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The transmission channels of monetary policy in monetary theory.

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Abstract

The primary objective of monetary policy lies in safeguarding macroeconomic stability, particularly by mitigating cyclical fluctuations and controlling inflationary pressures. However, contemporary monetary policies are implemented in an environment increasingly characterized by uncertainty regarding the scope and nature of their real effects on the economy.

Although monetary policy remains a fundamental instrument of economic regulation, it can generate unexpected, and at times undesirable, side effects. The effective conduct of such policy thus necessitates a rigorous assessment of its impact on key macroeconomic variables.

This requirement entails a thorough understanding of the transmission mechanisms through which monetary decisions affect the real economy. These mechanisms include, among others, the effects of interest rates, exchange rates, asset prices, and the credit channel.

In this context, the present article aims to examine the impact of monetary policy decisions on economic activity, through an analysis that draws on both theoretical frameworks and empirical findings.

Keywords: transmission channels, monetary policy, economic activity, interest rates.

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Introduction

In a context where the global economic environment is becoming increasingly complex, monetary authorities face major challenges. Their primary mission is to maintain macroeconomic stability, notably by mitigating fluctuations in economic activity and controlling inflationary pressures. However, the policies implemented now operate within a framework marked by heightened uncertainty regarding their actual economic effects. This uncertainty may impair the transmission of monetary impulses and provoke unpredictable responses from economic agents, thereby undermining the effective functioning of the economy.

The question of the effects and effectiveness of monetary policy has long been the subject of intense debate among both practitioners and theorists, in emerging and developed economies alike. However, emerging economies are structurally different from developed ones, and these differences must be considered when designing macroeconomic policies (Mishkin, 2004). There is no doubt that in emerging economies, monetary imbalances constitute a major source of concern. Volatility, as well as the speed of monetary adjustments, poses significant challenges for policymakers and economic agents.

Monetary policy is a powerful tool, but it can sometimes produce unexpected or undesirable consequences. To implement monetary policy effectively, monetary authorities must have an accurate assessment of the timing and impact of their actions on the economy, which requires a clear understanding of the mechanisms through which monetary policy affects economic activity. These transmission mechanisms include interest rate effects, exchange rate effects, other asset price effects, and what is commonly referred to as the credit channel.

To achieve its objective(s), the central bank must ensure that its actions are effectively transmitted to the target variables—that is, that these variables respond in the intended direction. Thus, the effectiveness of monetary policy is closely tied to the extent and quality of the transmission of its measures to the monetary, financial, and real variables of the economy.

These channels can be defined as the process through which monetary policy decisions are transmitted to income and inflation (Taylor, 1995).

This article aims to examine the impact of monetary policy decisions on economic activity. To this end, the analysis is structured around two complementary axes: first, a literature review will explore the theoretical foundations related to the transmission mechanisms of monetary policy; second, the study will focus on the various transmission channels, comparing their theoretical functioning with the main available empirical contributions. It is indeed essential to

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confront conceptual insights with empirical evidence to assess the relevance and operational effectiveness of each of these channels. To address this point, we have chosen to present both the theoretical and empirical frameworks for each channel individually.

The article adopts a positivist epistemological stance, aiming to identify and analyse the causal relationships between monetary policy decisions and economic activity dynamics. It employs a hypothetico-deductive reasoning approach, whereby hypotheses derived from established theoretical frameworks are tested against empirical findings drawn from the specialized literature.

From a methodological perspective, the study is based on a rigorous and systematic literature review, relying on recognized academic and institutional sources. This approach enables the articulation of theoretical dimensions through a critical examination of key economic theories and empirical dimensions through the analysis of observed outcomes across various economic contexts. The objective is to provide a structured and critical account of monetary policy transmission mechanisms, while assessing their relevance and operational effectiveness within contemporary economic settings.

1. Theories of monetary policy transmission.

The debate in monetary analysis frequently raises the question of whether the money supply is exogenous - that is, determined at the discretion of the central bank - or endogenous, resulting from the credit demand behaviour of households and firms. However, the very framing of this question can be misleading, as it tends to obscure the broad consensus shared by monetarists, new classical economists, and new Keynesians regarding the fundamental principles that guide the conduct of monetary policy.

The classical monetarist doctrine posits that deposits create loans, thereby implying that the money supply is a multiple of the monetary base determined by the central bank**.** In line with Friedman's (1968) approach, the central bank should therefore adopt a strict monetary growth rule. However, due to the practical difficulty of accurately determining the appropriate quantity of money and relying on a stable monetary aggregate, central banks have gradually shifted toward targeting interest rates as their primary policy instrument.

The alternative approach, inspired by the works of Wicksell (1898, 1934), argues that loans precede deposits, implying that commercial banks fully accommodate credit demand at the interest rate they set**.** This perspective is, explicitly, embedded in modern macroeconomic models, particularly within the framework of New Keynesian economics, as illustrated by the work of Woodford (2003).

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The commonly accepted mechanism is based on the assumption that, in anticipating a positive productivity shock, firms do not lower prices sufficiently, primarily due to the presence of price adjustment costs. As a result, the general price level remains above its equilibrium level, which limits the expansion of consumption. Consequently, output and employment do not increase as much as they potentially could. This dynamic leads to an inflationary gap, an output deviation from its potential level (output gap), and involuntary unemployment.

In this context, it is the responsibility of monetary policy to correct the distortions arising from the rational behaviour of firms. To this end, the central bank adopts an intervention rule whereby the interest rate is adjusted to simultaneously reduce both the inflation gap and the output gap. More specifically, in response to rising productivity gains, the central bank must increase the interest rate to steer individual consumption paths toward those that maximize agents' intertemporal utility, thereby restoring the resource allocation that would prevail in an environment of perfectly flexible prices.

