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INFLATION, INFLATION UNCERTAINTY AND THE ECONOMIC GROWTH NEXUS: A REVIEW OF THE LITERATURE

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Abstract

Research background: Price stability plays a crucial role in ensuring stabilities in the financial markets as well as the real sector. Despite this, questions are still raised, querying if it is either inflation, inflation uncertainty or a combination of both, which affects economic growth? The results obtained, both theoretically and empirically, differ. This paper seeks to revisit and provide both the theoretical and empirical review of literature on the inflation, inflation uncertainty and economic growth nexus.
Purpose: The focus of the paper is centred on the review of theoretical literature, investigating if the differences in findings are attributed to differences in the channels through which inflation and inflation uncertainty is passed over to economic growth; as well as a review of empirical literature, investigating if the source of differences in the findings lies in the separate or joint estimation of inflation and inflation uncertainty on economic growth.
Research methodology: This paper presents an extensive review of scholarly studies on the inflation, inflation uncertainty and economic growth nexus based on their results. The paper analysed, synthesised and critically evaluated previous studies on the inflation, inflation uncertainty and economic growth nexus on both the theoretical and empirical fronts.

Results: In theoretical literature, the study found that the impact of inflation and inflation uncertainty is passed over to economic growth mainly through two channels, which are the price-informative role and the investment spending channel. From the empirical front, studies which separately estimated the role of either inflation or inflation uncertainty on economic growth found mixed results. Studies which estimated the joint impact of both variables on economic growth, arrived at a conclusion that inflation harms economic growth while the literature still remains inconclusive on inflation uncertainty.
Novelty: The study provides an insight into the inflation, inflation uncertainty and economic growth nexus based on a detailed review of literature on the subject based on various transmission channels. Further, it enriches the literature through exploring possible reasons behind the lack of consensus on the impact of inflation and inflation uncertainty on economic growth.

Keywords: inflation, inflation uncertainty, price stability, price informational role, economic growth

JEL classification: E31, O47, O55

Introduction

Can inflation, a monetary variable, impose an enduring impact on economic growth, a real variable? Can price stability be a conducive factor in the determination of economic growth? These are common questions that are often asked in the literature and by policy-makers. The first question is mainly supported by those who believe in the notion of classical dichotomy where nominal variables operate in a vacuum, separate from real variables. However, world events dating from the hyperinflation of Germany in 1923, the stagflationary episodes of the 1970s, Zimbabwe's hyperinflation in the late 2000s to the current Venezuelan inflationary episodes have cast doubts on this notion and drove the literature towards paying attention to price stability as a crucial factor in the determination of economic growth.

The follow up question goes on to query if it is the rate of change in the prices (inflation), the uncertainties in the rate of change of these prices (inflation uncertainty), or a combination of the two, that impacts economic growth, and in which direction. The argument is still notable in the literature without reaching a consensus to this day, where for example, Grier and Tullock (1989) assert that it is the effects of inflation uncertainty that impacts growth, while in contrast, De Gregorio (1993) argues that it is the impacts of inflation in itself that are mainly transmitted to economic growth and most recently, Iyke and Ho (2019) found that both variables affect growth. The differences in consensus remains deeply rooted in both theoretical and literature review.

The aim of this paper, therefore, is to provide a comprehensive review of the literature on inflation, inflation uncertainty and economic growth nexus on both the theoretical and empirical fronts. The study aims to explore the argument of whether inflation and inflation uncertainty negatively or positively impacts economic growth. The study is expected to contribute to the literature on inflation, inflation uncertainty and economic growth. The study will also provide policy recommendations on the conduct of monetary policies on price stability and economic growth during periods crises and economic shocks.

The rest of the paper is organised as follows. Section 1 of the paper provides a review of conclusions derived from various schools of thought that discusses the transmission and relationship between price stability and economic growth. Thereafter, section 2 proceeds with a comprehensive analysis of theoretical postulations on inflation, inflation uncertainty and economic growth nexus. After a review of the theoretical literature, section 3 follows with a critical review of the existing empirical literature. Section Conclusions concludes the study.

