Inflation and growth in developing economies: A tribute to Professor Thirlwall

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INFLATION AND GROWTH IN DEVELOPING ECONOMIES: A TRIBUTE TO PROFESSOR THIRLWALL

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ABSTRACT

This paper pays tribute to Professor Thirlwall's substantive work in growth and development economics by providing a review of his book *Inflation, Saving and Growth in Developing Economies* (1974b) [hereafter ISGD]. Indeed, the hallmark of a good economics book is whether its theoretical content and empirical predictions made several decades ago remain relevant when assessed against more recent evidence. Thirlwall's ISGD book exhibits all these qualities. It emphasises the importance of distinguishing between different types of inflation. Structural inflation and, to a lesser extent, cost inflation, should be seen as the inevitable outcomes of the growth and development process, whereas demand inflation may act as a direct stimulus to growth, as predicted by the Kaldor-Thirlwall

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model of forced saving and the inflation tax model. These theoretical insights remain highly relevant in today's developing economies. Studies tend to show that inflation thresholds, up until the point where the effect of inflation on growth is positive, tend to be higher in developing economies relative to advanced countries, owing to a combination of structural, cost and demand-side sources of inflation. The analysis further argues that inflationary finance of development, as advanced in ISGD, remains a viable development strategy when open-economy constraints are considered.
Keywords: Developing economies, inflation, investment, growth, saving, Thirlwall, threshold.
JEL Classification: O11, O23, O47.

INFLACIÓN Y CRECIMIENTO EN ECONOMÍAS EN DESARRALLO: UN TRIBUTO AL PROFESOR THIRLWALL

RESUMEN

En este artículo rindo un tributo a la sustancial obra del Profesor Thirlwall sobre la economía del crecimiento y del desarrollo, para lo cual suministro una revisión de su *Inflation, Saving and Growth in Developing Economies* (1974b) [ISGD en adelante]. En realidad, la calidad de un buen libro de economía consiste en si su contenido teórico y sus predicciones empíricas formuladas hace varias décadas son relevantes cuando se evalúan a la luz de una evidencia más reciente. El libro ISGD de Thirlwall tiene todas estas cualidades. Enfatiza la importancia de distinguir entre diferentes tipos de inflación. La inflación estructural y, en menor medida, la inflación de costos deben considerarse como resultados inevitables del proceso de crecimiento y desarrollo, mientras que la inflación de demanda puede actuar como un estímulo directo al crecimiento, tal como lo pronosticaron el modelo Kaldor-Thirlwall de ahorro involuntario y el de impuesto de inflación. Estos discernimientos teóricos aún son muy relevantes en las economías en desarrollo actuales. Varios estudios muestran que los umbrales de inflación, hasta el punto en que el efecto de la inflación sobre el crecimiento es positivo, tienden a ser mayores en las economías en desarrollo que en los países avanzados, debido a una combinación de fuentes de inflación estructurales, de costos y de demanda. El análisis argumenta,

además, que el financiamiento inflacionario del desarrollo, tal como se plantea en ISGD, sigue siendo una estrategia de desarrollo viable cuando se consideran restricciones de economía abierta.
Palabras clave: economías en desarrollado, inflación, inversión, crecimiento, ahorro, Thirlwall, umbral.
Clasificación JEL: O11, O23, O47.

1. INTRODUCTION

I first met Professor Thirlwall in October 1997 as a PhD student at the University of Kent, School of Economics. Back in South Africa, as a young and inexperienced lecturer at the University of Fort Hare (the alma mater of former President Nelson Mandela), I had read his fascinating book *Inflation, Saving and Growth in Developing Economies* (1974b) [hereafter ISGD] and was determined to pursue a PhD in Economics on the same topic at the University of Kent under Prof Thirlwall's supervision. To my relief, my PhD application was accepted by Prof Thirlwall himself who, at the time, acted as the Director of Graduate studies.

Under Prof Thirlwall's excellent tutelage and supervision I managed to complete my PhD, with a thesis topic entitled *Money, Inflation and Growth in South Africa* (Nell, 2000a). I fondly remember our student-supervisor 'arrangement' back then. I had to submit a chapter to Prof Thirlwall and would always get handwritten feedback within a week, with an attached invitation to either discuss the chapter in his office or we would go to one of the idyllic countryside pubs in the surrounding area of Canterbury. It was always a bit of an anxious wait for me to find out the venue of our discussion. If the venue was Prof Thirlwall's office, I knew there were probably quite a few problem areas that needed to be discussed. Luckily for me, we more often than not ended up in one of the countryside pubs! Since my student days at University of Kent, and like many of his former PhD students, Tony and I have become close friends and also collaborated on a few research papers, in which we analyse the determinants of productivity of investment differences across countries and challenge the neoclassical way of testing for diminishing returns to capital in cross-country growth regressions (Nell and Thirlwall, 2017, 2018).

Given my close association with Tony since 1997, it is a great privilege and honour to contribute to this special issue in *Investigación Económica* on his substantive work in growth and development economics. Specifically, in this contribution I will focus on some of the main predictions in Thirlwall's (1974b) ISGD book and evaluate these against the existing empirical evidence on the inflation-growth nexus in developing economies. Indeed, the hallmark of a good economics book is whether its predictions made several decades ago are supported by the evidence over a more recent period. This paper shows that Thirlwall's (1974b) ISGD book distinguishes itself as such a book.

Starting with Fischer (1993), there has been a proliferation of empirical studies since the early 1990s that have focused on the effect of inflation on economic growth in developed and developing countries (for useful surveys, see Temple, 2000; Seleteng, Bittencourt, and van Eyden, 2013; Akinsola and Odhiambo, 2017; Ndoricimpa, 2017; Mandeya and Ho, 2022). Surprisingly, Thirlwall's (1974b) major contribution on inflation and growth in developing countries has largely gone under the radar and is rarely mentioned in any of the empirical studies and surveys since the early 1990s, although there are some notable exceptions (Nell, 2000b; Temple, 2000; FitzGerald, 2006; Ghatak and Sánchez-Fung, 2007). Both Temple (2000) and FitzGerald (2006), however, downplay the importance of inflationary finance and, in effect, one of the key tenets of ISGD *i.e.* that 'mild' inflation may be beneficial for growth in developing economies.

One suspects that another reason why ISGD has largely gone unnoticed in the more recent literature is because it was published at a time when many developing countries struggled with imported inflation and the fact that economists are generally infamous for their short memories. To underline this point, consider an extract from Cobbe's (1976, pp. 97-98) book review of ISGD:

> The unavoidable time lags between research and writing and actual publication sometimes results in books appearing at rather inopportune times. To some extent this has been the fate of Dr. Thirlwall's latest interesting contribution to the development debate. It is perhaps unfortunate that this book, on which work was started in 1971, and which relies heavily on empirical evidence from the 1950s and early 1960s, should appear in the middle of what may well be the most severe bout of inflation the world has

> ever experienced. One regrets this, because the book is a polemic, at least in part, unashamedly advancing the hypothesis that a somewhat faster rate of inflation than that common in most non-South American less developed countries (LDCs) can, under the right conditions, lead to a more rapid attainment of the generally accepted goals of development. Since many LDCs are currently suffering considerable difficulties as a result of imported inflation, this hypothesis may not be taken as seriously as it should be… Nevertheless, the major conclusion that most LDC governments have been excessively conservative financially to the detriment of their economies' growth is probably justified, and Dr. Thirlwall is to be thanked for reopening the controversy about inflation and growth in such an interesting and provocative way.