The challenge faced by monetary authorities does not lie in influencing real variables by introducing an element of surprise into the decisions of private agents, but rather in assessing the available information regarding price expectations. The key issue is to determine whether this information justifies an adjustment in monetary policy particularly through changes in the interest rate to steer real variables toward their optimal values. From this perspective, instability in the general price level serves as a relevant indicator of inefficient resource allocation (Woodford, 2003).

The fluctuation of the inflation rate resulting from these adjustments leads to a gap between the actual price level and its natural level. Consequently, under the assumption of perfectly flexible wages, the optimal objective of monetary policy should be to maintain a zero-inflation rate.

Achieving this objective also helps to reduce the output gap, thereby contributing to economic growth. In response to a positive and permanent technological shock, an increase in the interest rate encourages higher future consumption. This, in turn, stimulates output and employment by offsetting the decline in prices that would otherwise have occurred.

The real interest rate converges toward its natural level through an increase in the monetary policy rate. When nominal prices are rigid, a single instrument can simultaneously achieve two objectives—a situation described as a "divine coincidence" by Blanchard and Galí (2007): there is no need to choose between price stability and economic growth.

The effectiveness of monetary policy does not rely on the ability or the possibility of regulating credit flows. Such control is, in fact, prohibited, as it would generate distortions detrimental to

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the allocation of resources. It is within this perspective that the reference to a target (Woodford, 2002) should be interpreted.

The orientation of monetary policy through the adjustment of the nominal interest rate is part of a strategy aimed at preserving the stability of the absolute price level. This approach seeks to maintain the optimal allocation of resources by keeping relative price structures and quantities at their equilibrium levels. Although based on distinct analytical foundations, New Keynesian Economics and the New Classical School converge on the principle that monetary policy must primarily ensure the stability of the general price level.

1.1.The Non-Neutrality of Money and Credit

The theory of the non-neutrality of money challenges the classical idea that money only affects prices and not the real variables of the economy (such as output, employment, investment, etc.). It stands in opposition to the theory of the neutrality of money, which posits that money only has an effect in the long run and that a change in the money supply influences only the general price level, without altering output or employment.

Classical and neoclassical economists (such as David Hume and Milton Friedman) argued that money is neutral in the long run, as economic agents adjust their expectations in response to monetary variations. In contrast, several schools of economic thought have demonstrated that money can have real and lasting effects, particularly in the short and medium term.

According to Keynes and post-Keynesians, prices and wages do not adjust instantaneously to changes in monetary demand and supply. Thus, an expansionary monetary policy (increase in the money supply) can stimulate demand, thereby improving output and employment in the short term.

Economic agents do not immediately perceive the effects of inflation and adjust their behaviour based on nominal prices rather than real prices. As a result, an increase in the money supply can lead to a temporary rise in output and employment.

Friedman (1969) argues that money is not neutral in the short run due to information lags and the adjustment processes of economic agents. However, he asserts that these effects dissipate in the long run.

New Keynesians (such as Gregory Mankiw and David Romer), on the other hand, emphasize market rigidities and the persistence of monetary effects, explaining why money can have a lasting influence on the economy.

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There may be non-neutrality of money, with respect to its unanticipated variations, if prices are rigid. Various forms of price rigidity can be emphasized: rigidities arising from multi-year wage contracts, as suggested by New Keynesians, or rigidities resulting from an imperfect perception of rising prices, particularly regarding their sectoral or economy-wide dimension. However, price rigidity is not a necessary condition for non-neutrality according to all authors. Some scholars, such as Bernanke (1986) and Greenwald and Stiglitz (1988), develop arguments in which flexible prices are nevertheless compatible with real effects of monetary policy.

Money also influences the economy through the financial system. According to the credit channel theory, an accommodative monetary policy facilitates access to credit for firms and households, thereby stimulating investment and consumption.

The non-neutrality of money in the standard monetary channel arises from the fact that changes in bank reserves can affect real interest rates. In the event of monetary tightening, the contraction of the money supply must be accompanied by a shift toward holding bonds. This shift occurs only if interest rates rise sufficiently to incentivize agents. If prices are rigid and do not fully adjust immediately, monetary contraction leads to a decrease in the real money balances held by agents and an increase in real interest rates, which impacts investment and GDP. Non-neutrality also operates through wealth effects, which influence consumption.

The active management of liabilities by banks can weaken the monetary channel. In the event of monetary tightening, banks may issue more certificates of deposit in order to sustain their level of activity. Even if there is a decrease in money in the strict sense, the increase in certificates of deposit and other highly liquid marketable securities does not significantly reduce the liquidity perceived by economic agents.

The non-neutrality of money can also arise from the credit transmission channel. If one introduces a distinct asset - bank credit - the real effects of monetary tightening can be amplified by a reduction in credit supply. Some firms, lacking access to alternative forms of external financing, may be crowded out and thus forced to scale back investment. In addition to the widening of credit spreads, credit rationing may also occur.

The non-neutrality of money underscores the importance of active monetary policies, which can influence the real economy by acting on interest rates and the money supply. However, the effectiveness of such policies heavily depends on the expectations of economic agents, and they must be applied cautiously during periods of crisis to avoid unintended side effects such as inflation or financial instability.

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1.2.Inflation

The issue of inflation occupies a central place in debates on monetary policy. However, its origins and mechanisms remain subject to disagreement among different schools of economic thought.