1. Theoretical Framework on Inflation, Inflation Uncertainty and Economic Growth Nexus: Schools of Thought

The theoretical literature on the impact of inflation on economic growth is widely documented, with the root of contention deeply entrenched in the various conclusions derived from the economic schools of thought. Of note, however, these economic schools of thought only explain the link between inflation and economic growth but are silent on the impact of either inflation uncertainty on economic growth, or the joint impact of both on economic growth. The classical school of thought posits that the competitive behaviour by capitalists fuels inflation in the economy, which in turn erodes the capitalists' profits and discourages production (Tinbergen, 1935; Haberler, 1946). Accordingly, this classical reasoning implies that inflation harms economic growth.

The Keynesians offer a view that contrasts the classical view. This school of thought advances the idea that the level of output and income is only improved through interventionist demand management policies, expansionary fiscal policy in particular, however, at the cost of higher inflation emanating from higher expenditure (Aaron, 1967). In the same vein, a stable long-run positive relationship is then derived between inflation and economic growth. With wage and price rigidities as the defining tenets of this school of thought, the economy takes a long time to get to the equilibrium, hence, there is no visible relationship between inflation and economic growth in the short-run (Aaron, 1967).

Monetarists offer a distinguished view: they deduce that workers suffer from money illusion temporarily, in that any increase in nominal wages (and inflation) induces workers to increase their supply of labour (and economic growth) temporarily before reverting to the original supply of labour – hence, inflation has no relationship with economic growth in the long-run, but a positive one in the short-run (Friedman, 1968). Monetarists' analysis is based on the notion of adaptive expectations, where economic participants form their inflation expectations by adapting from past information.

Unlike the monetarists' backward-looking adaptive expectations analysis, the new classicals base their relationship, between inflation and economic growth, on a forward-looking rational expectations analysis which is explained by the inter-temporal substitution approach and the surprise model (Lucas, Rapping, 1969; Lucas, 1973; 1996). The inter-temporal substitution approach asserts that workers are rational beings who supply more labour when real wages increase, leading to an increase in productivity and spurring economic growth (Lucas, Rapping, 1969). The surprise model, on the other hand, stresses that firms are rational beings, which increase the production of a product whose relative (not absolute) price has increased (Lucas, 1973). Increases in money supply, whether announced or unannounced, results in a higher level of inflation but does not have any impact on long-run output growth, since according to the surprise model, the increase in prices would be absolute and not relative. Unlike Keynesians, new classicals assume price and wage flexibility which results in a zero sacrifice ratio for reducing inflation, should economic participants anticipate high inflation in the future (Lucas, 1996). Contractionary monetary policy can, therefore, be announced to reduce inflation in the short-run without a trade-off with output. Classicals, therefore, do not forecast any relationship between inflation and economic growth in both the short and long-run. Rather, new classicals recommend the implementation of supply-side policies to stimulate growth instead of monetary policies.

In consistency with the orthodox Keynesian school of thought, the New Keynesians also have wage and price rigidities as their defining hallmarks. Due to price rigidities, any policies aimed at reducing money supply are recessionary, while impotent to inflation. Therefore, monetary policy should be conducted with prior information about the future values of inflation and output (Blanchard, Gali, 2005). In addition, New Keynesians posit that inflation, whether anticipated or unanticipated, negatively impacts economic growth. The costs of anticipated inflation are in the form of menu costs and costs created by distortions in the non-indexed tax system, while the costs of unanticipated inflation are in the form of distortions in the distribution of income, losses due to uncertainties and distortions in the price mechanism (Ambler, 2008).

The lack of consensus, on the relationship between inflation and economic growth, presented by the different economic schools of thought sustains the theoretical debate on the relationship between the two variables to this day. The following subsection details different theories and scholarly articles on the inflation, inflation uncertainty and economic growth nexus.

2. Theoretical Postulations on Inflation, Inflation Uncertainty and Economic Growth Nexus

We have established that the existing theoretical literature on inflation, inflation uncertainty and economic growth nexus links the variables through, mainly, two different channels which are: the price information system channel and the investment channel. Within these channels, some of the available literature does not clearly separate the effects of inflation uncertainty on economic growth with the effects of inflation on economic growth, rather, the terms are often used synonymously. For instance, Temple (2000) uses the term inflation as a shorthand for both the growth rate of a price index, as well as uncertainty about this growth rate. Accordingly, under this section, the terms may be used interchangeably.