It is important to stress, however, that although the main focus of ISGD is on the benefits of mild inflation during the 1950s and 1960s when most non-Latin American countries inflated at a slow rate, the analysis does not neglect the relevance of structural and cost-push sources of inflation for policy purposes. In fact, a strong message of Thirlwall's (1974b) ISGD book is that the growth benefits of mild inflation would only materialise if the stimulus came from expansionary demand-side policy measures. Structural or supply-side inflation, on the other hand, is the natural outcome of the development process itself and may well be the price to pay for faster growth, with specific reference to the high-inflation experiences of Latin American countries during the 1950s and 1960s. Monetarists, in contrast, contend that inflation originates from the demand side and that excessive inflation is the result of irresponsible macroeconomic policy measures in Latin American countries (see the overviews of the monetarist-structuralist debate in Thirlwall, 1974b; Johnson, 1984; Wachter, 1976; Ghatak and Sánchez-Fung, 2007; Nell, 2004, 2018). The monetarist-structuralist debate of the 1950s and 1960s not only remains highly relevant in today's developing countries, but in some circumstances also applies to advanced countries. A case in point is the recent debate on the most efficient way to handle the surge in world-wide inflation associated with the COVID-19 pandemic and the War in Ukraine, and whether restrictive demand-side policies by Central Banks in developed and developing countries would be effective, given that inflation originates from supply-side bottlenecks and cost-

push forces (for more on this debate, see DeLong, 2023; Vernengo and Pérez Caldentey, 2023; Chowdhury and Sundaram, 2023; Blanchflower and Bryson, 2023).

Thirlwall's (1974b) ISDG book makes specific predictions about the threshold inflation rate one might expect in developing countries, using cross-country and time-series data. Because the direct demand-side stimulus to growth is obscured by the presence of structural and cost-push sources in cross-country and time-series data, the threshold inflation rate would tend to be relatively high in developing countries. Moreover, because structural inflation is the outcome of growth and development rather than a direct stimulus, the effect of inflation on growth up until the threshold may not be significant. Beyond the threshold, however, the distortionary effect of inflation on growth dominates.

The selective survey of empirical studies since the early 1990s in this paper generally supports Thirlwall's (1974b) key predictions made almost 50 years ago. Relatively high inflation thresholds in developing countries of up until 6%-21%, which are in many cases positive and statistically significant but insignificant in other cases, may capture the presence of demand as well as structural inflation. Beyond the threshold, the effect of inflation on growth is unambiguously negative and statistically significant. When the threshold is examined in more advanced economies only, the positive and significant effect of inflation on growth occur up until relatively low thresholds of 1%-5%, presumably because structural and cost inflation that dominate in developing countries are less pervasive in richer countries.

2. INFLATIONARY FINANCE OF DEVELOPMENT

This section provides a critique of theoretical models that formalise the growth and development benefits of mild inflation. Specific attention is paid to the inflation tax model originally proposed by Bailey (1956) and Cagan (1956), as well as Kaldor's (1955-1956) model of forced saving, as advanced and extended on by Thirlwall (1974a, 1974b). In Thirlwall's (1974b) ISGD book, both these models are singled out as plausible channels through which mild inflation may yield growth benefits in developing countries. Beyond a certain threshold inflation rate, however, inflation imposes a cost on growth.

Before the discussion proceeds with an analysis of the benefits of mild inflation, it is first necessary to acknowledge the monetarist-structuralist debate that took place in the 1950s and 1960s to explain the high-inflation experiences of many Latin American countries at the time. As shown later on, the arguments contained in the monetarist-structuralist debate are not only informative to interpret the empirical evidence of inflation-growth studies in developing countries, but also to evaluate the effectiveness of restrictive demand-side policies that have been implemented by Central Banks worldwide to stem inflationary pressure from the COVID-19 pandemic and the War in Ukraine.

The penultimate part of section 2 examines whether Thirlwall's (1974b) call for inflationary finance in developing countries is compatible with the predictions of his seminal paper, in which an economy's long-run growth rate is demand constrained by its balance of payments (Thirlwall, 1979). The concluding part of section 2 briefly discusses the costs of inflation and emphasises the importance of testing for a threshold inflation rate in empirical work.

2.1. The monetarist-structuralist debate

The orthodox or monetarist view of the money supply process, which is closely associated with the work of Friedman (1959a, 1959b) and Friedman and Schwartz (1963, 1982), states that the money supply is under the direct (exogenous) control of the Central Bank through its control over the monetary base. A key assumption of monetarism is that the economy is always operating at full capacity in the long run, so that expansionary monetary policy has no effect on output and employment. The only effect of a one-percentage point increase in the money growth rate by the Central Bank would be to increase the inflation rate by the same amount. Or put in another way, the real economy is super-neutral with respect to a permanent change in the money growth rate (Bullard, 1999; De Grauwe and Polan, 2005). The super-neutrality proposition of monetarism embraces a main tenet of orthodox economics in general, namely that the supply side of the economy is fixed or insensitive to demand in the long run (also see the long-run super-neutrality prediction of Sidrauski's, 1967 model).

The post-Keynesian/structuralist view of the money supply process presents a fundamental departure from the monetarist approach (Wa-

chter, 1976; Moore, 1988; Palley, 1994; Nell, 2000-2001; Ghatak and Sánchez-Fung, 2007; Vera, Guijarro, and Pérez, 2022). According to post-Keynesians and structuralists, the money supply is not under the direct control of the Central Bank but to a large extent endogenous (responsive) to the demand for bank credit. In this framework, the Central Bank sets the supply price of reserves/credit through its interest rate policy and stands ready to supply reserves/credit on demand. Even in a situation where the monetary policy instrument is not the interest rate, but the monetary base, Central Banks will tend to accommodate the demand for bank credit to preserve the liquidity of the financial system and to avoid slow growth and high unemployment rates.

The main policy implications of the two opposing views are the following. If the money supply is under the direct control of the Central Bank, consistent with the monetarist view, observed inflation is most likely caused by demand expansions in excess of fixed supply capacity. In this scenario, demand-side policies have no long-run effects on real variables such as output and the unemployment rate. To avoid the price level from rising, Friedman (1959a) proposes a fixed monetary growth rule, in which the money supply (through the Central Bank's control over the monetary base) is constrained to grow at the same rate as real output.

In contrast, when the money supply is endogenous, consistent with the post-Keynesian/Structuralist view, the underlying cause of the inflation rate may not necessarily originate from excess demand financed by excessive monetary expansion, but rather from structural sources. In this case, increases in the money supply *accommodate* the inflationary process, in which the supply side of the economy is slow to adjust to demand due to several supply rigidities and bottlenecks in the system. Because inflation does not originate from pure excess demand pressure, restrictive monetary policy may slow down the natural growth and development process of the economy.

To illustrate why inflation may be the inevitable outcome of the growth and development process, consider four prime examples of structural inflation in a typical developing economy (Campos, 1964; Johnson, 1967; Argy, 1970; Wachter, 1976; Thirlwall, 1974b; Johnson, 1984; Ghatak and Sánchez-Fung, 2007; Nell, 2004, 2018). The first example of structural inflation relates to the dispersion of demand between sub-markets (Thirlwall, 1974b). The process of development is often characterised by

resource shifts (capital and labour) from declining to expanding sectors. If capital and labour are immobile, and prices and wages are rigid downwards in the declining sector, the development process is likely to be accompanied by rapid inflation, even when aggregate demand matches aggregate supply. Although the supply side of the economy is slow to adjust, wage and price increases in the expanding sectors are necessary to reallocate labour and capital in the most efficient way (Johnson, 1984).

Secondly, consider a situation in a developing economy where faster demand growth in the domestic economy induces physical capital accumulation to meet demand (Nell, 2004, 2018). Because imported capital goods from abroad with embodied technical progress and intermediate goods are more productive than domestic resources, a large proportion of investment demand must be financed with foreign exchange earnings. However, foreign exchange shortages due to an undiversified export sector, together with the high demand for imported capital and intermediate goods, cause the nominal exchange rate to depreciate and the price of imported goods to rise. The initial rise in import prices triggers a wage-price spiral and a self-perpetuating inflationary process that is accommodated by endogenous increases in the money supply. For monetary policy purposes, some structural inflation due to foreign exchange shortages must be tolerated and viewed as part of the natural growth and development process.

Thirdly, structuralists often point to the underdeveloped nature of the agricultural sector in low-income economies as a main source of inflationary pressure (Cardoso, 1981; Canavese, 1982; Johnson, 1984). According to this view, the process of industrialisation in underdeveloped economies is typically characterised by rapid urbanisation and rising demand for food. Given the inelastic nature of agricultural supply and downward rigidities in non-agricultural prices, the high demand for food causes upward pressure on the absolute price level and, in reaction to rising living costs, wages in the urban sector increase as well. Because prices in industry are set as some mark up over wage costs, the initial increase in the demand for food offsets a wage-price spiral that makes the inflationary process self-perpetuating. The wage-price spiral is accommodated by endogenous increases in the money stock.