For monetarists, notably Milton Friedman, inflation is a purely monetary phenomenon: it results from an excessive increase in the money supply relative to output. In other words, "inflation is always and everywhere a monetary phenomenon" dictated by the relationship between the supply of money and the demand for goods and services.

In contrast, economists such as John Hicks (1977) and James Tobin (1972), following the Keynesian tradition, view inflation as the outcome of adjustments inherent in a monetary production economy. According to this approach, inflation stems from real disequilibria in the economy, notably tensions in the labour market, fluctuations in aggregate demand, or price and wage rigidities. Inflation may also arise from distributional conflicts among various economic agents (firms, workers, the state), leading to either cost-push or demand-pull inflation.

1.2.1. The monetarist theory

The characterization of inflation as a monetary phenomenon is based on the idea that the central bank possesses the necessary tools to regulate it effectively, either by controlling the growth rate of the money supply or by adjusting its policy interest rate. Its role is thus to correct economic imbalances by neutralizing the effects of expansionary government policies or by compensating for market imperfections related to institutional rigidities and informational asymmetries.

In the monetarist approach, inflation primarily results from excessive government interventions aimed at stimulating economic activity through public deficits financed by money creation. The Phillips curve, which establishes an inverse relationship between inflation and unemployment, is maintained to the extent that high unemployment curbs wage demands and limits price increases. However, this analysis is enriched by the consideration of inflation expectations: the more economic agents anticipate a rise in prices, the higher the actual inflation will be (Friedman, 1968; Phelps, 1967).

The theoretical break occurs with the introduction of the concept of the natural rate of unemployment, which represents a long-term equilibrium where price expectations are fully incorporated by agents. Any attempt at fiscal or monetary stimulus beyond this threshold proves ineffective, as it fuels inflation without reducing unemployment sustainably. An increase in demand leads to a rise in prices, which feeds into inflationary expectations, wages, and,

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ultimately, the profitability of firms, bringing production and unemployment back to their initial levels.

The stagflation of the 1970s, characterized by a simultaneous rise in both inflation and unemployment, validated this analysis and transformed the management of economic policies. Inflation is now seen as a purely monetary phenomenon, resulting from an excess of liquidity, while unemployment is attributed to real factors, such as demographic structure and dysfunctions in labour and goods markets. This perspective strengthens the belief that a high rate of unemployment is favored by strong worker protections (unemployment benefits, severance costs) and by excessive market power of firms, which allows them to maintain high profit margins.

This rehabilitation of the dichotomy between the monetary sphere and the real sphere, in line with Walras's general equilibrium theory, justifies the focus of economic policies on structural reforms aimed at increasing competition. Consequently, the sustainable reduction of unemployment no longer relies on stimulus policies, but rather on structural adjustments designed to increase market flexibility and restore the optimal functioning of the economy.

While the peak of monetarism occurred at the end of the 1970s, its influence remains strong in the evolution of economic thought, particularly through the new classical economics and new Keynesian economics. However, these schools have not fundamentally challenged the monetary approach, which remains central to economic stabilization strategies. Monetary policy continues to be the primary tool, with the main objective of controlling inflation, while the concept of the natural rate of unemployment is still maintained. According to this view, any attempt to reduce unemployment sustainably below this level would inevitably lead to inflationary or deflationary pressures.

The major innovation lies in the increased focus on price formation mechanisms and private sector expectations. Unlike past models, which relied on "backward-looking" expectations, the new models are based on "forward-looking" expectations, within a framework where economic agents are assumed to behave rationally. Thus, the anticipated inflation in the Phillips curve relationship no longer corresponds to past inflation, but to the inflation expected in the future.

In this context, the central bank must set its interest rate by referring to the private sector's expectations to maintain price stability. Its independence becomes crucial to avoid political and electoral pressures, which are considered detrimental. Meanwhile, the government must ensure budgetary balance and eliminate structural rigidities in labour and goods markets, which could increase the natural rate of unemployment.

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The trade-off in economic policy thus comes down to a choice between a rapid increase in unemployment followed by stabilization, or a lower but persistent level of unemployment. In any case, the persistence of uncontrolled inflation only becomes truly problematic if the state attempts to artificially keep unemployment below its natural level, which distorts expectations and fuels an inflationary spiral. When inflation is correctly anticipated, it remains stable, and its economic cost is relatively low compared to the negative effects of an overly abrupt disinflation policy on employment (Tobin, 1972).

1.2.2. The Keynesian theory of inflation

The omnipresence of monetarist theories should not overshadow the existence of an alternative analysis of inflation and stagflation in the 1970s. Contrary to the monetarist explanation, which attributes these phenomena to price expectations disrupted by loose fiscal policies, a Keynesian-inspired approach emphasizes the heterogeneity and imbalance of markets. According to this perspective, firms respond asymmetrically to market imbalances, while wages and prices adjust more quickly upwards than downwards. This structure explains why an accumulated dispersion of imbalances between labour and goods markets can simultaneously exacerbate both inflation and unemployment (Tobin, 1972).

In this framework, wages do not immediately decrease in the case of high unemployment, unless it persists. On the other hand, they increase more rapidly when it is necessary to attract skilled labour. Therefore, the unemployment rate that does not accelerate inflation is not the natural rate of unemployment, but rather a variable dependent on the dispersion of imbalances and the speed of price and wage adjustments (Tobin, 1995).

Another essential distinction lies between markets with flexible prices and those with rigid prices (Hicks, 1974). The former, such as commodity and food markets, immediately adjust their prices to fluctuations in supply and demand. In contrast, markets with rigid prices react more slowly, as sellers set their prices based on normal costs rather than temporary fluctuations. This regulation can generate cumulative inflationary mechanisms, particularly if the rise in consumer goods prices triggers an increase in wages, which in turn is passed on to prices.

