflation is approached by an average of its second to fourth lags:

$$\pi_t^{\mathrm{e}} = \frac{(\pi_{t-2} + \pi_{t-3} + \pi_{t-4})}{3}$$

The presence of stochastic terms in both equations allows for transitory shocks to impact the output gap and inflation while movements in r_t^* reflect persistent shifts in the relationship between the real-short term interest rate and the output gap.

The relationship between the natural interest rate and the output growth is derived from the neoclassical growth model. The law of motion for the NIR is thus given by:

$$r_t^* = \mathrm{b} \,.\, g_t + z_t \; ; (5)$$

$$\mathrm{z_t} = \mathrm{z_{t-1}} + \varepsilon_{\mathrm{t}} \; ; (6)$$

where $\mathrm{z_t}$ is an idiosyncratic shock that follows a random walk and captures changes in economic conditions that can have an impact on the NIR (i.e. capital accumulation, demographics, financial development and shifts in fiscal policy). Recent analysis points that $\mathrm{z_t}$ can be more sensitive to temporary shocks and less stable (see Holston-Laubach-Williams, 2023 and ECB, 2025). We modified the law of motion to account for a proportional relationship between the trend growth and the NIR rather than assume it equal to unity (Laubach and Williams, 2003).

2.2. Modified HLW-model

We extend the model to account for the propagation of external shocks to the output gap and inflation by incorporating the REER (denoted by $reer_t$) as an exogenous variable. On the one hand, a decrease of the REER below its equilibrium level ($\overline{reer_t}$) is expected to stimulate exports and have a positive impact on the output gap.

$$\tilde{y}_t = a_1 \tilde{y}_{t-1} + a_2 \tilde{y}_{t-2} + a_3 \sum_{j=1}^{2} \left(r_{t-\mathrm{j}} - r_{t-\mathrm{j}}^*\right) + a_4 \widetilde{reer}_{t-1} + \varepsilon_{\tilde{y}_t} \; ; (8)$$

Following Berger and Kempa (2014) and Pedersen (2015), we assume that the equilibrium level of the REER behaves like a random walk and its gap ($\widetilde{reer_t}$) follows an AR (2) process:

$$\overline{reer_t} = \overline{reer}_{t-1} + \varepsilon_{\overline{reer},\mathrm{t}} \; ; (9)$$

$$\widetilde{reer_t} = b_1 * \widetilde{reer}_{t-1} + b_2 * \widetilde{reer}_{t-2} + \varepsilon_{\widetilde{reer},\mathrm{t}} ; (10)$$

The observed REER is decomposed as follows:

$$reer_t = \overline{reer_t} + \widetilde{reer_t} \; ; (11)$$

On the other hand, the REER is also expected to impact inflation in two ways: indirectly through its effects on the output gap, and directly, through its impact via the Phillips curve. An appreciation of the exchange rate implies that imported products are cheaper, hence, the domestic inflation is supposed to fall. Inversely, an exchange rate depreciation operates as a cost-push shock by raising import prices and firms' marginal costs, thereby exerting upward pressure on inflation.

$$\pi_t = c_1\pi_{t-1} + (1 - c_1 - c_2)\pi_t^{e} + c_2\,\pi_t^{EZ} + c_3\tilde{y}_{t-1} + c_4(reer_t - reer_{t-1}) + \varepsilon_{\pi,t}\ ; (12)$$

2.3. Estimation technique

We use Bayesian inference to jointly estimate the parameters and the shocks standard deviations. It has the advantage of combining prior beliefs with information from observed data. It also solves the so called "pile-up" problem in the HLW model: if the model was estimated simultaneously, using maximum-likelihood, the variance of one of the shocks to the latent state variables would peak at zero. The priors on model's parameters assume a normal distribution whereas standard errors assume an inverse-gamma distribution (Kiley, T. (2015), Berger and Kempa (2014) and Pedersen (2015)). The unobserved variables are extracted using the Kalman filter. For estimation and filtering, we used Dynare. The posterior distributions are recovered by a Markov Chain Monte Carlo simulation, using Metropolis-Hasting algorithm.