Fourthly, structuralist writings emphasise the effect of autonomous increases in the price of food and imported goods on the fiscal deficit

and how this leads to an increase in the inflation rate (for an informative review, see Ghatak and Sánchez-Fung, 2007). The initial rise in the domestic price level from structural sources would tend to widen the public deficit. This occurs because the expenditure side of the budget is typically fixed in real terms, meaning that the money value rises in the same proportion as prices. Taxes, on the other hand, are set in money terms and only adjust slowly to rising prices, causing the real value of taxes to fall. The net effect is that the fiscal deficit tends to increase in real terms, thus forcing the Central Bank to finance the deficit through expansionary monetary policy, which sets in motion a self-perpetuating inflationary process.

Monetarists, on the other hand, strongly contest the structuralist view of the inflationary process (Thirlwall, 1974b; Wachter, 1976; Johnson, 1984; Ghatak and Sánchez-Fung, 2007; Thirlwall and Pacheco-López, 2017; Nell, 2004, 2018). The argument is advanced that the initial increase in the real value of the fiscal deficit is the result of imprudent fiscal manag ment and inflation from exogenous increases in the money stock by the Central Bank. The initial fiscal deficit induces an endogenous increase in the money supply to finance it, which causes a further rise in the inflation rate and a widening of the fiscal deficit in real terms. If the process is allowed to continue unabated it may lead to hyperinflation, such as those experienced in many Latin American countries (Aghevli and Khan, 1977; Phylaktis and Taylor, 1993). Along the same lines, monetarists typically do not regard supply inelasticities in the agricultural sector and foreign exchange shortages as natural characteristics of underdevelopment, but rather the outcome of irresponsible macroeconomic policies. To moderate high inflation rates from excessive expansions in the money stock, price controls are often imposed on food prices which, in turn, lead to supply inelasticities in the agricultural sector. Foreign exchange bottlenecks, on the other hand, develop because inflation causes an overvalued exchange rate and a deterioration in the international competitiveness of the export sector. From a monetarist perspective, it is inflation that *causes* structural rigidities in the economic system, rather than the other way around.

It is clear from the examples of structural inflation above and the counterarguments of monetarists that the correct diagnosis of inflation is crucial for the conduct and efficiency of monetary policy. If inflation is diagnosed as a pure excess demand phenomenon, whereas in reality it

is structural in nature, then overly conservative inflation and monetary growth targets may constrain the natural growth and development process.

Structuralist theories of inflation imply that inflation should be higher in developing countries than in developed countries. Indeed, this is what the recent evidence presented by De Carvalho, Ribeiro, and Marques (2018) confirms: Inflation, on average, is much higher in lower-income countries than advanced economies. In addition, empirical evidence in favour of structuralist theories of inflation would have to show that the money supply is endogenously determined, and that the underlying cause of inflation is not demand-pull but structural in nature. In this scenario, increases in the money supply accommodate structural sources of inflation due to supply rigidities and bottlenecks in the economy.

Looking at the monetarist-structuralist debate in Latin American countries during the 1950s and 1960s, it would perhaps be a safe bet to take a middle way and attribute high inflation rates in these economies to structural rigidities in the economic system as well as exogenous expansions in the money stock (Thirlwall and Pacheco-López, 2017). But what about other developing economies that have historically not recorded excessive (hyper) inflation? There is a growing body of empirical evidence which shows that the money supply is endogenously determined in non-Latin American developing countries (see the comprehensive survey in Vera, Guijarro, and Pérez, 2022). Moreover, structural and cost-push sources of inflation appear to play a dominant role relative to monetary factors in low-income African countries (Heintz and Ndikumana, 2011; Durevall, Loening, and Yohannes, 2013; Nguyen *et al.*, 2017; Ndikumana *et al.*, 2023), as well as in emerging market economies such as South Africa (Nell, 2004, 2018).

The secondary role of monetary factors as an explanation of inflation in low-income countries is often attributed to the inability of an underdeveloped banking system to transmit monetary policy shocks to the real economy (Durevall, Loening, and Yohannes, 2013; Mishra and Montiel, 2013; Nguyen *et al.*, 2017; Bhattacharya and Jain, 2020). This view certainly has merit, but it should also be kept in mind that all inflations usually require some expansions in the money supply, either through exogenous increases by the Central Bank or endogenously driven by structural and cost-push sources. Central banks in low-income and emerging market economies may therefore *choose* not to intervene,

given the dominance of structural and cost-push forces of inflation, otherwise restrictive monetary policy measures may thwart the growth and development process.

A case in point is the different empirical results that Bhattacharya and Jain (2020) obtain for advanced countries and emerging market economies when they analyse the effect of restrictive monetary policy in response to a rise in food inflation. For advanced countries, their results show that an increase in the monetary policy (interest) rate led to further increases in food inflation as well as overall inflation, because the disinflationary effect of contractionary demand-side measures was more than offset by a rise in production costs. In contrast, for emerging market economies the monetary policy transmission mechanism is statistically insignificant, which Bhattacharya and Jain (2020) attribute to the underdeveloped nature of their financial systems. However, it is difficult to believe that the emerging market economies included in their sample (Brazil, Russia, India, China, South Korea, Chile, Mexico, Turkey and Hungary) suffer from an underdeveloped financial system in the same way as a typical low-income country does. Rather, the Central Banks in their group of emerging market economies may have chosen to be less aggressive in their policy responses because the underlying cause of inflation is not demand-pull but structural or cost-push in nature. We are back to a structuralist interpretation, in which Central Banks tend to accommodate inflationary pressure that originates from the supply side.

The structuralist interpretation provided here implies that the twin objectives of low inflation and fast growth may not be obtainable through restrictive macroeconomic policy measures. Instead, what is required is a coordinated, economy-wide anti-inflationary programme that directly addresses the rigidities that originate in the agricultural sector, trade sector, labour market and product market (Nell, 2018).

To summarise, the heated debate between monetarists and structuralists that took place in the 1950s, 1960s and some part of the 1970s to analyse the high-inflation experiences of many Latin American countries is just as relevant in today's developing countries. Although the policy instrument of many Central Banks is no longer the monetary base but the interest rate, the influence of monetarism is still evident in the belief that the underlying cause of inflation is excess demand, and that Central Banks are able to effectively control this source of inflation

through their control over interest rates (Nelson and Schwartz, 2008; Jahan and Papageorgiou, 2014). This point is underscored by recent developments in the world economy to moderate the surge in inflation from supply-side bottlenecks that developed after the COVID-19 pandemic and the sharp rise in food and energy prices (cost inflation) related to the War in Ukraine. Central Banks in advanced economies, such as the United States (US), the United Kingdom (UK) and European Union, have reacted by raising their monetary policy rates.

In a special issue organized by the editors of *Review of Keynesian Economics* (2023) on the effectiveness of restrictive monetary policy measures in advanced countries, the contributors seem to be unanimous in their view that restrictive demand-side policy measures may not have the desired effect, despite the view by Central Banks that generous COVID-19 relief measures created excess demand (DeLong, 2023; Vernengo and Pérez Caldentey, 2023; Chowdhury and Sundaram, 2023; Blanchflower and Bryson, 2023). In fact, restrictive demand-side policy measures in the presence of structural and cost-push inflation would most likely cause a recession and generate further inflationary pressure by raising production costs, as underlined by the empirical evidence on food inflation in advanced countries discussed above (see Bhattacharya and Jain, 2020). The only way to maintain growth and employment levels and subdue inflationary pressure at the same time is to design policy measures that *directly* address supply-side bottlenecks and cost inflation (*e.g.* by speeding up the switch to renewable energy sources), with monetary policy playing an accommodating role. Allowing inflation to rise from supply-side bottlenecks may also assist in allocating labour and capital in a more efficient way and eventually moderate inflationary pressure.

The overly conservative monetary policy stance in advanced economies may further cause undesirable ripple effects in underdeveloped and emerging market (UEM) economies. Large interest rate differentials between UEM economies and advanced countries could trigger another round of imported inflation in UEM economies through capital outflows and nominal exchange rate depreciations (Chowdhury and Sundaram, 2023). To counter imported inflation triggered by advanced countries, UEM economies may be forced to raise their own monetary policy rates as well. The importance of the monetarist-structuralist debate in present-day economies is self-evident.