Historical analysis shows that inflation can be necessary for growth. After World War II, reconstruction led to inflationary pressures because the wages paid could not be immediately absorbed by the supply of consumer goods (Hicks, 1990). Similarly, major technological innovations required costly initial investments that, while ultimately compensated by productivity gains, temporarily fueled inflation (Hicks, 1973; Amendola & Gaffard, 1998). In

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such situations, attempting to eradicate inflation prematurely could harm investment and growth.

In the face of these dynamics, the central issue is that of nominal anchoring. According to monetarists, it is based on controlling the money supply, while Wicksell's credit economy suggests adjusting the interest rate in response to imbalances (contingent rate rules). However, stability does not depend solely on the central bank's key interest rate, but also on the overall architecture of the monetary and financial system, which influences the behaviour of economic agents in markets that are out of equilibrium.

To avoid excessive inflation, agents must be able to form stable expectations, which requires the ability to identify the true causes of inflation and a monetary policy that aligns with the long-term needs of the economy. Some price rigidity can then play a stabilizing role, preventing excessive opportunity costs that would undermine investment and growth (Georgescu-Roegen, 1968).

Finally, although inflation is fuelled by credit and money creation, it is not mechanically linked to the public deficit. An expansion of private credit can cause inflationary pressures even in the absence of a budgetary deficit, particularly when demand exceeds supply. Therefore, rather than systematically blaming public finances, it is essential to analyse the joint evolution of public and private debts to identify the true origins of inflation or deflation (Heymann & Leijonhufvud, 1995; Leijonhufvud, 1997).

1.3.Inflation targeting

Inflation targeting is a monetary strategy in which the central bank directly focuses its policy on controlling inflation, thus abandoning any other explicit intermediate objectives. By prioritizing price stability as the ultimate goal, this approach aligns with a perspective in which monetary policy is primarily assessed based on its ability to contain inflation (Lucotte, 2015). This strategy provides the central bank with some discretionary margin in conducting its policy, while maintaining an obligation for transparency and public accountability (Svensson, 2002). This stance, referred to as "constrained discretion" by Bernanke and Mishkin (1997), reflects a compromise between the strict application of a monetary rule and total discretion.

The inflation targeting framework relies on several key elements. First, it assumes that the central bank has sufficient operational autonomy to achieve its primary objective of price stability. Secondly, it requires the explicit definition of a quantitative inflation target. Additionally, transparency in the implementation of the strategy and the obligation to be accountable for its outcomes are essential components of this framework. Finally, the central

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bank relies on anticipatory inflation assessments, based on a thorough analysis of economic indicators (Mishkin, 2004; Heenan et al., 2006).

In this context, price stability has gradually emerged as the primary objective of monetary policies, in line with the work of Kydland and Prescott (1977) as well as McCandless and Weber (1995). While consensus around this objective has solidified, debates have since shifted towards determining the optimal level of inflation and evaluating the economic costs associated with different inflation rates.

Studies by Bruno and Easterly (1996) as well as Barro (1997) highlight that high levels of inflation erode the real value of income and non-indexed assets, such as wages, retirement pensions, or fixed-income securities. Inflation also leads to greater price variability, generating uncertainty regarding relative prices, forecasting errors, and, consequently, distortions in economic decisions. In this perspective, Ascari (2003) demonstrates that the effectiveness of monetary policy in managing cyclical fluctuations decreases as the trend inflation rate increases. According to this author, the trade-off between inflation and real activity depends not only on the behaviour of the central bank but also on the perception that economic agents have of the conduct of monetary policy.

In a framework where central banks adopt an explicit inflation target and their credibility is well established, the inflation rate tends to become a stationary process around the set target. As agents incorporate into their expectations the idea that the central bank does not tolerate any permanent deviation of the inflation rate from its goal, fluctuations of this rate around its trend become less and less significant. This helps explain the negative relationship between the trend level of inflation and the degree of price rigidity.

Nominal rigidities are positively correlated with the proportion of agents setting their prices based on retrospective (backward-looking) behaviours. Thus, an increase in trend inflation, by affecting the proportion of firms using a forward-looking rule for price setting, weakens the trade-off between inflation and real activity. However, some authors, such as Mishkin (2002) and Vinayagathasan (2013), argue that an inflation rate that is too low can be counterproductive. Trichet (2003) identifies three reasons in favour of a non-zero inflation target: measurement errors in inflation that may lead to involuntary disinflation, the need to facilitate relative price adjustments in the presence of downward nominal wage rigidity, and the constraint imposed by the zero lower bound on nominal interest rates.

In addition to these justifications, the Balassa-Samuelson effect highlights that differences in inflation performance within a monetary union partially reduce the convergence of productivity

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levels between member countries. This effect justifies the existence of a structurally higher inflation rate in economies catching up in terms of productivity, thereby reinforcing the relevance of a non-zero inflation target to ensure overall macroeconomic stability.

1.4.IS-LM and the credit channel

Although the IS-LM model may seem outdated today in light of later theoretical advancements, it continues to serve as a key reference for analysing the effects of monetary policy. In its basic formulation, this model does not consider the role of bank credit. It relies on the assumption of a single source of financing, typically government bonds, implying perfect substitutability between bonds and credit.

In the case of a monetary tightening, which results in a contraction of bank reserves, banks may respond by increasing their reliance on deposits not subject to reserve requirements - such as certificates of deposit or term deposits - or by issuing securities. This dynamic leads to an increase in interest rates, which, particularly impacting investment, exerts a real effect on the economy. Within this framework, the adjustment of banks to a shift in monetary policy primarily concerns the structure of their liabilities, while the composition of their assets appears to remain unchanged. However, this assumption is challenged by the credit channel approach.