3. Data

In this paper, we use seasonally adjusted quarterly data for Moroccan variables from 2009 to 2025. Output is the quarter-on-quarter real non-agricultural Gross Domestic Product [1](GDP) (log-linearized and annualized) and inflation is the first difference of core Consumer Price Index (CPIX) (annualized and log-linearized). This data is published by the *Haut-Commissariat au Plan*, the Moroccan national statistics agency.

As shown in figure 1, real non-agricultural GDP has consistently recorded a stable growth, hovering around 3.3 percent, except for 2020, when it slowed significantly to -7,1 percent. More recently, the national economy has experienced some momentum driven by the increase in infrastructure investment as part of the government's efforts to mitigate the effects of climate change and prepare for major international events by 2030. As a result, the non-agricultural growth evolves around 5 percent since the third quarter of 2024.

[1] In Morocco, agricultural value added represents around 10% of GDP and is volatile.

Figure 1: Real non-agricultural GDP (%, QoQ, ar)

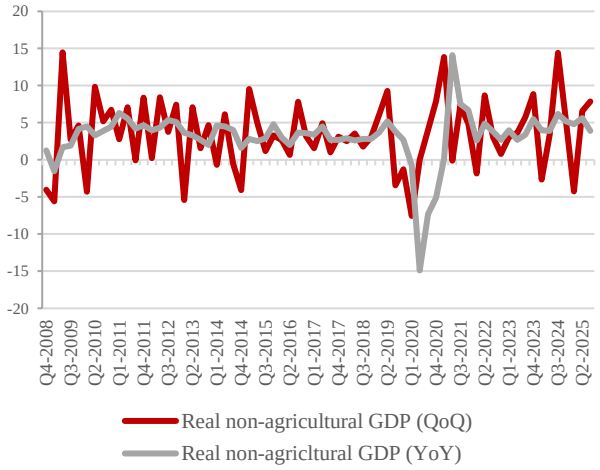

Figure 2: Inflation and core inflation (%, QoQ, ar)

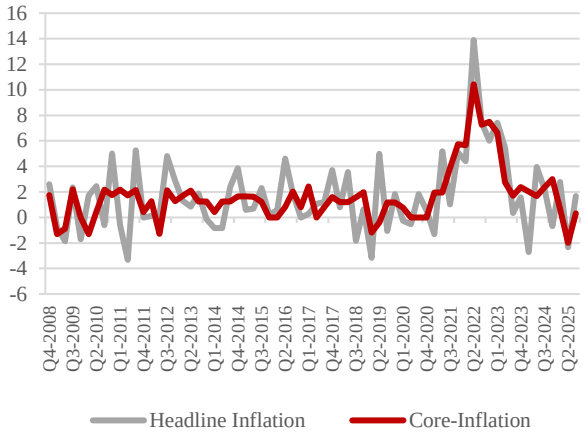

Figure 2 reports inflation dynamics. It shows that, historically, Morocco has exhibited low core inflation relative to other small open and emerging market economies, with an average of around 1.3 percent prior to the surge in inflation observed between late 2021 and 2023. Over that episode, core inflation rose to an average of 6.1 percent—its highest level since 1986—driven largely by the sharp increase in global commodity prices due to the implications of Russia-Ukraine war for global supply chains. As tradable products account for a substantial share of the core CPI index (56.6 percent), these developments played a pivotal role in the inflation surge in Morocco. In 2025, a succession of domestic supply shocks affecting agricultural products exerted a pronounced disinflationary effect, bringing both headline and core inflation down to 0.8 percent.

The nominal interest rate is sourced from the central bank's data, with the real interest rate calculated using the moving average of inflation over the previous four quarters from 2009 to 2011 and the inflation expectations' survey from 2012 to 2025 (see figure 3). The nominal and real rates have evolved closely due to low inflation levels. However, the gap became larger from the second quarter of 2021. Financial experts started having higher inflation expectations as domestic and foreign inflation rates increased. As for today, inflation expectations slowed down but remain higher than their historical average.