2.1. Informational Role of Prices

A number of studies have previously explained that either inflation, inflation uncertainty or a combination of both possess a price informative role, which explains the variations in economic growth. The seminal work in introducing the informative role of prices was pioneered empirically by Lucas (1973) and theoretically by Okun (1975). Information is crucial in the determination of contractual long-term relationships between employees and employers, as well as between customers and suppliers. These parties use relative prices in their determination of these contracts, hence, prices play an informational role (Okun, 1975).

It is not the effects of high inflation, but rather the inflation uncertainty component that renders market prices a less efficient system for coordinating economic activity, cautions Friedman (1977). Friedman (1977) draws this conclusion from a position of influence by Lucas (1973; 1975) and Harberger (1976) who endorse that the higher the uncertainty about inflation, the more futile the system of absolute prices is, which then forces economic agents to resort to an alternative currency, or to the far extreme to barter trade, which attracts adverse effects on productivity. In the same vein, Mirman (2019) also pointed out that uncertainty diminishes the informational role of prices.

An idea complementary to Friedman's, but sustained by a different argument, is elaborated by Ball and Romer (2003). While the ideas are complementary, since their analyses are both derived from the price informative channel, they are contradictory in that Ball and Romer (2003) argue against the notion of unobservable prices advanced by Friedman. By contrast, their argument is that the price level is observable such that agents have full information of relative prices, and further, information uncertainty only concerns future price movements. The paper documents, from one extreme, that if demand is not linked across periods, inflation uncertainty forces agents to spend more on low-priced goods, which increases consumer welfare and economic growth. Furthermore, inflation uncertainty results in costly instabilities in firms' sales, which incentivises firms to circumvent these disturbances through frequent price adjustments (towards low and stable prices), implying that an economy has inbuilt self-corrective measures that automatically lowers inflation. To the other extreme, if demand is linked across periods such that there are long-term customer relationships, in contrast, inflation uncertainty reduces consumer welfare and economic growth in turn, through its impairment on the informativeness of prices.

Apart from the monotonous relationship between economic growth and, either, inflation or inflation uncertainty, the price informative channel also yields a non-linear relationship. Reducing the rates of inflation, to rates as low as zero, attracts a sacrifice ratio that would attract contractions in output, bearing short-term pains for a small and elusive long-term gain (Krugman, 1996). Krugman (1996) argues that while 3% inflation does much less than one-third as much harm as 9%, however, very low rates of inflation diminish real wage flexibility, and may, therefore, increase unemployment and output reduction in the long-run.

2.2. Investment Spending Channel

The second group of theoretical literature we reviewed links the effects of inflation and inflation uncertainty on economic growth through investment spending. The literature under this category has three main strands. The first line of argument explains that inflation affects real deposit rates, which may affect saving ratios and, ultimately, investment spending and in turn, economic growth. This argument is supported by De Gregorio (1993), Gylfason (1998) and Blackburn (1999), among others. The second strand is the monetary growth literature which is built upon a neoclassical growth model and the trails of this literature date back to the mid-1960s from a seminal work by Tobin (1965). The third line of argument explains that inflation influences capital accumulation through an imperfect tax system and this idea gained traction from the late 1970s and beyond (Temple, 2000).

Theoretical ideas under the inflation and savings category concur that inflation affects real deposit rates, which then affects the savings ratio and changes in the savings ratio affects the cost of capital and, ultimately, the volumes of investment (see Kaldor, 1959; De Gregorio, 1993; Gylfason, 1998 and Temple, 2000). According to Kaldor (1959), price stability lowers the share of nominal profits in income, which discourages production, thereby, resulting in economic stagnation. A rise in inflation reduces savings propensities (which inversely increases the urge to consume), while increasing the ratio of profit to income, which then stimulates investment spending, hence, higher economic growth (Kaldor, 1959). It seems Kaldor's analysis viewed economic agents as money illusion, that they are more worried with nominal rates of return than with real rates of return in their investment decisions. Using the same channel, Gylfason (1998) derives a divergent conclusion. Instead, inflation drives a wedge between marginal returns to real and financial capital, which distorts production, hence, a negative relationship between inflation and economic growth. The results from this category are, therefore, ambiguous.