Two major factors can explain why this transmission mechanism, often referred to as the money channel, tends to become less effective. First, an increasing share of bank deposits is now interest-bearing, with rates aligned to those of the money market, particularly affecting the traditional substitution between money and securities. Second, in many developed countries, mandatory reserves on bank deposits have gradually decreased or even disappeared, making banks less concerned with managing their liabilities to avoid them.

Blinder (1987) illustrates, within the framework of the IS-LM model, the consequences of credit rationing. He highlights the real effects induced by the transition to an economy characterized by credit constraints, as well as the distinct growth regimes that emerge from it. On their part, Bernanke and Blinder (1988) integrate a banking credit market into the IS-LM model, alongside the securities market, and demonstrate that this modification profoundly alters traditional outcomes. Shocks to the supply of credit can then generate divergent effects on the two types of interest rates.

For example, a negative shock to the credit supply - resulting from an increase in the risks faced by bank borrowers - can simultaneously lead to a decrease in the volume of credit, gross national product (GNP), and the interest rate on government bonds, while the interest rate on bank loans rises. In this context, variations in interest rate spreads can serve as valuable indicators for

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identifying the nature of the shocks the economy is facing. The significance of these spreads is, in fact, confirmed by numerous empirical studies.

2. The Transmission channels of monetary policy

The transmission channels of monetary policy refer to the ways in which monetary policy acts on aggregate supply and demand, and consequently on activity and prices.

Theoretical and empirical developments highlight a crucial distinction between the transmission and effectiveness of monetary policy. Transmission refers to the extent and timing with which monetary policy measures are conveyed to intermediate variables and targets. The effectiveness of monetary policy refers to the central bank's ability to achieve its intended objectives, which requires optimal and complete transmission, although this is difficult to achieve due to the divergent interests of economic agents. Nevertheless, it is relevant to question how the effectiveness of a country's monetary policy depends on its political and economic context.

Monetary policy is distinguished by its indirect impact on economic objectives, which underscores the importance of understanding transmission mechanisms. These mechanisms represent the sequence of reactions of economic agents following an action initiated by the central bank. They manifest through the transfer of decisions from the central bank to the target variables, passing through various monetary and financial variables. The economic literature identifies several channels of monetary policy transmission (Mishkin, 1996). The interest rate channel is often considered the most traditional, while the credit channel plays a significant role. The channels of asset prices and expectations, or announcement effects, complement this transmission structure.

2.1. Interest rate channel

The first theoretical developments related to the interest rate channel find their origins in the work of Keynes (1936), who analysed the mechanisms through which monetary policy operates through changes in interest rates.

Keynes (1936) highlights the fundamental role of interest rates as the channel through which money exerts, indirectly, an influence on the monetary, financial, and real spheres of the economy. He concludes that the link between monetary policy and the real economy is firmly established, with this link being primarily mediated by interest rates. His theory thus assigns a central role to interest rates in the overall functioning of economic policy, and more specifically in the functioning of monetary policy. Indeed, the central bank's intervention, through the adjustment of interest rates, shapes the behaviours of economic agents and directs the evolution

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of key macroeconomic variables. Furthermore, Keynes (1936) emphasizes the degree of correlation between monetary policy and interest rates, asserting that the latter result from a set of determinants, among which the economic situation plays a predominant role.

Without fully adhering to the Keynesian view, Friedman (1956) proposes an analysis based on a four-asset model, in which money is not considered merely as a form of wealth holding. According to him, the total wealth of an economic agent comprises a diversified portfolio made up of bonds, stocks, physical goods, and human capital. Thus, agents' choices are made based on the structure of this overall wealth, but also considering prices, relative returns, particularly that of money, as well as their individual preferences. As a central figure of the monetarist school, Friedman acknowledges that monetary policy can influence the real economy through the interest rate channel. However, he emphasizes that this effect remains partial, as other variables, both structural and behavioural, play a role in determining economic decisions.

In a similar perspective, Baumol (1952) emphasizes that economic agents arbitrage between holding liquid assets and making investments based on the level of interest rates and transaction costs. When these costs are high, agents tend to limit their investment activities and prioritize holding liquid assets. This dynamic is closely linked to the level of development of the financial system and the degree of competition within it. Indeed, a mature financial market, characterized by effective competition among intermediaries, is assumed to offer lower transaction costs, thereby facilitating adjustments to the portfolios of economic agents.

The short-term interest rate is the preferred instrument for conducting monetary policy in the vast majority of central banks. These institutions believe that this tool adequately reflects the requirements and characteristics of contemporary monetary policy (Blake, 1997). According to McCallum (1999), several factors justify this preference, the most important of which is the role of the lender of last resort traditionally assumed by central banks. This role allows them to ensure financial stability by providing liquidity to institutions in distress, thereby enhancing their ability to influence short-term interest rates and stabilize the economy.

Although there is no absolute consensus regarding the precise functioning mechanism of the interest rate channel, it is widely accepted that it serves as a crucial vector through which monetary policy influences the consumption and saving behaviours of economic agents, particularly households. At this stage, the structuring role of this transmission channel seems firmly established, although the extent of its impact on the real economy remains conditioned by other determinants, such as income levels, the architecture of the financial system, and the individual preferences of economic agents.

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Driven by the goal of analysing the impact of monetary policy on the mechanisms of substitution, wealth, and income, Mojon (2001) chooses to focus his study on the transmission process of the central bank's policy interest rates to the banking rates applied to economic agents.