Figure 3: Nominal and real policy interest rate (%)

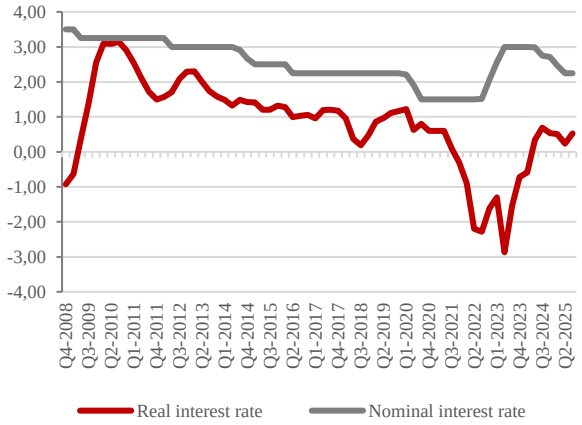

Figure 4: Nominal and Real Effective Exchange Rate Indexes (NEER and REER)

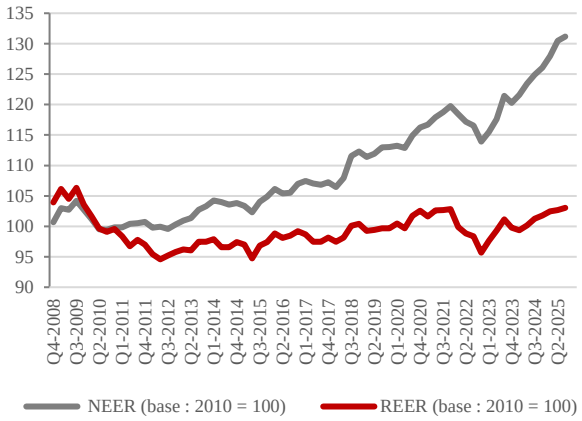

Figure 4 displays the real effective exchange rate index (REER) calculated by the BAM using the exchange rate and inflation data of 31 trading partners, with a share up to 54 percent for the Eurozone. The weights correspond to the contribution of each economy to foreign trade of manufactured goods over a given period and are updated every three years to reflect the changes in trade partners and competitors, with an increase in the index implying a real appreciation of the local currency. In a low to moderate inflation environment, nominal and real effective exchange rate indices tend to move closely together; however, the REER exhibited a slower pace of appreciation, compared to the NEER, when trading partners experienced higher inflation rates.

4. Results

4.1. Estimations results

Table 1 reports posterior estimates under the baseline model and Table 2 reports those of the modified model.

Table 1: Estimated parameters (HLW, 2017)

Parameters	Prior mean	Post. Mean	90% HPD interval		Prior	Pstdev
a_1	0.700	0.6738	0.5224	0.8415	Normal	0.1
a_2	-0.030	-0.0547	-0.2140	0.1024	Normal	0.1
a_3	-0.060	-0.0583	-0.0744	-0.0417	Normal	0.01
b	0.900	0.8904	0.7262	1.0535	Normal	0.1
c_1	0.500	0.5505	0.4296	0.6712	Normal	0.1
c_2	0.100	0.3452	0.2540	0.4335	Normal	0.1
c_3	0.220	0.1232	-0.0377	0.2868	Normal	0.1

We assess the role of the REER by comparing posteriors of the two models. First, the comparison shows that the Phillips curve slope (c_3; sensitivity of inflation to output gap) is lower in the modified version declining from 0.12 to 0.08 once exchange rate movements are considered. Second, the external factors seem to play a substantial role in inflation dynamics. Imported inflation exhibits an important pass-through from foreign to domestic prices ($c_2 = 0.3$) and exchange rate movements can exacerbate the impact of imported inflation ($c_4 = -0.2$). These results highlight the significant impact of external supply shocks on the Moroccan economy through imported inflation. Similar estimations were found in previous studies (Lahlou and Bennouna, 2022) with c_2 averaging 0.3 and c_3 at 0.1. This confirms that the preponderance of external factors is consistent with Morocco's accelerated integration into the global economy.