The second category under the investment spending channel is based on the neoclassical growth model and considers the effect of monetary growth changes on the level of investment spending. The literature in this category is common for its reference to the role of money holdings in their analysis of the effects of inflation on economic growth, via investment spending. The seminal work in this category was pioneered by Tobin (1965). Tobin (1965) posits that money and capital are perfect substitutes such that increases in inflation uncertainty induces households to hold more capital than cash, thereby promoting capital formation and in turn, economic growth. In contrast, Stockman (1981) presents a cash-in-advance model which argues that money and capital are complementary; and uncertainties about inflation negatively affects the efforts of acquiring capital stock in an economy, thereby inhibiting economic growth. In the same vein, Zeira (1991) extends the cash-in-advance framework to deal with money holdings by sellers as well as buyers. Sellers are stuck with money they are paid until the next period, hence, inflation forces them to pay a share of the inflation tax, lowering their profitability and, thus, slowing down capital accumulation and economic growth (Zeira, 1991).

Complementary to the positive relationship between price instabilities and economic growth assertion by Tobin (1965), are also studies by Ungar and Zilberfarb (1993) as well as Aghion and Saint-Paul (1998), to name a few. Apart from the positive and negative relationships, the effects of inflation uncertainty on economic growth can be ambiguous, depending on the behaviour of financial market participants (Caballero, 1991). Furthermore, inflation and economic growth can be negatively related in the long-run, while positively related at cyclical frequencies, and this positive relationship may dissipate or even turn negative in economies

with underdeveloped financial markets (Dotsey, Sarte, 2000). It is, therefore, clear that the relationship among the variables is also ambiguous in this category.

The third category contends that inflation affects investment spending through the imperfections of the tax system. A rise in inflation results in an increase in the user cost of capital and tax liabilities, which reduces investment spending and in turn, pulls economic growth down (Feldstein, 1983). In advancement of this line of thought, the degree of international openness determines the magnitude and direction of tax effects. Given countries with similar tax structures, the effects of inflation are low in open economies, as compared to closed economies (Cohen, et al., 1997). In contrast to the negative relationship between inflation and economic growth supported by Feldstein (1983), Desai and Hines (1997) argue that, to take advantage of low real value of taxes, international capital may flow to countries with relatively high inflation rates, thereby spurring economic growth.

3. Inflation, Inflation Uncertainty and Economic Growth: Empirical Evidence

A review of the theoretical literature shows a lack of consensus on inflation, inflation uncertainty and economic growth nexus. In the same vein, empirical literature also points to ambiguous conclusions. We noted that the available literature on the relationship has three main strands. The first form is a set of studies which focuses on the impact of inflation without controlling for the role of inflation uncertainty. The second strand consists of studies which estimated the impact of inflation uncertainty on economic growth without controlling for the role of inflation. The last set of studies is more comprehensive, and it estimates the joint impact of both inflation and inflation uncertainty on economic growth. Accordingly, we will review the empirical literature in line with these three categories of studies.

3.1. Empirical Evidence on Inflation-Growth Nexus, without Controlling for the Role of Inflation Uncertainty

The empirical evidence on the inflation-growth link indicates that studies that do not control for inflation uncertainty finds three different possible outcomes, which assumes either a negative relationship, a combination of a positive and negative relationship, depending on the state of events, or obtains evidence of a thresholds effect. To the best of our ability, we did not find any empirical study which obtains an outright positive impact of inflation on economic growth in this category. A number of studies in this category, however, supports the notion of a negative relationship between these variables. Although there may be arguments in the

literature that are rooted in classical dichotomy that inflation does not yield any lasting effects on growth, there is a body of literature that debunks this idea. For example, Gylfason and Herbertsson (2001) argue that inflation impacts long-run growth through four channels, namely, the saving and real interest rates channel, the velocity and financial development channel, the government budget deficit channel, as well as the production channel. Gylfason and Herbertsson (2001) find that inflation erodes savings in the economy, which will signal households to slow down consumption, thereby hurting economic growth. Studies that, likewise, derived the same conclusion investigated the impact of inflation on economic growth via the endogenous growth model had obtained evidence of a negative relationship. For instance, Gillman et al. (2004) present a monetary model of endogenous growth and employ a fixed effects approach on a pack of panel data from the Organisation for Economic Co-operation and Development (OECD) and Asia-Pacific Economic Cooperation (APEC) countries over the period stretching from 1961 to 1997. The data from both member groups showed a negative impact of inflation on economic growth.