Mojon's (2001) study highlights the existence of heterogeneity in the transmission of policy rates to banking rates within the euro area countries, attributed to the divergences observed in national financial structures. It also shows that increasing competition between banking institutions tends to reduce these asymmetries by enhancing the responsiveness of banking rates to changes in policy rates. Furthermore, the composition of economic agents' balance sheets determines their sensitivity to interest rate fluctuations, which, in turn, affects the overall effectiveness of monetary policy.

Many studies (Coffinet 2005; Donnay and Degryse 2001) have focused on analysing the transmission mechanisms of monetary policy interest rates to the lending rates applied by banks. A relative consensus has emerged regarding the relevance of using the money market rate or the policy rate as the main indicator of monetary policy. Research on the pass-through mechanism between the policy rate and bank interest rates typically relies on aggregated national data. However, the significant heterogeneity observed in individual data has led several researchers to favour analyses based on disaggregated data. The results obtained vary depending on several parameters, including the study period, the level of data aggregation, and the institutional context specific to each country.

The main findings from empirical studies on this topic indicate that the degree of transmission of monetary policy interest rates to bank rates is generally higher and tends to approach unity in the long term rather than the short term, regardless of the type of interest rate considered.

It is clear from this theoretical presentation that the traditional interest rate channel derives its relevance from its ability to influence the cost of capital as well as financing and investment conditions. The formalization of this mechanism highlights that an expansionary monetary policy leads to a reduction in interest rates, which in turn lowers the cost of capital (Mishkin, 1996). This dynamic stimulates investment spending, which, through a spillover effect, contributes to an increase in production and aggregate demand.

Furthermore, a significant portion of the effects transmitted through the interest rate channel flows through credit, influencing both financial and real variables. It thus becomes necessary to deepen the analysis of the credit channel to enhance the overall understanding of the

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transmission mechanisms of monetary policy. With this in mind, the next section will focus on the theoretical foundations and empirical validations related to this specific channel.

2.2.The credit channel

Since the 1970s, advancements in the field of economic theory regarding incomplete information have significantly renewed the analysis of bank credit. From the second half of the 1980s, the credit transmission channel - also known as the credit channel - has been the subject of abundant literature, primarily empirical in nature. This literature highlights the weakening of the traditional relationships stemming from the money view and seeks to emphasize the specific role played by bank credit in the monetary policy transmission mechanism. However, these studies are based on heterogeneous theoretical foundations, without forming a unified framework, and the microeconomic explanations proposed vary significantly depending on the author. Nevertheless, a shared approach among these contributions lies in the recognition of the central role of bank assets, and consequently of credit, in transmitting monetary impulses.

The administrative control of credit, implemented in several countries, has been the subject of numerous theoretical works, notably those by Jaffee and Modigliani (1969) as well as Sealey (1979). However, this literature, situated within the framework of disequilibrium theory, has gradually lost its influence. This decline can be explained, on the one hand, by the lack of solid economic foundations justifying exogenous credit rationing, and on the other hand, by the gradual abandonment of these administrative control mechanisms in major developed economies.

In their contribution, Kashyap and Stein (1993) specify the conditions necessary for the effectiveness of the credit channel in the transmission mechanism of monetary policy. First, it is essential that bank loans and bond financing are not perfectly substitutable for firms; in other words, some firms do not have full access to financial markets and cannot offset a reduction in bank credit by increasing direct financing. Second, monetary policy must have an impact on the behavior of banks in terms of credit issuance, which implies that financial institutions cannot completely decouple their credit decisions from fluctuations affecting their reserves. Finally, for this mechanism to have real effects, monetary policy must be non-neutral, which implies, among other things, a certain price rigidity preventing instantaneous adjustment.

The transmission of monetary policy via the bank credit channel can be understood through the joint analysis of the determinants of credit supply and demand. Among the factors influencing the demand for credit, the financial situation of firms, and in particular the structure of their balance sheets, plays a crucial role. Indeed, following a monetary tightening, the cash flows of

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firms and the value of their assets may contract, leading to a depreciation of the collateral they can use to access bank financing. This context can increase their propensity to undertake riskier projects, thus raising the probability of adverse selection, as riskier firms would be more inclined to seek additional credit. In an environment characterized by high uncertainty, where the precise assessment of risk becomes more complex for banking institutions, this can result in higher risk premiums being demanded and stricter credit access conditions.

Furthermore, a restrictive monetary policy can influence economic activity by reducing the supply of credit, in line with the credit channel mechanism. Following an increase in the central bank's key interest rates, the refinancing cost for banks rises, making access to lendable resources more expensive (Bernanke et al., 1988). This increase in financing costs can lead to higher lending rates applied to borrowers, which restricts access to credit, particularly for economic agents who are heavily reliant on bank financing, such as small businesses and households. Thus, the effectiveness of the credit channel in the transmission of monetary policy is strengthened in economies where bank credit is a major source of financing.

In the context of the functioning of the credit channel, banks may be led to sell financial assets or restrict the supply of loans in order to restore their liquidity ratio. These adjustments, regardless of their mode, result in an increase in the cost of credit and specifically influence the investment or consumption decisions of agents who are most dependent on bank financing. In this regard, the structural relationships between non-financial agents and banks strengthen the relevance of the credit channel in the monetary transmission mechanism. These relationships, often long-lasting, are driven by the need for businesses -including the largest ones - to ensure stability and continuity in their access to financing. While the longevity of banking relationships and the trust established allow certain businesses to benefit from more favourable financing conditions, they also grant banks significant market power over all economic agents.

