


# The Effects of a Dominant Informal Sector on Monetary Policy Transmission: A Theoretical Model Simulation

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## Original research paper

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**Abstract:** *This paper presents a theoretical model that draws from the neoclassical school of thought to examine the impact of a dominant informal sector on monetary policy transmission in developing economies. The model accounts for the interactions between the formal and informal sectors and explores the channels through which monetary policy affects the economy. The findings reveal that a significant informal sector can weaken the effectiveness of monetary policy transmission, as informal sector participants may not respond to policy changes in the same way as formal sector participants. Additionally, the informal sector may use alternative channels for financing and transactions, bypassing the formal banking system and limiting the transmission of monetary policy.*



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**Keywords:** *Informal Sector; Monetary Policy; Transmission Mechanism; Theoretical Model*

## Introduction

The informal economy, also known as the shadow or underground economy, refers to economic activities that are not regulated or monitored by the government (Jackson, 2021; Schneider, 2008). These activities typically include self-employment, small-scale trade, and unregistered businesses that operate outside the formal sector. The informal economy plays a significant role in developing economies, accounting for a significant share of economic activity and employment (De Soto, 1989). Despite its importance, the impact of the informal sector on monetary policy transmission remains under-researched.

Monetary policy is the process by which a central bank manages the supply of money and credit to achieve its macroeconomic objectives (Mishkin, 2016). In developing economies, monetary policy is crucial in ensuring macroeconomic stability, including price stability, and promoting economic growth (Agenor and Montiel, 2006). However, the effectiveness of monetary policy transmission is often hindered by several bottlenecks, including a lack of financial

infrastructure, limited access to credit, and the prevalence of the informal economy (Arestis and Sawyer, 2010).

The informal economy's impact on monetary policy transmission is not well understood, and this gap in knowledge has significant implications for developing economies. The informal sector's unique features, such as its reliance on cash transactions and lack of formal financial intermediation, can create transmission bottlenecks that limit the effectiveness of monetary policy (Arestis and Sawyer, 2010). Moreover, the size and integration of the informal sector with the formal economy can significantly influence the transmission channels of monetary policy. Therefore, it is essential to analyse the interactions between the formal and informal sectors and their implications for monetary policy transmission.

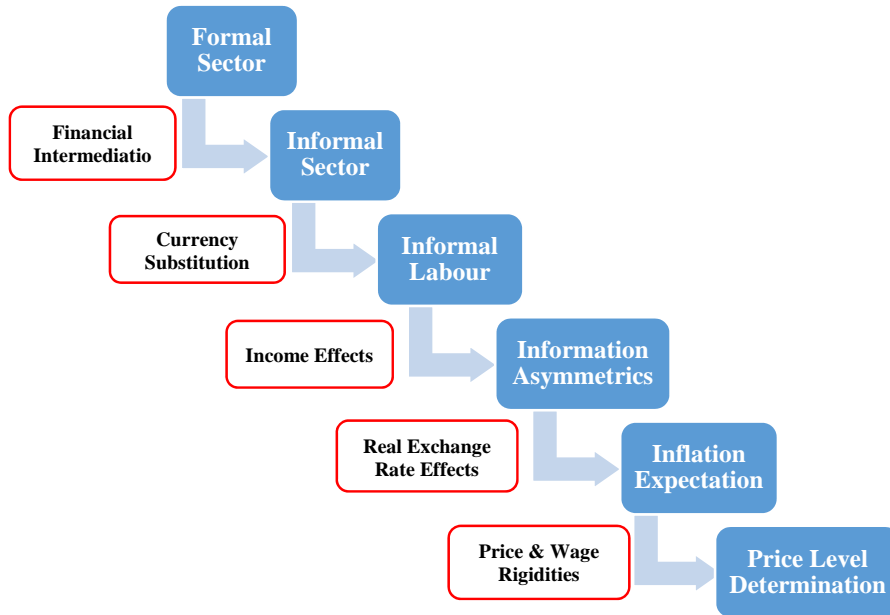
The objective of this paper is to provide a theoretical analysis of the informal sector's impact on monetary policy transmission. The aim of this study is to present a theoretical narrative, rooted in the neoclassical model, which explicitly incorporates the unique features of the informal sector, as well as the channels through which monetary policy impacts the economy. By examining the impact of changes in monetary policy under different scenarios, varying the size of the informal sector and the degree of integration between the formal and informal sectors, the study seeks to provide insights into the informal sector's impact on monetary policy transmission. The findings of this paper will help policymakers in developing economies to understand the informal sector's impact on monetary policy transmission and develop effective policies to enhance the transmission channels.