Table 2: Estimated parameters (Modified HLW, 2017)

Parameters	Prior mean	Post. Mean	90% HPD interval		Prior	Pstdev
a_1	0.700	0.6842	0.5233	0.8418	Normal	0.1
a_2	-0.030	-0.0204	-0.2015	0.1259	Normal	0.1
a_3	-0.060	-0.0581	-0.0743	-0.0431	Normal	0.01
a_4	-0.090	-0.0809	-0.2225	0.0696	Normal	0.1
b	0.900	0.9207	0.7417	1.1008	Normal	0.1
c_1	0.500	0.5667	0.4518	0.6915	Normal	0.1
c_2	0.100	0.3238	0.2328	0.4223	Normal	0.1
c_3	0.220	0.0819	0.0000	0.1713	Normal	0.1
c_4	-0.180	-0.1959	-0.3669	-0.0246	Normal	0.1
b_1	0.800	0.8455	0.7111	0.9812	Normal	0.1
b_2	-0.100	-0.0048	-0.1212	0.1044	Normal	0.1

Next, we will discuss the estimates of the natural interest rate in three subperiods. The first one is the post-Great Financial Crisis period of 2009-2020, the second is the post-pandemic and inflationary episode of 2021-2023 and the last one spans from 2024 to 2025 (see figure 5).

4.2. Estimation of the Natural Interest Rate

Figure 5: Natural Interest Rate (%)

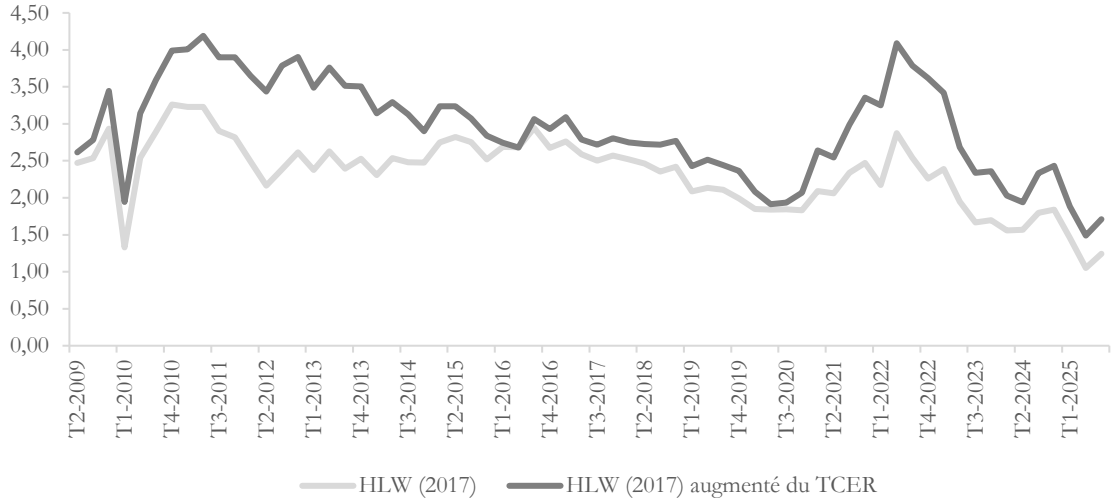

Figure 5 displays the estimated NIR for the baseline and the extended model. During the first subperiod, we find evidence of a declining natural interest rate, which reached an average of 2.3 percent in 2019. The path of the estimated natural rate closely follows potential non-agricultural growth, which experienced a relative deceleration that intensified in 2020. This reflects slower capital accumulation and labor force growth, as well as the impact of the Covid-19 pandemic at the end of the period (see Chafik, 2017).

The second subperiod stresses an increase in the natural interest rate, reaching 2.8 percent in the baseline model and 4 percent in the REER-augmented version. This rise is associated with an increase of the "other determinants" component (z_t), mainly reflecting persistent inflationary pressures driven by the escalation and domestic pass-through of external shocks to food and energy prices. External cost-push pressures stemming from global commodity price shocks played a central role in Morocco's inflation surge and were amplified by the depreciation of the real effective exchange rate (REER). As noted above, the core inflation index includes a sizable tradable component, implying that these developments also affected underlying inflation dynamics.

The higher natural interest rate can also be attributed to fiscal stimulus as well as to the importance of a monetary tightening cycle as the real interest rate was becoming largely negative. Similar patterns were observed in both advanced and emerging economies, with more volatile z component during supply shock episodes, explaining higher estimates of the natural rate during this period (see HLW, 2023 and ECB, 2025). As for potential growth,

it remained resilient from 2021 to 2023, owing to the post-pandemic recovery and the rebound in investment dynamics.