In the same vein, while incorporating the New Keynesian role of sticky prices due to menu costs, inflation reduces the reward for innovation, thereby lowering economic growth, as argued by Oikawa and Ueda (2018). Inflation also forces inflation targeting regimes to increase their interest rates resulting in a rise in the opportunity costs of research and development investments, which slows technological progress and negatively affects growth (Rocha et al., 2020). Further to the negative harm caused by inflation on economic growth, it is also interesting to note that countries that have experienced hyperinflation before are likely to be more disciplined in the implementation of price stabilisation policies (Guerrero, 2006). Using a panel data focusing on a number of countries from 1949 to 2002, Guerrero (2006) also finds evidence in support of the negative relationship between inflation and economic growth. Inflation also harms economic growth, since it lowers the marginal propensity to invest by firms (Barro, 2013).

Inflation also distorts long term growth through its dampening effect on human capital investment. Education is regarded as a long-term function of economic growth, and an increase in the cost of acquiring education through higher tuition fees limits long term growth. However, this effect is small (Sequeira, 2021).

Apart from these channels, the effects of inflation can be transmitted from crises, economic shocks and external determinants. For instance, any shocks on the prices of oil poses short run negative effects to oil importing countries, and short-run positive effects to oil abundant countries (Hayati, Nitami, 2021). Apart from oil price shocks, financial crises also explain the negative relationship between inflation and economic growth. Financial crises force central

banks to shift from their price stability mandates, and instead, respond to output fluctuations and financial stability (Boissay et al., 2021). In the end, it results in a time inconsistency problem, thereby losing all the objectives.

Some studies obtained mixed results. While analysing the sources of growth in Thailand, Ho (2018) discovers that inflation harms economic growth in the short-run, while exerting a positive impact in the long-run. This is not necessarily the case with South Africa, where Hodge (2006) finds mixed but contrasting results where inflation harms economic growth efforts in the long-run, while encouraging growth efforts in the short-run.

On the other hand, there is a body of empirical literature that challenges the notion of a linear relationship between inflation and economic growth. These studies found a non-linear relationship between inflation and economic growth, where the impact of inflation on growth is positive until a certain threshold and becomes negative afterwards. In line with this, Ndoricimpa (2017) employed a novel dynamic panel threshold regression model to examine the non-linearities in the inflation-growth nexus on African economies for different periods and confirmed the existence of a thresholds effect of inflation on economic growth. Similarly, Sarel (1996) examined the possibility of non-linear effects of inflation on growth and found that inflation rates below 8% yield an insignificant relationship, growth is exposed to harm if inflation exceeds 8%. Yilmazkuday (2013) also obtained the same threshold levels in modelling the relationship between inflation and economic growth. Synthesising Sarel's findings, Bruno and Easterly (1998) found that there is no compelling evidence on the effect of inflation on economic growth at lower ranges of inflation, while, in contrast, data on discrete high inflation episodes showed a strong and robust negative relationship between high inflation and economic growth.

Recently, Phiri (2020) obtained an inflation threshold of 7.64% at which economic gains are maximised for the Eswatini (formerly Swaziland) economy which is higher than the optimal inflation threshold of 5.30%, beyond which inflation harms economic growth obtained for South Africa by Phiri (2018) for South Africa. This is notwithstanding the fact that both South Africa and Eswatini are member states to the Common Monetary Area which uses the South African Rand as the base currency.

The thresholds also differ according to the level of development in an economy. The threshold is lower for developed economies as compared to developing economies (Khan, Senhadji, 2001). The same finding was also obtained by López-Villavicencio and Mignon (2011) between advanced economies and emerging economies, where a lower threshold applied for advanced economies as compared to emerging economies. The results found by Kremer

et al. (2013) also corroborate with the findings by López-Villavicencio and Mignon (2011), that developed economies have a lower threshold level of inflation compared to developing and emerging economies.

The studies that empirically tested the inflation-growth nexus without controlling for inflation uncertainty can, therefore, be grouped into three categories based on their findings. One category finds a negative relationship between inflation and economic growth, implying that economic growth decreases as the rate of inflation rises. The second category finds mixed results where inflation impedes or promotes growth in either the short or long-run. The third category challenges the existence of a monotonic relationship between inflation and economic growth. These studies suggest, rather, the existence of a non-linear relationship between inflation and economic growth. These studies suggest a threshold level of inflation below which inflation positively affects economic growth, while beyond this point inflation harms economic growth.