2.2. The benefits of mild inflation

A main premise in Thirlwall's (1974b) ISGD book is that the growth benefits of mild inflation come from demand inflation instead of structural or cost-push inflation. Structural inflation is the unavoidable outcome of the growth and development process itself. To reduce structural inflation through restrictive demand-side policy measures would be to impair growth. But there is nothing in the process of structural inflation and pure cost inflation (autonomous increases in unit labour costs and rising food and energy prices) that directly stimulates growth in a causal sense (Thirlwall, 1974b, p. 233).

To formalise the growth-effects of demand inflation *à la* Thirlwall (1974b), consider an initial equilibrium position, using Harrod's (1939) three different growth rates and some of the modifications suggested by McCombie (2011):

$$(g_d = g_w = g_s) < g_n \qquad [1]$$

Where g_d is the growth rate of demand or actual growth rate; g_w is the warranted growth rate; g_s is the growth rate of supply; and g_n is the natural growth rate. The warranted growth rate is the rate of growth that keeps entrepreneurs satisfied in the sense that their capital is fully utilised, so that their plans to invest (i^P) are equal to their plans to save (s^P). Any deviation of demand growth (g_d) from the warranted growth rate (g_w) would cause entrepreneurs to revise their investment plans. The natural growth rate (g_n) is the maximum potential growth rate that an economy can achieve, given the rate of growth of population, physical and human capital accumulation, and technological progress. Note that the maximum or natural growth rate is a *hypothetical* growth rate, which means that a typical underdeveloped economy would tend to grow below this rate in the long run (see McCombie, 2011).

Suppose a monetary or fiscal stimulus initially raises demand growth above the warranted growth rate and the rate of growth of supply:

$$(g'_d > g_w = g_s) < g_n \qquad [2]$$

Plans to invest now exceed plans to save ($i^P > s^P$). One way to finance

the deficit is to borrow from domestic and foreign capital markets, but these sources of finance involve interest payments and future debt obligations. An attractive alternative is to allow inflation from excess demand pressure in the product market to raise the actual saving-to-income ratio (s) by redistributing income from wage earners to profits earners and from the private sector to the government sector. In effect, the inflationary pressure from excess demand pulls up the warranted growth rate and the growth rate of supply:

$$(g'_d = g'_w = g'_s) < g_n \qquad [3]$$

Consistent with the main hypothesis in León-Ledesma and Thirlwall (2002), equation [3] implies that the growth rate of supply is endogenous to the growth rate of demand through static economies of scale associated with large scale production techniques and lower average production costs, as well as dynamic economies of scale from a faster rate of capital accumulation, embodied technical progress and learning-by-doing effects. Formally, Setterfield (2006) shows that the growth rate of supply adjusts to the growth rate of demand through a rise in the Verdoorn coefficient (for more details, see McCombie, 2011).

The discussion now turns to a more detailed examination of the Kaldor-Thirlwall model of forced saving and the inflation tax model. Although ISGD highlights these two models as the main channels through which inflation could stimulate development, it also covers other Keynesian views and neoclassical monetary growth models of inflationary finance. The discussion below briefly incorporates some of these additional views on the growth benefits of mild inflation, as well as more recent ones that have gained prominence after the publication of ISGD.

2.2.1. The Kaldor-Thirlwall model of forced saving

Suppose the Central Bank decides to implement more expansionary demand-side policy measures to finance development through inflationary means. In Thirlwall's (1974a, 1974b) Kaldorian-type model (Kaldor, 1955-1956), the initial response of the private sector to the demand-side stimulus is to raise planned investment relative to planned

saving to match the increase in demand for goods. Excess demand in the product market generates inflation, which redistributes income from wage earners to profit earners through a fall in real wages. If the marginal propensity to save out of profit income exceeds the marginal propensity to save out of wage income, the aggregate saving ratio rises. Thus, investment finances itself through a rise in the saving ratio. Or, put in another way, inflation finances business fixed investment and faster economic growth.

Formally, Thirlwall (1974a, 1974b) shows that the extra increase in the saving ratio for each percentage point increase in the inflation rate can be calculated from the following equation:

$$\frac{\partial\left(S_t/Y_t\right)}{\partial p} = (\alpha - 1)t\left(\frac{W_0}{Y_0}\right)e^{p(\alpha-1)+at}(s_w - s_r) \qquad [4]$$

Where S_t/Y_t is the saving-to-income ratio at time t; p is the inflation rate; α is the wage-price coefficient; W_0 is the initial wage bill; Y_0 is the initial income level; a is autonomous wage growth; s_w is the marginal propensity to save out of wages; and s_r is the marginal propensity to save out of profits.

It is apparent from equation [4] that the success of inflationary finance will crucially depend on the response of wage growth with respect to the rate of inflation (α) and the difference between the marginal propensity to save out of wages and the marginal propensity to save out of profits. Without money illusion ($\alpha = 1$) or with equal saving propensities across wage earners and profit earners ($s_w = s_r$), the extra increase in the saving ratio for each percentage point increase in the inflation rate is zero: $\partial(S_t/Y_t)/\partial p = 0$. On the other hand, with money illusion ($\alpha < 1$) and a higher saving propensity of profit earners relative to wage earners ($s_r > s_w$), inflation finances investment through an increase in the saving ratio: $\partial(S_t/Y_t)/\partial p > 0$. The calibration exercises of equation [4] in Thirlwall (1974b) and Thirlwall and Pacheco-López (2017) suggest that, for reasonable parameter values, there is some scope to raise the saving ratio by a non-trivial amount without reverting to excessive inflation.

One objection that has been raised against the Kaldor-Thirlwall model is that the money illusion assumption ($\alpha < 1$) only holds in the

short run (Woodfield and McDonald, 1978; Johnson, 1984). Critics argue that wage earners will resist real wages from falling below a certain threshold, implying that the wage-price coefficient approximates unity in the long run. This interpretation, however, assumes a static economy without labour productivity growth. As Thirlwall (1974b, 1978) formally demonstrates, the behaviour of wage earners would most likely be different in a growing economy. Although real wages decrease from an increase in inflation ($\alpha < 1$), the overall effect on real wage growth could be positive if autonomous wage growth ($a > 0$) from other determinants (*e.g.* efficiency wages) more than offsets the fall in real wages from inflation. Furthermore, as long as positive growth in real wages falls below labour productivity growth, the share of profit income will rise. Thus, wage earners are likely to be less resistant to real wage cuts from inflation in a growing economy, implying that $\alpha < 1$ holds in both the short run and long run.

These counterarguments imply that inflation via the Kaldor-Thirlwall model does not necessarily imply an overall fall in real wages. It also means that a faster rate of capital accumulation through inflationary finance may reduce structural unemployment in capital scarce developing economies (Thirlwall, 1974a, 1974b).

FitzGerald (2006) seems to raise another issue against the practical relevance of the Kaldor-Thirlwall model. He constructs backward- and forward-looking wage-price models, in which the behaviour of real wage growth seems to be 'explosive' with respect to *increasing* inflation rates, and concludes, on the basis of these instability properties, that the Kaldor-Thirlwall model of forced saving is only relevant in the short run (FitzGerald, 2006, p. 255). However, there seems to be a disconnect between FitzGerald's (2006) models and the actual assumptions of the Kaldor-Thirlwall in equation [4]. Forced saving in equation [4] does not require *increasing* inflation rates, but a *one-off* increase in the inflation rate. FitzGerald (2006, p. 255) further remarks: "Moreover, in the modern world of independent central banks and inflation targeting, rates of domestic inflation sufficient to force up the savings rate are not feasible, and in any case the uncertainty this causes seem to reduce savings…"

The first point to make is that the debate is not whether a country adopts an inflation-targeting regime or not, but rather whether the official or unofficial inflation target is too low, given the benefits of mild infla-

tion. The second point is that the argument is about the benefits of *mild* inflation rather than excessive inflation that may discourage voluntary saving. In the US economy, for example, there is a strong view that the unofficial inflation target of 2% is too low and that the Federal Reserve should increase it to at least 4% (Palley, 2000; Blanchard, Dell'Ariccia, and Mauro, 2010; Ball, 2013; Krugman, 2014). Interestingly, one of the arguments in favour of a higher inflation target in the US economy has some affinity with the money illusion assumption of the Kaldor-Thirlwall model. Akerlof, Dickens, and Perry (1996) show that downward rigidity in nominal wages and price stability (zero inflation) may cause a rise in the natural unemployment rate because real wages in declining sectors are inflexible downwards (also see Akerlof *et al.*, 2000). A higher inflation rate up until 4% has the advantage of creating real wage flexibility to keep the natural unemployment rate at a lower level (Palley, 2000; Krugman, 2014). In the case of emerging market economies with inflation targets, the policy debate is whether targets in the range of 3%-5% should be revised upwards to say 6%-8%, and whether slow-growing underdeveloped countries should strive for low inflation rates, such as those observed in more developed economies.