Since 2024, trend growth showed slightly higher levels, supported by domestic demand driven by investment efforts (section 3). The natural interest rate declined and averaged 1.5 percent over the first three quarters of 2025 in the baseline model and 2 percent in the modified version, due to domestic disinflationary pressures.

4.3. Monetary policy implementation by Bank Al-Maghrib

The real interest rate gap was estimated to be positive throughout the estimation period which reflects the conduct of an accommodative monetary policy by the Central Bank. This is in line with the narrative of several measures taken by the Central Bank to promote credit supply and favorable monetary conditions. In fact, BAM has repeatedly reduced its key interest rate from 2008 to 2016, reaching 2.25 percent, as well as its reserve requirements ratio, from 16.5 percent to 4 percent. During this period, the Bank has promoted a new series of measures to improve credit supply and financing conditions of the Micro, Small, and Medium Enterprises (MSMEs), with a program allowing for banks to benefit from additional refinancing equal to the amount they intend to grant to MSMEs and remuneration on their reserve for those who make greater efforts in lending supply.

During the following years, in the context of moderate inflation and slow growth, BAM continued its accommodative monetary policy stance, maintaining the key interest rate at 2.25 percent to support growth. The Bank has also cut the requirements reserve ratio to 2 percent to inject liquidity in response to the significant liquidity shortage in the money market following the introduction of a more flexible exchange regime that put pressure on the foreign exchange reserves. It has also continued to implement its Funding for Lending program to support the financing of MSMEs by introducing an unlimited refinancing mechanism for bank loans granted to groups targeted by this program.

In 2020, in response to the Covid-19 pandemic, the bank reduced its key interest rate to 1.50 percent — a historically low level — and cut the reserve requirements to 0 percent while also eased the refinancing conditions of commercial banks. The Bank also decided to adopt full allotment to fulfill all banks' demands for liquidity. To support credit lending, the Central bank further extended its Funding for Lending program and increased its frequency and implemented two new credit refinancing lines.

During the tightening cycle in 2022-2023, when the challenge was to choose between a hard or soft landing, the Bank adopted a cautious approach to keep inflation expectations well anchored and support the return of inflation to lower levels. The real rate gap remained positive, signaling that BAM's monetary policy remained accommodative despite the three

increases implemented from September 2022 to March 2023. Once the inflationary pressures faded and the inflation was in line with the objective of price stability, BAM started cutting its interest rate back to 2.25 percent in 2025. It has also announced a new Funding for Lending program for micro enterprises with a preferential rate for participating banks.

Conclusion

In recent decades, monetary policymakers pursuing inflation targeting have focused increasingly on the natural rate framework to assess the stance of monetary policy. This paper provides an updated estimation of the natural interest rate for Morocco based on a reduced form semi-structural model (HLW, 2017) and extends it to account for foreign inflation and the real effective exchange rate as external factors.

Both models highlight the downward trend of the natural interest rate in the aftermath of the Great Financial Crisis and the upward trend during the inflation surge in 2021-2023. Since 2023, it is estimated to hover around 1.9 percent, indicating a negative interest gap in comparison with the real key interest rate. Furthermore, this paper emphasizes the importance of the REER as an explanatory factor for inflation dynamics. It remains worth noting that, in periods of inflationary pressures stemming from supply shocks, significant REER depreciation calls for a more restrictive monetary policy with higher estimates of the natural interest rate. Also, additional caution is warranted when interpreting large interest rate gaps, as higher inflation expectations can push policy rates into negative territory.

NIR estimates are inherently imprecise constraining its usefulness as a sole indicator for monetary policy implementation, notwithstanding the recurrent supply shocks since the Covid-9 pandemic and the rising climate change risks that affect the underlying dynamics of the Moroccan economy. Thus, it should be analyzed alongside complementary indicators to assess the stance of financing conditions and evaluate the monetary policy transmission to financial markets. Furthermore, the decision-making process must continue to rely on an even larger set of indicators such as inflation projections, economic activity developments, and medium-term risk assessment.

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