3.2. Empirical Evidence on Inflation Uncertainty-Growth Nexus, without Controlling for the Role of Inflation

Studies that investigate the relationship between inflation uncertainty and economic growth without controlling for the role of inflation draw inconclusive results. Some studies find a positive relationship between inflation uncertainty and economic growth, while others derive a negative relationship between the two variables.

Jansen (1989) queried if inflation uncertainty affects economic growth. The study employs the ARCH techniques on USA time series data from 1960 to 1988. The results of the study do not support the orthodox belief that inflation uncertainty harms economic growth. Rather, the evidence supports that inflation uncertainty results in an increase in economic growth.

Using the bivariate GARCH-M model on five Asian economies, namely India, South Korea, Malaysia, Singapore and the Philippines, for the period covering 1962 to 2000, Bredin et al. (2009) test the effect of macroeconomic uncertainty on economic growth. The study uses output uncertainty and inflation uncertainty as the explanatory variables on economic growth. Contrary to theoretical propositions by renowned scholars such as Friedman (1977), the study found evidence that inflation uncertainty is beneficial to economic growth, thereby supporting the theoretical underpinnings by Dotsey and Sarte (2000).

Inflation uncertainty stimulates economic activity in the form of increased production and decreased unemployment (Coulson, Robins, 1985). The theoretical explanation behind this relationship is in line with propositions by Dotsey and Sarte (2000) that inflation uncertainty

prompts households to increase their precautionary savings, providing funds for investment spending, which stimulates economic growth.

In contrast, a study by Baharumshah et al. (2011) employs the least absolute deviation autoregressive conditional heteroscedastic model to investigate the relationship between inflation uncertainty and economic growth on the economies of Malaysia, Singapore, Thailand, Indonesia and the Philippines (ASEAN-5). The study focuses on different periods of the economies and obtains a significant negative effect of inflation uncertainty on economic growth. The study suggests greater stability in the economy to stimulate economic growth. Studies deriving the same conclusion include studies by Apergis (2005), Grier and Perry (2000) as well as Grier et al. (2004), among others.

Inflation uncertainty also exerts a regime-dependent impact to economic growth. Inflation uncertainty has adverse effects on economic growth mainly during the periods of economic contraction, posits Chowdhury et al. (2018), using UK and USA data for the period 1970 to 2013. In the same vein, Caglayan et al. (2016) indicate that inflation uncertainty exerts a negative and regime-dependent impact on output growth, using USA data stretching between 1960 and 2012. The literature in this category, therefore, derives two contrasting findings.

3.3. Empirical Evidence on Inflation, Inflation Uncertainty and Growth Nexus

The third category estimates the joint impact of both inflation and inflation-uncertainty on economic growth. Most of the studies that estimated the joint impact of these variables found a negative impact of the variables on economic growth. Other studies in the same vein, to a lesser extent, found results where inflation negatively harms economic growth, while inflation uncertainty encourages growth. Some studies found mixed results within the same panel of data.

Judson and Orphanides (1999) examined the relationship between inflation, inflation uncertainty and economic growth and drew two conclusions. First, inflation uncertainty is negatively correlated with economic growth at all levels of inflation, and on all types of economies – whether advanced, emerging or developing. Second, inflation rates above double digits affect economic growth negatively, which implies the presence of threshold effects of inflation on economic growth. Partly in agreement, Wilson (2006) admits that inflation uncertainty harms economic growth while increases in the rate of inflation, at any level, harms economic growth as well.

From a closer observation, while agreeing that inflation harms economic growth in both the short and the long-run, Iyke and Ho (2019) further investigate the existence of differential effects on inflation, inflation uncertainty and economic growth nexus. Inflation uncertainty

harms economic growth in the long-run, however, it has differential effects in the short-run. Furthermore, the study finds that the harm from increases in inflation uncertainty outweighs the benefits derived from reducing inflation uncertainty. This finding influences policy-makers to pursue policies that strictly ties down inflation uncertainty. Synthesising the finding, Mandeya and Ho (2021) also find that both inflation and inflation uncertainty breed an inconducive environment for economic growth in both the short- and the long-run.