As an alternative to inflationary finance of development, FitzGerald (2006) develops a model that links a real exchange rate depreciation to a real wage reduction. It is then shown that the saving ratio in equation [4] is a positive function of a real exchange rate depreciation rather than the inflation rate. However, assuming downward rigidity in nominal wages, and the fact that the real exchange rate is a function of real wage changes, it is not clear how real wages are supposed to fall without reverting to some inflation (see *e.g.* Gala, 2008). Although the open-economy model of Fitzgerald (2006) is an interesting extension of the Kaldor-Thirlwall model, the saving ratio remains a positive function of the inflation rate if it is assumed that nominal wages are rigid downwards. The open-economy implications of inflationary finance are discussed in a later section.

2.2.2. The inflation tax model

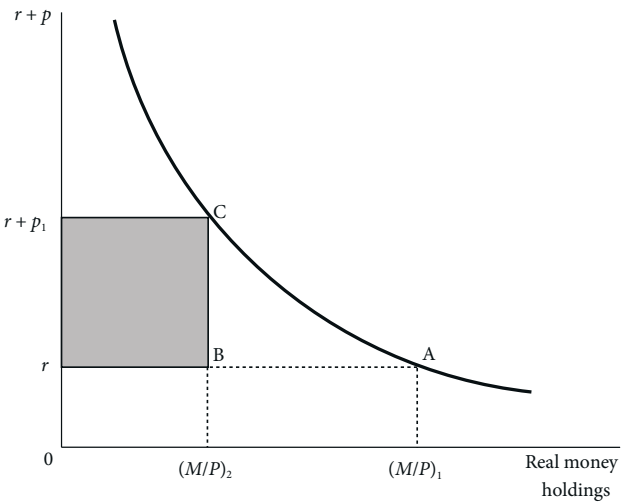
In addition to the Kaldor-Thirlwall model of forced saving, Thirlwall's (1974b) ISGD book highlights the potential of an inflation tax on real money holdings as another source of finance in underdeveloped economies.

The relevance of the inflation tax model is premised on the observation that tax revenue with respect to income is typically inelastic in underdeveloped countries, while tax collection involves large administrative costs. It is further assumed that there are many productive investment projects of the infrastructure type and research and development (R&D) activities with high social returns, but low private returns because private entrepreneurs cannot capture all the benefits themselves, that need to be undertaken by the government. In this situation, the government's plans to invest in excess of plans to save cannot be financed with normal tax revenue due to the inelastic nature of the tax system.

One way to finance government expenditure in excess of normal tax revenue is to impose an inflation tax on real money holdings (Bailey, 1956; Cagan, 1956; Mundell, 1965; Johnson, 1967; Friedman, 1971). Consider a simplified version of the inflation tax model in Figure 1.

The vertical axis measures the opportunity cost of holding real money balances and is calculated as the difference between the real rate of return of physical capital (r) and what is earned from holding real money balances ($i - p$): $r - (i - p)$, where i is the nominal interest rate and p is the inflation rate. Assuming that the holdings of real money balances pay

Figure 1. The inflation tax model



Sources: Thirlwall (1974b); Ghatak and Sánchez-Fung (2007).

no nominal interest, the opportunity cost of holding money balances is simply $r + p$. The horizontal axis in Figure 1 measures the holdings of real money balances, (M/P), where M is nominal money balances and P is the price level.

The initial equilibrium position at point A in Figure 1 assumes zero inflation and a corresponding level of real money holdings of $(M/P)_1$. Suppose the government borrows from the Central Bank to finance new investment outlays on productive infrastructure projects. Based on the Quantity Theory approach that underlies a monetarist view of inflation, the increase in the rate of growth of the monetary base to finance the public deficit leads to an equi-proportional increase in the inflation rate from $p = 0$ to $p_1 > 0$. The real yield from the inflation tax (R) for investment purposes is the shaded area in Figure 1 and equal to the tax rate (p_1) multiplied by the tax base $(M/P)_2$:

$$R = p_1 \times (M/P)_2 \qquad [5]$$

Note that, with inflation, the tax base (M/P) continuously deteriorates unless it is offset by equi-proportional increases in M. To keep the tax base constant at $(M/P)_2$, the model assumes a real balance effect where the holders of money consume less and use the additional resources (forced saving) to supplement M. Put in another way, the real yield from the inflation tax, R, is equivalent to the real income foregone by the holders of money to keep their real money balances intact in the presence of inflation. Thus, an inflation tax diverts real resources from the holders of money to the government who invests the proceeds on behalf of society.

The textbook model in Figure 1 implies that the optimum inflation rate (tax rate) that maximises the real yield is the rate at which the elasticity of demand for real money balances with respect to the inflation rate is unity (see Friedman, 1971; Thirlwall, 1974b; Ghatak and Sánchez-Fung, 2007). For inflation (tax) rates beyond this optimum rate, the tax base falls by a larger percentage and the real yield declines. Friedman (1971), however, shows that the optimum inflation rate that maximises the real yield is lower when the rates of growth of population and real income are positive, rather than zero as assumed in the textbook model. The revenue-maximising inflation rate is lower under these conditions because the issuer of money (government) obtains an additional source

of revenue from positive growth in the demand for real money balances as income and population rise.

Despite Friedman's (1971) own, positive contribution, and the fact that the inflation tax model originates from monetarist theories, he remains sceptical about the effectiveness of inflationary finance for development purposes: "My own personal view is that inflation is neither desirable nor necessary, that the most effective road to development is through free enterprise and private investment, and that the government can serve best by limiting itself to essential government functions, keeping taxes of all kinds low, refraining from intervention into the economy, and providing a stable monetary framework." (p. 847).

Friedman's (1971) aversion to inflation is consistent with his monetary growth rule mentioned earlier (Friedman, 1959a), which implies an optimum inflation rate of zero, because the real economy is insensitive to expansionary demand-side policies in the long run. Economists of a structuralist and Keynesian persuasion, in contrast, take a very different view. The emphasis is on supply rigidities in the tax system, and the fact that inflationary demand-side policies can help capital scarce developing countries to raise their long-run growth rates through a faster rate of physical capital accumulation (Thirlwall, 1974b).

Whether an inflation tax supplements total government revenue in a significant way will also depend on lags in the collection of taxes. Tanzi (1977, 1978, 1982) emphasises that the real yield obtained from an inflation tax could be offset by a fall in normal tax revenue. Earlier it was mentioned that the real value of normal tax revenue tends to fall with inflation, whereas government expenditure remains fixed in real terms. If there are lags in tax collection, the real yield of an inflation tax may be partly offset by a fall in the real value of normal taxes. If the initial level of normal tax revenue-to-Gross Domestic Product (GDP) ratio is high and there are long lags in tax collection, the net additions to a government's *total* revenue from inflationary finance may be greatly diminished. Since the initial level of normal tax revenue-to-GDP ratio is typically low in underdeveloped economies, the effect of inflationary finance on total government revenue would be optimised if strategies could be employed to reduce long delays in tax collection.

Recently, the merits of money-financed government deficits (as depicted in Figure 1) to mitigate the recessionary conditions caused by the

2008-2009 global financial crisis and COVID-19 pandemic have gained popularity (Buiter, 2014; Turner, 2015; English, Erceg, and Lopez-Salido, 2017; De Grauwe, 2020; Agur *et al.*, 2022). One of the main advantages of a money-financed deficit relative to a debt-financed fiscal stimulus is that the former involves no future debt obligations and is therefore more effective in stimulating aggregate demand (De Grauwe, 2020; Agur *et al.*, 2022).