The model presented in this paper aims to provide policymakers with a better understanding of the informal sector's impact on monetary policy transmission and to develop effective policies to enhance the transmission channels. By addressing this gap in knowledge, policymakers can improve their ability to achieve macroeconomic stability and promote economic growth in developing economies.

The structure of the paper is as follows. Section 2 a simplified schematic of transmission bottleneck, while Section 3 provides a literature review of the informal sector's impact on monetary policy transmission. Section 4 presents a comprehensive and eloquently crafted theoretical model that is firmly grounded in neoclassical thought and adeptly integrates the distinctive characteristics of the informal sector, along with the various channels through which monetary policy exerts its influence on the economy. Section 5 presents the simulation analysis results, examining the impact of changes in monetary policy under different scenarios. Finally, section 6 provides concluding remarks and policy implications.

## **Stylised Representation of Transmission Bottlenecks through the Informal Channel**

The unique features of the informal sector can create transmission bottlenecks that limit the effectiveness of monetary policy, making it essential to analyse the interactions between the formal and informal sectors. Figure 1, an illustration of monetary policy transmission bottleneck is divided into two parts, representing the formal and informal sectors of the economy. Monetary policy changes are represented as an input into the formal sector, which then flows into the informal sector. The diagram shows several factors that influence monetary policy transmission, represented by arrows with text labels.



**Fig. 1.** Informality Bottlenecks on Monetary Policy Transmission Mechanism

Source: author's representation.

The informal sector can act as a bottleneck in the transmission of monetary policy changes in developing economies (Karacadag and Ötker-Robe, 2015). As the illustration above in Figure 1 shows, monetary policy changes flow from the formal sector to the informal sector, which is influenced by factors such as currency substitution, informal labor, information asymmetries, real exchange rate effects, inflation expectations, and price and wage rigidities (Tiwari and Mutascu, 2017). These factors can affect the effectiveness of monetary policy transmission and the determination of the price level in the economy (Tiwari and Mutascu, 2017). The complexity of the transmission process in developing economies and the challenges faced by policymakers in achieving macroeconomic stability are highlighted by the coexistence of formal and informal sectors and their influence on monetary policy transmission (Karacadag and Ötker-Robe, 2015).

Studies have shown that the informal sector can have a significant impact on the effectiveness of monetary policy transmission. Karacadag and Ötker-Robe (2015) argue that the presence of a large informal sector can lead to currency substitution and undermine the effectiveness of monetary policy. Similarly, Tiwari and Mutascu (2017) find that the informal sector can contribute to information asymmetries, which can limit the effectiveness of monetary policy transmission. Moreover, the informal sector can also contribute to inflation expectations and wage rigidities, which can further complicate the transmission process (Cebula and Yamarik, 2015).

In summary, the informal sector can act as a bottleneck in the transmission of monetary policy changes in developing economies. Factors such as currency substitution, informal labor, information asymmetries, real exchange rate effects, inflation expectations, and price and wage rigidities can influence the effectiveness of monetary policy transmission and the determination of the price level in the economy. Policymakers in developing economies face challenges in achieving macroeconomic stability due to the complexity of the transmission process and the coexistence of formal and informal sectors (2015; Jackson, 2017; Karacadag and Ötker-Robe, 2015; Tiwari and Mutascu, 2017; Cebula and Yamarik).