Gertler and Gilchrist (1994) study the differentiated responses of businesses following a monetary tightening in the United States, using quarterly data covering the period from 1960 to 1991. Their findings indicate that small businesses are generally more vulnerable to the effects of a monetary tightening. According to the authors, this increased sensitivity is due to the fact that small businesses are perceived as riskier and have limited collateral, which creates friction in financial markets and restricts their access to credit. In contrast, large businesses, benefiting from more favourable financing conditions, tend to increase their short-term debt during periods of monetary contraction, particularly to finance the accumulation of inventories.

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Leblebicioglu and Valcarcel (2018) study the effects of monetary policy on bank loans in a sample of emerging economies, using monthly data covering the period from 1986 to March 2016, with observations beginning in 1994 for Mexico. Their analysis focuses on Turkey, Mexico, and Chile. First, the authors construct a spillover index based on the decomposition of forecast error variance. This methodology allows them to identify the transmission effects of U.S. monetary policy on the volume of bank loans in the three countries studied. Notably, they highlight a negative response of commercial and industrial bank loans in Chile and Turkey following a monetary easing in the United States. Furthermore, in response to domestic monetary expansion, all three countries also exhibit a paradoxical reaction in these same categories of loans, which the authors describe as a perverse response.

Economic literature typically distinguishes between two forms of the credit channel: the narrow credit channel and the broad credit channel. The narrow credit channel refers to the transmission of monetary policy through the behaviours of households and firms whose access to financial markets is limited, forcing them to rely primarily on bank financing. In contrast, the broad credit channel applies more broadly to all economic agents, including those with relatively easy access to financing, whether bank-based or disintermediated.

More specifically, the functioning of the narrow credit channel relies on credit rationing mechanisms. In this context, an increase in interest rates may not necessarily be sufficient to discourage the riskiest borrowers. Faced with a potential deterioration in borrower quality and increased uncertainty, banks may respond by restricting their credit supply, thereby intensifying the restrictive effects of monetary policy on the real economy.

2.3.The quantitative channel (Balance sheet effect)

The quantitative channel, also known as the balance sheet effect, describes how monetary policies affect the balance sheets of economic agents and thus influence their consumption and investment decisions. This mechanism relies on the relationship between asset price fluctuations, the wealth of households and firms, and the conditions of access to credit. The concept was popularized within the framework of monetary transmission theories, particularly through the work of Bernanke and Gertler (1989), who analysed how changes in monetary policy affect the financial constraints of economic agents.

Bernanke and Gertler (1989) showed that changes in interest rates directly influence the net worth of firms. An increase in interest rates reduces the value of assets held by firms, thereby raising their external financing costs. This financial constraint reduces their investments, strengthening the transmission of monetary policies.

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Mishkin (1995) explored the impact of asset price fluctuations on household consumption. A decrease in asset prices, resulting from restrictive monetary policy, reduces the perceived wealth of households, prompting them to reduce their spending. This decrease in aggregate demand fuels the transmission effect.

Kiyotaki and Moore (1997) highlighted the role of collateral in the transmission mechanism. A drop in asset prices reduces the value of collateral available to borrowers, which limits access to credit. This effect is particularly important for small businesses, which rely more heavily on collateral to obtain financing.

Iacoviello (2005) introduced a model in which real estate assets play a central role in the quantitative channel. He shows that changes in real estate prices, in response to monetary policies, affect the consumption and investment decisions of indebted households. This mechanism is particularly relevant in economies where mortgage credit represents a significant portion of financing.

The 2008 financial crisis highlighted the importance of the quantitative channel. Gertler and Karadi (2011) demonstrated that disruptions in financial markets amplify the effects of monetary policy on the balance sheets of businesses and households. They emphasized that quantitative easing (QE) is an effective tool for restoring liquidity and stabilizing balance sheets.

Peek and Rosengren (2000) analysed the effect of falling real estate prices in Japan during the 1990s. They showed that the decline in real estate assets led to a contraction in bank credit, particularly affecting small and medium-sized businesses.

Case, Quigley, and Shiller (2005) examined the relationship between real estate prices and household consumption. They concluded that changes in real estate asset prices have a significant impact on consumption, thereby amplifying the effect of monetary policy.

2.4.Exchange rate channel

The exchange rate channel is one of the main mechanisms through which monetary policy can influence an open economy. This channel works by modifying the relative competitiveness of domestic goods and services compared to those from abroad, thereby affecting trade flows, foreign investment, and domestic prices. Since the pioneering works of Mundell (1963) and Fleming (1962), the exchange rate channel has held a central position in international macroeconomics. This review explores the theoretical and empirical contributions related to this channel, highlighting its mechanisms, practical applications, limitations, and implications for modern monetary policies.

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The IS-LM-BP model developed by Mundell (1963) and Fleming (1962) is the starting point for analyses of the exchange rate channel. It shows that in an open economy, exchange rate fluctuations influence net exports through two main mechanisms:

- **Price effect**: A depreciation of the domestic currency makes domestic products cheaper for foreigners, increasing exports, while imports become more expensive, reducing their volume.
- **Volume effect**: The price effect leads to a reallocation of spending toward domestic goods.

The effectiveness of this channel depends on the sensitivity of exports and imports to changes in relative prices, as captured by the price elasticities of external and internal demand (Marshall-Lerner condition).

Dornbusch (1976) introduced the concept of exchange rate overshooting. According to this theory, an expansionary monetary policy leads to an immediate depreciation of the national currency that exceeds its long-term equilibrium level, due to the faster adjustment of financial markets compared to domestic prices. This dynamic amplifies the short-term effects of the exchange rate channel.