Inflation that emanates from a money-financed fiscal deficit may also reduce the cost of borrowing through lower real interest rates and act as stimulus to investment, which, in addition to the Kaldor-Thirlwall model, is another Keynesian view of the benefits of mild inflation (Thirlwall, 1974b; Galí, 2020). The Keynesian approach further emphasises that the nominal rate of return on investment in physical assets, such as machinery and equipment with embodied technical progress, tends to rise with inflation. Mild inflation, therefore, encourages investment in productive physical assets to maintain profitability relative to money assets, hoarding, inventories and more speculative activities (Thirlwall and Barton, 1971; Thirlwall, 1974b).

Figure 1 can also be used to illustrate an additional channel through which inflation could raise capital accumulation. In addition to the increase in government revenue from the inflation tax, Tobin's (1965) model predicts that the increase in the opportunity cost of holding money from r to $r + p_1$ would entice wealth-holders to reduce their holdings of real money balances from $(M/P)_1$ to $(M/P)_2$ and use the proceeds to invest in physical capital with a higher relative rate of return (Thirlwall, 1974b; Orphanides and Solow, 1990). Although Tobin's (1965) model is an attempt to introduce money into Solow's (1956) neoclassical growth model, it is analogous to one of the Keynesian views of inflationary finance discussed above where inflation maintains the profitability of physical assets relative to money assets.

The Tobin (1965) model rests on the assumption that real money balances and physical capital are substitutes. If, however, they are complements, the additional channel of inflationary finance will not materialise (Thirlwall, 1974b; Orphanides and Solow, 1990; Ghatak and Sánchez-Fung, 2007). In Stockman's (1981) cash-in-advance model and the complementarity hypothesis of McKinnon (1973) and Shaw (1973), for example, the accumulation of real money balances and physical capital

occur in tandem. In the McKinnon (1973) and Shaw (1973) hypothesis, the accumulation of real money balances (saving) via financial intermediaries plays an important role to fund large-scale investment projects. Since inflation erodes the real value of money balances and acts as a deterrent to holding money, the rate of physical capital accumulation and output growth fall with inflation.

To summarise, Thirlwall's (1974b) ISGD book identifies several models that predict a positive relationship between inflation, investment, and growth. Inflation in these models redistributes income from wage earners to profit earners and from the private sector to the government and, in the process, generates domestic resources to finance plans to invest in excess of plans to save. Mild inflation may also encourage investment in physical assets relative to money assets, but this proposition only holds if physical capital and real money balances are substitutes instead of complements.

2.3. Open-economy implications of inflationary finance

Arguably, the biggest obstacle to a successful policy of inflationary finance is an economy's balance of payments. Thirlwall's (1974b) ISGD book devotes a whole chapter to the open-economy implications of inflationary finance and pre-empts many of the arguments in his seminal paper (Thirlwall, 1979) on balance-of-payments-constrained (BPC) growth. To illustrate how an economy's balance of payments may thwart a policy of inflationary finance, consider Thirlwall's (1979) original growth law:

$$g_b = \frac{x = \varepsilon z}{\pi} \qquad [6]$$

Where g_b is the BPC growth rate; x is the growth of export; ε is the income elasticity of demand for exports; π is the income elasticity of demand for imports; and z is world income growth.

Augmenting the equilibrium outcome of a monetary or fiscal demand-side stimulus in equation [3] with the BPC growth rate (g_b) in equation [6], gives:

$$\left[\left(g'_d = g'_w = g'_s\right) > g_b\right] < g_n \qquad [7]$$

Equation [7] illustrates that, although the growth of supply is endogenous to demand, the rate of growth of demand exceeds the BPC growth rate: $g'_d > g_b$. Because each demand component (investment spending, consumption spending and government spending) comprises an important content, faster demand growth relative to the BPC growth rate implies a growing current account deficit, with imports growing faster than exports. Since an economy cannot borrow indefinitely in foreign markets and because the real exchange rate is an inefficient adjustment mechanism, demand growth must be constrained to its initial level to preserve equilibrium on the current account of the balance of payment. We go back to the initial condition in equation [1] without the demand stimulus, but now with the BPC growth rate imposed:

$$(g_d = g_w = g_s = g_b) < g_n \qquad [8]$$

Equations [7] and [8] capture the main arguments in Thirlwall (2001, 2019). The growth of supply is endogenous to demand, but the growth of demand itself is constrained by the balance of payments. To relax the demand constraint imposed by the balance of payments would require an export-led strategy that improves the structural demand features of exports in equation [6] through an increase in the income elasticity of demand for exports ($\uparrow\varepsilon$) and/or import-substitution strategies that reduce the income elasticity of demand for imports ($\downarrow\pi$). Foreign exchange earnings generated from faster export growth allow faster demand growth for domestically produced goods and an endogenous response from the growth of supply, by financing the import content of expenditure growth (McCombie, 1985). Foreign exchange earnings from exports can also be used to purchase imported capital and intermediate goods that are more productive than domestic resources.

Is it possible to reconcile a policy of inflationary finance with the BPC growth model? The view advanced here, as well as those in Chapter 8 of ISGD, is in the affirmative, provided that the demand-induced inflationary finance policy is accompanied by foreign capital inflows to finance the current account deficit during the initial stages. Let us first consider in more detail the role of the real exchange rate to support faster demand growth consistent with current account equilibrium.

Generally, the BPC growth literature downplays the role of the real

terms of trade (or real exchange rate) as an efficient balance-of-payments adjustment mechanism (McCombie, 2011; Thirlwall, 2011, 2019). To illustrate this proposition, consider the growth rate of the real terms of trade, starting from initial values of zero for all the variables:

$$p_{dt} - p_{ft} - e_t = 0 \qquad [9]$$

Where, at time t, p_{dt} is the growth rate of export prices; p_{ft} is the growth rate of import prices; and e_t is the growth rate of the nominal exchange rate.

Assuming that the growth rate of export prices approximates the domestic inflation rate (p_t), such that $p_{dt} \approx p_t$, inflationary finance would initially cause an appreciating real terms of trade ($p_{dt} > p_{ft}$): $p_{dt} - p_{ft} - e_t > 0$. Under a flexible exchange rate system, the difference between p_{dt} and p_{ft} could be offset by a depreciating nominal exchange rate ($e_t > 0$) to maintain international competitiveness, assuming that the absolute sum of the price elasticities in the export and import demand function is greater than unity (*i.e.* the Marshall-Lerner condition is satisfied). But a depreciating nominal exchange rate may itself cause a further increase in the domestic inflation rate through a rise in import prices (imported inflation) and an ensuing wage-price spiral, bringing the economy back to its initial position: $p_{dt} - p_{ft} - e_t > 0$. Nevertheless, studies often find that the absolute sum of the price elasticities in the export and import demand function is not significantly different from unity *i.e.* the Marshall-Lerner condition is just met, which would nullify the adverse balance-of-payments effect of an appreciating real terms of trade (Bahmani Harvey, and Hegerty, 2013; McCombie, 2023). Thus, although the balance of payments deficit may not necessarily worsen from an appreciating real terms of trade, it is clear that the real terms of trade is an inefficient mechanism to correct the current account deficit from inflationary finance.

Alternatively, a typical developing economy with a high income elasticity of demand for imports would have to rely on foreign capital inflows to support the internal demand expansion during the *initial* stages (Thirlwall, 1974b). Foreign borrowing to finance capital imports has the undesirable side-effect that it requires interest payments and future debt obligations in scarce foreign currency. Indeed, the evidence shows that financing investment and growth out of foreign resources (foreign debt)

is often too risky and counterproductive (Cavallo, Eichengreen, and Panizza, 2018). Nonetheless, at least in the short run, domestic saving and foreign exchange are not close substitutes, making foreign capital inflows an important source of finance to purchase imported capital and intermediate goods and to support faster expenditure growth with import contents.