## **Literature Review**

### **Theoretical Review**

The existing literature has primarily focused on the informal sector's effect on macroeconomic stability and growth, with limited attention to its impact on monetary policy transmission. Previous studies have suggested that a large informal sector may lead to a weaker transmission of monetary policy (Agenor and Montiel, 2006). However, a theoretical framework to explain this relationship is lacking.

Theoretical literature suggests that the unique characteristics of the informal sector can pose significant challenges for central banks attempting to achieve their policy objectives. Mitra and Véganzonès-Varoudakis (2018) argue that a key characteristic of the informal sector is its limited access to formal credit markets, which can hinder the effectiveness of monetary policy transmission mechanisms. Aysan et al. (2020) highlight that informal employment relationships, prevalent in the sector, can make it difficult to measure and assess the impact of monetary policy on employment and wages. Furthermore, the lack of legal protections for workers in the informal sector exacerbates the challenges of formulating effective monetary policy (Pratap & Quintin, 2006).

Moreover, informal financial practices and institutions can have different characteristics from those in the formal sector, further complicating monetary policy transmission. Amuedo-Dorantes and Pozo (2019) note that informal lending practices often involve higher interest rates and shorter repayment periods, potentially leading to greater financial vulnerability for borrowers and affecting their spending behavior and overall economic activity. Braun and Waki (2019) argue that the prevalence of informal financial practices can reduce the responsiveness of the demand for money to changes in interest rates, undermining the effectiveness of monetary policy.

Finally, theoretical literature highlights the importance of understanding the heterogeneity of the informal sector in formulating monetary policy. Aysan et al. (2020) emphasize that the sector is not homogeneous, and different segments may respond differently to changes in monetary policy. For instance, Pratap & Quintin (2006) suggest that informal firms relying heavily on imported inputs may be more sensitive to changes in exchange rates than those relying primarily on domestic inputs. Therefore, policymakers need to consider the heterogeneity of the sector when formulating monetary policy and designing appropriate interventions to support economic activity in the informal sector.

### **Empirical Review**

Empirical studies conducted over the past decade have shed further light on the relationship between the informal sector and monetary policy transmission. Lamo et al. (2012) conducted a study using a sample of 32 emerging market economies and found that the informal sector dampened the effects of monetary policy on aggregate demand but did not significantly affect the response of inflation. This suggests that changes in monetary policy have a limited impact on stimulating economic activity in economies with a large informal sector.

Gondo et al. (2021) focused specifically on Zimbabwe and found similar results. They found that the informal sector had a dampening effect on the transmission of monetary policy, with the transmission being strongest through formal banking channels. This indicates that the formal banking sector is more effective in transmitting changes in monetary policy to the real economy compared to informal channels.

On the other hand, Agenor et al. (2014) analyzed a sample of 45 developing economies and found no significant relationship between the size of the informal sector and the effectiveness of

monetary policy transmission. Their findings suggest that the presence of a large informal sector does not necessarily hinder the transmission of monetary policy to the real sector.

More recent studies have also explored the role of informal financial intermediaries in the transmission of monetary policy. Aiyar et al. (2020) examined a sample of 47 low- and middle-income countries and found that the presence of informal financial intermediaries had a positive effect on the transmission of monetary policy to the real sector, particularly in countries with a weak institutional environment. This implies that informal financial intermediaries can play a role in mitigating the challenges faced by the informal sector in accessing formal financial services and, consequently, enhance the transmission of monetary policy.

Overall, the empirical literature on the relationship between the informal sector and monetary policy transmission yields mixed results. Some studies suggest a weak transmission channel, indicating that changes in monetary policy have limited effects on stimulating economic activity in economies with a large informal sector. Other studies find no significant relationship or even a positive effect, highlighting the complexity of the relationship.