The Purchasing Power Parity (PPP) theory and the Uncovered Interest Parity (UIP) theory establish the links between exchange rates, domestic prices, and interest rates. Changes in interest rates in response to monetary policy actions affect international capital flows and, consequently, the exchange rate (Obstfeld & Rogoff, 1995).

Indeed, exchange rate fluctuations affect net exports. A currency depreciation improves the competitiveness of domestic goods, boosting exports while reducing imports (Krugman & Obstfeld, 2003).

The interest rate differential between countries influences capital flows. An increase in domestic interest rates attracts foreign capital, leading to an appreciation of the local currency, whereas a decrease in rates promotes depreciation (Calvo & Reinhart, 2002).

The relationships between exchange rates and economic performance, particularly regarding foreign trade, have been the subject of numerous empirical studies. Hooper and Marquez (1995) examined the sensitivity of net exports to exchange rate fluctuations and confirmed that currency depreciations help improve the trade balance, provided that the Marshall-Lerner conditions are met. These conditions state that the sum of the absolute values of the price

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elasticities of exports and imports must exceed one for a depreciation to lead to an improvement in the trade balance.

Sectoral heterogeneity also plays an important role in this dynamic. Goldberg and Knetter (1997) demonstrated that the elasticity of exports varies across economic sectors, with manufactured goods showing greater sensitivity compared to primary products. This difference reflects the specific characteristics of supply chains and market structures within different sectors.

Monetary policies and their interaction with exchange rates have also been widely studied. Clarida, Galí, and Gertler (1998) analysed the response of exchange rates to monetary policies in industrialized countries. They found that the impact of monetary adjustments on exchange rates depends heavily on the exchange rate regime in place, with more pronounced variations under flexible exchange rate systems.

The study by Burstein, Neves, and Rebelo titled *"Distribution Costs and Real Exchange Rate Dynamics During Exchange-Rate-Based Stabilizations"* (2003) examines the role of distribution costs in real exchange rate dynamics, particularly during exchange-rate-based stabilization policies. The authors argue that distribution services, which rely on local factors such as labor and land, naturally create a gap between retail prices across countries. By incorporating a distribution sector into a standard model of exchange-rate-based stabilization, they show that this extension significantly improves the model's ability to explain the observed dynamics of the real exchange rate.

At the same time, the transmission of exchange rate variations to domestic prices (known as the *exchange rate pass-through*) has evolved over time. Gagnon and Ihrig (2004) showed that this phenomenon has decreased in developed countries over the past few decades, largely due to the increased credibility of central banks. This credibility has helped stabilize inflation expectations, thereby reducing the impact of exchange rate fluctuations on domestic prices.

Finally, Edwards (2006) examined the impact of exchange rate fluctuations on macroeconomic stability in emerging markets. He highlighted their vulnerability to rapid depreciations, which can exacerbate macroeconomic imbalances and trigger financial crises. These findings underscore the importance of appropriate economic policies to mitigate the negative effects of exchange rate fluctuations in these economies.

Thus, empirical studies show that exchange rates play a crucial role in economic dynamics, but their impact varies depending on sectors, exchange rate regimes, and the level of development of the countries involved.

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The exchange rate channel remains a central mechanism for the transmission of monetary policy in open economies. However, its effectiveness heavily depends on the structural characteristics of the economy, the exchange rate regime in place, and the broader macroeconomic environment. Theoretical and empirical studies emphasize the need for central banks to integrate the interactions between exchange rates, capital flows, and domestic prices into their decision-making processes. Financial globalization and unconventional monetary policies present new challenges, requiring a deep understanding of this channel to maximize its effectiveness while minimizing side effects.

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Conclusion

The various transmission channels of monetary policy, such as the interest rate channel, the credit channel, the quantitative channel, and the exchange rate channel, play a crucial role in regulating the economy and adjusting macroeconomic variables to the objectives of central banks. Each channel has specific characteristics that depend on the structural features of economies, the adopted exchange rate regime, the behaviour of economic agents, and the global context in which monetary policy is implemented. While certain channels, such as the exchange rate channel, are particularly influential in open economies, others, such as the credit channel, are especially important in economies where bank financing plays a central role.

Recent developments in financial markets and non-conventional monetary policies, such as quantitative easing, add new dimensions to the understanding of these mechanisms. In this context, it becomes crucial for monetary authorities to consider the complex interaction between these channels and continuously adjust their strategies to ensure economic stability and control inflation, while minimizing risks associated with economic fluctuations. Financial globalization, in particular, has altered the impact of certain channels, making their study and adaptation even more relevant for the formulation of effective monetary policies.

The emergence of new non-conventional transmission channels, particularly since the 2008 financial crisis, has significantly enriched the debate on monetary policy. These mechanisms arose in response to the limitations of traditional tools, especially adjustments to policy interest rates, which had reached their lower bound near zero in many advanced economies. As a result, central banks have had to resort to non-conventional instruments to stimulate the economy.

These new channels have allowed the effectiveness of monetary policy to extend beyond the constraints imposed by traditional tools. However, they also raise questions about their long-term effectiveness, the risks of side effects (such as the accumulation of financial risks or market distortions), and their impact on wealth distribution. Central banks now face an additional challenge: finding a balance between these non-conventional instruments and their potentially destabilizing effects, while continuing to maintain economic stability.

Thus, the emergence of these new non-conventional channels has transformed the transmission of monetary policy, providing monetary authorities with new levers to act in a globalized and complex economic environment. Their management requires a deep understanding of new market mechanisms and increased vigilance regarding their long-term effects.

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