In high inflationary regimes, firms channel resources towards portfolio management and speculation at the expense of activities that are 'engines to sustained growth', such as research and development, leading to lower economic growth (De Gregorio, 1993). Both inflation and inflation uncertainty harms economic growth but De Gregorio (1993) points out that quantitatively, the effects of inflation are more severe. However, Rother (2004) takes a different stance on the severity of inflation uncertainty, compared to the severity of inflation on economic growth. Instead, inflation uncertainty is more severe in its harm on economic growth, since it leads to an unanticipated redistribution of wealth, impeding growth even if inflation is low. Further, the study ascertains that high inflation uncertainty distorts inflation expectations, which increases the risk premia on long-term nominal contracts and costs of hedging against inflation risk.

In the same vein, Živkov et al. (2020) find that inflation imposes a significantly smaller negative effect on economic growth compared to inflation uncertainty, further confirming the Friedman hypothesis. Along the same line, Grier and Tullock (1989) further argue that it is inflation uncertainty, and not inflation, that significantly lowers economic growth. This is also in line with the findings by Grier and Grier (2006) which stresses that the effect of inflation on economic growth is transmitted through inflation uncertainty. In essence, these studies assert that inflation has no impact on economic growth if it is predictable and stable.

Apart from these, panel data studies obtained the same results for all countries under study, some studies found mixed results within a set of panel data from different countries. For example, Fountas et al. (2004) found that out of six European countries (Germany, the United Kingdom, the Netherlands, Italy, Spain and France), inflation uncertainty harmed economic growth only in the United Kingdom, while in the other countries it did not have any harm on economic growth.

The effects of inflation can also differ from the effects of inflation uncertainty on economic growth, within the same sample of data. Baharumshah et al. (2016), in a panel of 94 emerging and developing countries, confirms that inflation harms economic growth while, in contrast, inflation uncertainty promotes growth through its inducement of precautionary savings which

provides funds for investment spending. In support, Fountas (2010) also found strong evidence that inflation uncertainty does not negatively affect economic growth.

The majority of studies in this category points to one category – the negative impact of both variables on economic growth. The second segment of studies found mixed results where inflation uncertainty benefits growth, while inflation harms growth, and the third strand represents results that are mixed for the same variable within the same panel data.

Conclusions

In this paper, we reviewed the literature on inflation, inflation uncertainty and economic growth nexus. From the body of available theoretical literature, we identified that the effects of inflation and inflation uncertainty are passed over to economic growth mainly through two channels, which are the price information role as well as the investment spending channel. Studies that base their analysis on the informational role of inflation and inflation uncertainty on economic growth derive mixed results. These studies either reason that price instabilities distort the price informational role in the markets, leading to market inefficiencies and sluggish growth, or it leads to the reallocation of investment portfolios towards the productive use of capital assets and in turn, stimulates economic growth. Literature on the investment spending channel follows mainly three strands which are: the savings channel, the monetary-growth model and the imperfect tax system. Ambiguous conclusions are also drawn on inflation, inflation uncertainty and economic growth nexus despite the channel followed.

Empirical evidence can be grouped into three categories. The first category consists of studies which estimated the impact of inflation on economic growth without controlling for the role of inflation uncertainty. These studies found three outcomes of either a negative relationship between inflation and economic growth, mixed results where there is evidence of a contrasting relationship between the short or the long-run, or the existence of threshold effects of inflation, where inflation starts to harm economic growth beyond a certain level of inflation. The second category involves studies that estimated the impact of inflation uncertainty on economic growth without controlling for the role of inflation. These studies also point to two outcomes where inflation uncertainty either impedes or benefits economic growth. The third category is the most comprehensive one, and it examines the joint impact of both inflation and inflation uncertainty on economic growth. The results from this category are convincing on the relationship between inflation and economic growth, which is mainly negative in almost all the studies. However, the effect of inflation uncertainty on economic growth still remains ambiguous, even in this category.

It is also interesting to observe that, although the empirical literature on the inflation-growth nexus includes mixed results, the majority of these studies find a negative relationship between the two variables. The lack of consensus on the impact of inflation uncertainty on economic growth makes it difficult for policy-makers in designing monetary policy. The differences in the results could be due to the differences in the methodologies employed.

We, then, advise that future studies should evaluate the robustness and suitability of methodologies used in modelling the inflation, inflation uncertainty and economic growth nexus. The Literature reviewed also points out that central banks are bound to neglect the price stability objective if faced with a financial crisis or any factor that disrupts production like the Covid-19 pandemic. Based on this, we advise that central banks craft policies that can deal with output disruptions without abandoning the price stability goal.

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