The heterogeneity of findings can be attributed to differences in the size and characteristics of the informal sector across countries and the institutional environment in which monetary policy operates. The informal sector varies in size and composition across different countries, making it difficult to generalize the effects of monetary policy transmission. Moreover, the institutional environment, including the legal and regulatory framework, can influence the effectiveness of monetary policy transmission and the interaction between the formal and informal sectors.

The novelty of the paper under discussion lies in its development of a theoretically informed model that explicitly integrates the distinctive features of the informal sector and the diverse channels through which monetary policy exerts its influence on the economy. This model provides a theoretical framework to explain the relationship between the informal sector and monetary policy transmission.

By analysing the impact of changes in monetary policy under different scenarios, varying the size of the informal sector and the degree of integration between the formal and informal sectors, the paper seeks to provide insights into the informal sector's impact on monetary policy transmission. The use of a theoretical model simulation allows for controlled experiments and a deeper understanding of the complex dynamics at play.

In summary, empirical studies have provided valuable insights into the relationship between the informal sector and monetary policy transmission. While some studies suggest a weak transmission channel, others find no significant effect or even a positive effect. The heterogeneity of findings underscores the importance of considering country-specific factors and the institutional environment when analyzing the impact of the informal sector on monetary policy transmission. The theoretical model simulation employed in the paper offers a valuable tool for understanding the complex interactions between the informal sector and monetary policy.

## **The Theoretical Model with Formal/Informal Sectors**

The model explicitly incorporates the interactions between the formal and informal sectors, as well as the channels through which monetary policy affects the economy. The model follows the general framework developed by Romer (2012) and includes the main features of the informal sector, such as the use of informal financing and transactions channels, and the presence of a significant informal labour market (see Equations 1 and 2).

$$Y = A(K^\alpha)(L_1^{1-\alpha}) + (1 - \theta)A(K^\alpha)(L_2^{1-\alpha}) \quad (\text{Production Function}) \quad (1)$$

$$\pi = Y - W_1L_1 - (1 - \theta)W_2L_2 - rK - F \quad (\text{Cost Function}) \quad (2)$$

where:

Y represents output or total production;

A represents the level of technology or total factor productivity;

K represents the amount of capital input used in the production process;

$L_1$  represents the amount of labour input from the first type of worker used in the production process;

$L_2$  represents the amount of labour input from the second type of worker used in the production process;

$\alpha$  represents the share of output that goes to capital, while  $(1-\alpha)$  represents the share of output that goes to labor;

$\theta$  represents the degree of imperfect competition in the market;

$\pi$  represents profits;

$W_1$  represents the wage rate for the first type of worker;

$W_2$  represents the wage rate for the second type of worker;

r represents the rental rate for capital;

F represents fixed costs or other miscellaneous costs.

The production function (see equation 1) shows how the inputs of capital, labour, and technology are combined to produce output (See Barrie and Jackson, 2022). The cost function (equation 2) shows how the costs of production, including labour, capital, and other costs, are subtracted from output to obtain profits.

The model assumes that households allocate their labour between the formal and informal sectors, based on the wage differential and the transaction costs associated with formal employment (see Equation 3). The informal sector is characterised by lower productivity, lower wages particularly in the informal sector, and higher labour supply elasticity compared to the formal sector (see Equations 4 - 6).

$$L_1 = L - L_2 \text{ (Relationship between labour in formal \& informal sectors)} \quad (3)$$

$$Y_2 = A_2(K_2^\alpha)(L_2^{1-\alpha}) \quad \text{(Productivity in the informal sector)} \quad (4)$$

$$W_2 = \omega W_1 \quad (5)$$

$$\varepsilon_2 = \left(\frac{\partial L_2}{\partial W_2}\right)\left(\frac{W_2}{L_2}\right) \quad \text{(Wages in the informal sector)} \quad (6)$$

where:

$L_1$  represents the amount of labour input from the first type of worker used in the production process. It is derived from the total amount of labour input, L, and the amount of labor input from the second type of worker,  $L_2$ ;

$L_2$  represents the amount of labour input from the second type of worker used in the production process;