It should be acknowledged, however, that a policy of mild demand inflation that keeps resources fully employed and maintains the profitability of investment in physical assets relative to money assets may attract a relatively stable source of external finance, such as foreign direct investment (FDI), and reduce the need to borrow in foreign capital markets to finance the balance-of-payments deficit. The importance of buoyant demand growth in the host country, as a key determinant of FDI, is supported by the theoretical models and evidence presented in Rob and Vettas (2003) and Conconi, Sapir, and Zanardi (2016).

Other sources of external finance in low-income countries are official development assistance (ODA) that can take the form of grants and concessional loans, as well as remittances from abroad. Although the effectiveness of ODA has been hotly debated (see *e.g.* Sachs *et al.*, 2004; Easterly, 2006; Doucouliagos and Paldam, 2009; Lof, Mekasha, and Tarp, 2015; Herzer *et al.*, 2015), there is growing evidence that foreign aid has benefited low-income countries, with specific reference to sub-Saharan Africa (SSA) countries, through its positive effect on per capita income and other macro- and micro-related outcomes (Juselius, Møller, and Tarp, 2014; Arndt, Jones, and Tarp, 2015). Looking at remittances from abroad, the meta-analysis of Cazachevici, Havranek, and Horvath (2020) across 95 studies suggests a positive, albeit relatively small, effect on economic growth.

A standard argument against foreign aid and remittances is that these sources of external finance undermine the recipient economy's international competitiveness through a 'Dutch disease effect', by raising the price of non-tradables (P_N) relative to the price of tradables (P_T), with a resultant appreciation in the internal real exchange rate: $\downarrow(P_T/P_N)$ [see the overviews in Addison and Baliamoune-Lutz, 2017; Cazachevici, Havranek, and Horvath, 2020; Ahmad, Pentecost, and Stack, 2023]. An appreciation of the internal real exchange rate, however, should not be seen as an inevitable outcome of foreign aid and remittances.

The evidence for African countries in Ahmad, Pentecost, and Stack (2023) suggests that one-third of the Dutch disease effect of foreign aid is offset by external debt interest repayments. In fact, foreign aid and remittances can support a policy of inflationary finance by providing foreign exchange to purchase essential capital imports and by financing the import content of faster expenditure growth, all of which may offset any downward pressure on the internal real exchange rate (also see Ahmad, Pentecost, and Stack, 2023).

To summarise, in an open-economy context, a policy of inflationary finance can be effective if it is supported by foreign capital inflows during the initial stages. Although demand creates its own capacity, this is a necessary condition to sustain demand over the medium run. This would ensure that enough time elapses for the capacity-creating effect of demand to favourably affect the structural parameters of the BPC growth model ($\uparrow\varepsilon/\pi$) in equation [6] over the long run[2]. Government outlays on productive infrastructure projects, education and R&D activities that are partly financed through an inflation tax would complement private investment (Barro, 1990; Easterly and Rebelo, 1993; Fedderke, Perkins, and Luiz, 2006) and, in the process, relax the balance-of-payments constraint by generating export capacity and reducing the propensity to import.

In effect, a successful policy of inflationary finance would alter some of the fundamental determinants of the internal real exchange rate, P_T/P_N. Government investment in productive infrastructure with high social returns, such as ports, electricity supply, water supply and domestic transport, would cause a depreciation in the internal real exchange rate ($\uparrow P_T/P_N$) through a fall in the price of non-tradables ($\downarrow P_N$). This would raise the relative profitability of tradables and induce another round of investments in physical capital and R&D activities in the tradable sector, all of which may relax the BPC growth rate in equation [6] via an increase in the relative income elasticities ($\uparrow\varepsilon/\pi$). In line with these arguments, several studies on BPC growth have endogenised the relative income elasticities in equation [6] with respect to a level change in the real exchange rate (Missio and Jayme 2012; Missio, Araujo, and Jayme,

[2] For more on the capacity-creating effect of physical capital accumulation and the effect on the BPC growth model, see Perrotini-Hernández and Vázquez-Muñoz (2019).

2017; Setterfield and Ozcelik, 2018; Cimoli, Pereima, and Porcile, 2019; Marconi *et al.*, 2021).

Thus, although inflationary finance could lead to an appreciation in the real exchange rate during the initial stages, as argued in Johnson (1984), over the medium to long run it is entirely consistent with a depreciation in the real exchange rate. Indeed, there is a large literature that finds a positive relationship between growth and a one-off depreciation in the real exchange rate (see the extensive surveys in Rapetti, 2020; Blecker, 2022; Demir and Razmi, 2022; Ridhwan, Ismail, and Nijkamp, 2023). Note, however, that the real exchange rate depreciation of inflationary finance is not achieved by manipulating the nominal exchange rate, but rather through a change in fundamentals. Arguably, this is a more viable development strategy than direct interventions in the foreign exchange market to depreciate the real exchange rate.

2.4. Costs of inflation

The call for inflationary finance of development does not disregard the fact that excessive inflation can be seriously harmful to growth and development (Thirlwall, 1974b). It is fair to say, however, that standard textbooks and authoritative surveys on the topic tend to emphasise the costs of inflation relative to the benefits of mild inflation and typically ignore the fact that some inflation may be regarded as the inevitable outcome of the development process itself (Briault, 1995; Temple, 2000; Romer, 2019). The rest of this section provides a brief overview of the costs of inflation, given its extensive coverage in the literature.

Consider some of the costs of excessive inflation. Deliberate inflationary policies that cause one country to inflate at a much faster rate than others could cause severe balance-of-payments difficulties, requiring import substitution strategies and exchange controls that may lead to inefficiencies in resource allocation (Thirlwall, 1974b). The uncertainty associated with high and variable inflation could encourage investment in real estate, inventories, and speculative activities instead of productive investment in physical plant and machinery (Thirlwall, 1974b; Briault, 1995). Moreover, uncertainty about future prices could force investors to delay their decisions because investment in physical capital is a sunk cost and largely irreversible (Pindyck, 1991; Carruth, Dickerson, and

Henley, 2000). Excessive and volatile (unanticipated) inflation may further cause confusion between relative and aggregate price changes, which leads to a misallocation of scarce resources and slower growth (Briault, 1995). Another cost of high and variable inflation is the uncertainty it creates between savers and investors. If savers and investors form different expectations about the *ex-ante* real interest rate, capital will be misallocated (Briault, 1995).

The theoretical models covered up until this point suggest that the relationship between economic growth, investment and inflation may be non-linear. Up until a threshold inflation rate, mild inflation stimulates investment and growth, but thereafter the distortionary effect of inflation dominates. The discussion now turns to the empirical evidence on the inflation-growth nexus.

3. EMPIRICAL EVIDENCE ON THE INFLATION-GROWTH NEXUS

Thirlwall (1974b) and Johnson (1984) provide comprehensive surveys of earlier studies on inflation and growth. Generally, these studies have not been successful in uncovering a clear and systematic relationship between inflation, saving, investment and economic growth. To quote Thirlwall (1974b) in full: "Despite the long history of the idea that inflation may be conducive to development, the hypothesis has never been put to a thorough, satisfactory empirical test. What evidence there is tends to be sketchy, impressionistic and inconclusive" (p. 199).

Consider Thirlwall's (1974a, 1974b) own empirical evidence and earlier work by Thirlwall and Barton (1971). The Kaldor-Thirlwall and inflation tax models covered in the previous section predict a positive effect of inflation on saving, investment, and output growth up until a certain threshold value, beyond which point the effect becomes negative. Looking at the effect of inflation on the domestic saving ratio across 68 countries over the period 1958-1968, there is little evidence of a statistically significant effect in the linear and non-linear (quadratic) models for the full sample and split samples across developed and developing countries (Thirlwall, 1974a, 1974b). The inflation variable appears to have a stronger effect in the investment equations, but only in developed countries where the coefficient estimate is positive and statistically significant at the 90 percent confidence level (Thirlwall, 1974b, p. 217).

Thirlwall (1974b) attributes these differential results to the fact that an excess of investment over saving is financed by foreign capital inflows in national accounts. Inflationary finance that raises the money rate of return on investment may attract foreign capital inflows, which drive a wedge between investment and saving. Thus, the insignificant effect of the inflation rate in saving equations does not capture the effect of inflation on 'total' saving that includes capital inflows. In a later study by Hussein and Thirlwall (1999), they examine the effect of inflation on the domestic saving ratio, using panel data across 62 countries from 1967 to 1995. Their results show a significant non-linear effect of inflation on the saving ratio, although the positive effect of inflation occurs up until a very low threshold level of 1.36%. The 'true' threshold may be obscured by the role of foreign capital flows as mentioned above, or the fact that the sample includes both developed and developing countries. These results suggest that it is preferable to focus on investment, because the inflation effect on domestic saving may be distorted by capital inflows.