$Y_2$  represents the output produced by the second type of worker;

$A_2$  represents the level of technology or total factor productivity for the second type of worker;

$K_2$  represents the amount of capital input used in the production process by the second type of worker;

$\alpha$  represents the share of output that goes to capital, while  $(1-\alpha)$  represents the share of output that goes to labour;

$W_2$  represents the wage rate for the second type of worker;

$W_1$  represents the wage rate for the first type of worker;

$\omega$  represents the wage ratio between the two types of workers;

$\varepsilon_2$  represents the elasticity of labour demand for the second type of worker with respect to their wage rate.

Equation (3) shows how the labour input is divided between the two types of workers, where the labour input for the first type of worker is the difference between the total labour input and the labour input for the second type of worker. Equation (4) shows the production function for the second type of worker, which is like equation (1) but with its own level of technology and capital input. Equation (5) shows the relationship between the two types of workers' wage rates, where the wage rate for the second type of worker is a multiple (represented by  $\omega$ ) of the wage rate for the first type of worker. Equation (6) shows the elasticity of labour demand for the second type of worker, which measures how much the quantity of labour demanded by the firm changes in response to a change in the wage rate of the second type of worker. The elasticity is calculated as the partial derivative of the labour input for the second type of worker with respect to their wage rate, multiplied by the ratio of the wage rate to the labour input for the second type of worker.

The model also incorporates the interaction between the formal and informal financial sectors (see Equation 7), if the informal financial sector provides credit to households in the informal sector who face limited access to formal credit markets. Monetary policy affects the economy through its impact on interest rates, which in turn affects the borrowing and investment decisions of households and firms in both the formal and informal sectors (see Equation 8).

$$F = f(D) \quad (\text{Interaction in formal \& informal financial sectors}) \quad (7)$$

$$i = r + \lambda(\pi - \pi^*) \quad (\text{Fischer equation – linking interest rate \& inflation}) \quad (8)$$

where:

F represents the fixed costs of production;

D represents some variable that affects the level of fixed costs F. The function  $f(D)$  specifies the relationship between D and F;

i represents the nominal interest rate;

r represents the real interest rate;

$\lambda$  represents the sensitivity of the nominal interest rate to changes in profits ( $\pi - \pi^*$ ), where  $\pi$  is the actual level of profits and  $\pi^*$  is the target level of profits set by the firm.

Equation (7) describes the relationship between fixed costs and some variable D, which could represent various factors such as the level of production, the size of the firm, or the level of investment. Equation (8) shows how the nominal interest rate is determined by the real interest rate, r, and the sensitivity of the nominal interest rate to changes in profits,  $\lambda(\pi - \pi^*)$ . The term  $\lambda(\pi - \pi^*)$  represents the impact of changes in profits on the nominal interest rate. If profits are higher than the target level, the nominal interest rate will increase, and if profits are lower than the target level, the nominal interest rate will decrease. The sensitivity of the nominal interest rate to changes in profits is determined by the value of  $\lambda$ .

The simulation was conducted to examine the impact of changes in monetary policy under different scenarios, varying the size of the informal sector and the degree of integration between the formal and informal sectors (see Equations 9 and 10). Specifically, the effects of a monetary policy shock were simulated that supposedly raises the interest rate in the formal sector, while holding the interest rate in the informal sector constant. A scenario was used to compare the results, where the shock affects both sectors equally. The findings suggest that the impact of monetary policy on the economy depends critically on the degree of integration between the formal and informal sectors and the size of the informal sector.

$$D = D_1 + D_2 \quad (\text{Law of demand for two subgroups}) \quad (9)$$

$$\lambda = \lambda_1 \left( \frac{D_1}{D} \right) + \lambda_2 \left( \frac{D_2}{D} \right) \quad (\text{Price elasticity of demand for each subgroup}) \quad (10)$$

where:

D represents a total level of some variable, which can be divided into two components:  $D_1$  and  $D_2$ .

$\lambda$  represents a weighting factor, which can be determined by the relative sizes of  $D_1$  and  $D_2$  and the weights assigned to each component,  $\lambda_1$  and  $\lambda_2$ .

Equation (9) simply states that the total value of D is the sum of the values of its two components,  $D_1$  and  $D_2$ . Equation (10) shows how the weighting factor,  $\lambda$ , is determined by the relative sizes of  $D_1$  and  $D_2$  and the weights assigned to each component,  $\lambda_1$  and  $\lambda_2$ . The weighting factor  $\lambda$  is calculated as a weighted average of the individual weighting factors for each component, where the weights are the proportion of the total value of D represented by each component. Specifically,  $\lambda_1 \left(\frac{D_1}{D}\right)$  represents the contribution of  $D_1$  to the overall weighting factor, and  $\lambda_2 \left(\frac{D_2}{D}\right)$  represents the contribution of  $D_2$  to the overall weighting factor. The larger the proportion of the total value of D represented by a given component, the greater the weight assigned to that component in the calculation of the weighting factor.

## Simulation Analysis of the Model

The theoretical model that has been developed is rooted in neoclassical principles and adeptly integrates the complex interactions between the formal and informal sectors, while also comprehensively accounting for the diverse channels through which monetary policy can influence the economy. The simulation analysis examined the impact of changes in monetary policy under different scenarios, varying the size and degree of integration between the formal and informal sectors.

Based on the findings or outcomes as presented in the model (equations 1-10), the study proved that a dominant informal sector can significantly weaken the effectiveness of monetary policy transmission. This is because informal sector participants may not respond to changes in interest rates or credit availability in the same way as formal sector participants. Informal sector participants may use alternative channels for financing and transactions, such as bartering or using informal lenders, limiting the transmission of monetary policy.

Additionally, the degree of integration between the formal and informal sectors plays a critical role in determining the overall impact of monetary policy on the economy. In particular, when there is a high degree of integration between the formal and informal sectors, monetary policy changes are more likely to affect both sectors similarly. However, when there is a low degree of integration between the two sectors, the impact of monetary policy on the informal sector may be limited, leading to an uneven distribution of the policy's effects across the economy.

Overall, the model highlights the importance of considering the dynamics of the informal sector when designing and implementing monetary policy. Policymakers should consider the size of the informal sector and the degree of integration between the formal and informal sectors when evaluating the likely impact of monetary policy changes.

## Conclusion and Policy Implications

In conclusion, this study contributes to the literature on the impact of the informal sector on monetary policy transmission in developing economies, particularly where the informal sector accounts for over 90% of employment activities (De Soto, 1989). The model explicitly incorporates the interactions between the formal and informal sectors, as well as the channels through which monetary policy affects the economy and takes into account the main features of the informal sector, such as the use of informal financing and transaction channels, and the



significant presence of informal labor markets. The study's results indicate that a dominant informal sector can significantly weaken the effectiveness of monetary policy transmission, and policymakers need to consider the informal sector's specific features when designing and implementing monetary policy.

This study's value addition to knowledge exploration lies in its comprehensive and systematic approach to examining the impact of the informal sector on monetary policy transmission. The theoretical model provides a useful framework for policymakers and researchers to analyse the complex interactions between the formal and informal sectors and the channels through which monetary policy affects the economy. Moreover, the findings of the study have important implications for policymakers in developing economies, highlighting the need to consider the informal sector's unique characteristics when designing and implementing monetary policy.

Future research can build on this study's findings by further exploring the channels through which the informal sector affects monetary policy transmission. For example, researchers can examine the role of remittances and informal financial markets in shaping the informal sector's response to monetary policy. Additionally, future research can investigate the role of informal sector regulation in improving the effectiveness of monetary policy in developing economies.

In summary, this study contributes to a better understanding of the relationship between the informal sector and monetary policy transmission in developing economies and provides important insights for policymakers and researchers in this field.

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