Turning to the effect of inflation on output growth (excluding investment as a control variable) in the studies by Thirlwall and Barton (1971) and Thirlwall (1974b) over the sub-periods 1958-1967 and 1958-1968, respectively, there is a significant non-linear relationship, but only for the sample of developed countries. Up until a threshold of 6% the effect of inflation on output growth is positive and statistically significant, but beyond the threshold the effect turns negative and statistically significant. It is also shown that in the sample of developing countries there appears to be a negative relation between output growth and inflation rates in excess of 10%, but below 10% there is no discernible effect.

Thirlwall (1974b) summarises his overall findings as follows: "For those who believe that most developing countries have been over-cautious in financing capital formation by inflationary means… the results reported here might seem disappointing on the surface." (p. 220).

Indeed, inflationary finance seems to be relevant in developed countries but not in developing economies. However, Thirlwall (1974b, p. 220) cautions against any hasty conclusions. The low inflation rates recorded in all the developing countries outside Latin American countries over the time period under analysis (1958-1968) need not necessarily capture demand inflation but structural inflation, whereas the opposite is true

in more advanced economies. As stressed before, the growth benefits of mild inflation come from demand inflation rather than structural inflation. The main problem any researcher faces is that observed inflation could be a composite of different types of inflation in a given period, or one type of inflation could dominate, other than demand inflation. As Thirlwall (1974b) emphasises: "If the origins of inflation in a particular country change over time, or the primary impetus to inflation differs between countries, the normal statistical techniques of time series and cross-section analysis of the relation between inflation and growth may be expected to yield very disappointing results. The problem is insuperable. All that can be reasonable done is to bear the problem in mind in interpreting the empirical results." (p. 31).

The analysis now turns to some of the empirical studies on the inflation-growth nexus that have emerged since the early 1990s. Given the somewhat inconclusive nature of earlier studies, it is interesting to see whether larger samples of countries, longer time periods under analysis, different non-linear estimation techniques and a comprehensive set of control variables in recent empirical work provide us with more definite answers on the inflation-growth nexus in developing economies. Indeed, Thirlwall (1974b, p. 220) highlights the short time period in his study (1958-1968) as a main constraint and the need to use longer runs of time series data to increase the number of episodes where inflation originates from the demand side. As we shall see, the theoretical exposition and interpretation of the empirical results in Thirlwall's (1974b) ISGD book provide us with invaluable guidelines on how to assess the more recent evidence in a policy relevant way.

3.1. More recent evidence since the early 1990s

Surveys of the literature often interpret Fischer's (1993) study as the first one to identify the possibility of a non-linear relationship between inflation and growth, and that his evidence in fact shows a positive relationship at low inflation rates and a negative relationship at high inflation rates (Khan and Senhadji, 2001; López-Villavicencio and Mignon, 2011; Baharumshah, Slesman, and Wohar, 2016). To quote Khan and Senhadji (2001) in full: "The possibility of such a nonlinear relationship was first identified by Fischer (1993), who noted the existence of a positive

relationship at low rates of inflation and a negative one as inflation rose (which weakened as inflation increased)." (p. 2).

From the overview of earlier studies in the previous section, it is clear that these statements are factually incorrect. Thirlwall's (1974b) ISGD book and some of the earlier studies reviewed therein, such as Dorrance (1966), were the first ones to examine the empirical possibility of a non-linear relationship inflation and growth. Moreover, Fischer (1993) does not in any way find a positive relationship at low levels of inflation, as claimed by Khan and Senhadji (2001, p. 2) and López-Villavicencio and Mignon (2011, p. 455). For the three inflation groups identified in Fischer (1993), the effect of inflation on growth and other outcome variables is consistently *negative* and generally statistically *insignificant* across the inflation ranges of 15% or less, between 15%-40% and above 40% (see Table 8 in Fischer, 1993). Only for the full sample of countries does Fischer (1993) find a negative and statistically significant effect of inflation on per capita income growth, capital accumulation and productivity growth. Most studies since the early 1990s reviewed below use Fischer's (1993) study as a benchmark. In doing so, however, they neglect some of the major insights of earlier work, such as Thirlwall's (1974b) ISGD book.

Using more refined spline techniques than the Fischer (1993) study to identify whether there is a non-linear relationship between per capita income growth and inflation, the panel data studies of Sarel (1996) and Ghosh and Phillips (1998) identify threshold inflation rates of 8% and 2.5%, respectively. Sarel (1996) finds that up until 8% the effect of inflation on per capita income growth is positive but statistically insignificant. Beyond the 8% threshold the inflation effect is negative, statistically significant, and quantitatively large. Ghosh and Phillips (1998) show that the effect of inflation on per capita income growth is positive and statistically significant up until a low threshold of 2.5%, but thereafter turns negative and statistically significant. Both studies emphasise the costs of inflation since the inflation effect is either statistically insignificant up until the threshold or the threshold is very low. However, both studies do not test whether the threshold inflation rate differs across developed and developing countries, implying that the optimum inflation rates of 8% and 2.5%, together with their respective significance levels, may be biased. We know from earlier studies that the threshold inflation rates may differ across rich and poor countries (Thirlwall, 1974b; Johnson, 1984).

Table 1 provides a selective summary overview of studies that have tested for a non-linear relationship between inflation and growth in developed and developing countries, using either GDP growth or GDP per capita growth as the dependent variable. All the studies use panel data, except for the Yemba, Kitenge, and Woodburne (2020) article, that specifically looks at the Democratic Republic of the Congo (DRC) over the period 1975-2017.

Consider the evidence for developed countries in Table 1. Studies tend to identify relatively low threshold values that range between 1% and 5%. The majority of these studies find that the effect of inflation on growth up until 1%-5% is positive and statistically significant, but thereafter turns negative and statistically significant (Khan and Senhadji, 2001; López-Villavicencio and Mignon, 2011; Kremer, Bick, and Nautz, 2013; Azam and Khan, 2022). Ibarra and Trupkin (2016), on the other hand, find that the effect of inflation on growth up until 4.5% is positive, but statistically insignificant. Beyond the 4.5% threshold value the inflation effect becomes negative and statistically significant. The Espinoza, Leon, and Prasad (2012) study is the only one that reports an insignificant non-linear effect, but a negative and statistically significant effect in their linear model. Sepehri and Moshiri (2004), in contrast, obtain insignificant non-linear and linear effects for their sample of developed (Organisation for Economic Co-operation and Development, OECD) economies. Overall, and consistent with earlier studies by Thirlwall and Barton (1971) and Thirlwall (1974b), the evidence for developed countries points to the growth benefits of mild inflation up until relatively low thresholds of 1%-5%.

The analysis now turns to the evidence for developing countries in Table 1. Studies tend to find a positive and statistically significant effect of inflation on growth up until relatively high thresholds that range between 6% and 19% (Khan and Senhadji, 2001; Sepehri and Moshiri, 2004; Pollin and Zhu, 2006; Bick, 2010; Baharumshah, Slesman, and Wohar, 2016; Ndoricimpa, 2017; Yemba, Kitenge, and Woodburne, 2020; Azam and Khan, 2022). It is noteworthy how these results contrast with those in Thirlwall and Barton (1971) and Thirlwall (1974b), whose empirical analyses were constrained by a lack of data over a long time period. Indeed, Thirlwall's (1974b) observation that the insignificant inflation effect in developing countries over his short sample period (1958-1968)

Table 1. A Selective survey of empirical studies on the inflation-growth nexus

Authors	Sample	Method		Investment as a control	Threshold findings
Khan and Senhadji (2001)	140 developed and developing countries, 1960-1998	Non-linear least squares (NLLS)		Yes (+) (significant)	1% for developed countries and 12% for developing countries. Below the thresholds the inflation effect is positive and significant for both groups when NLLS with fixed effects (5-year average data, *excluding high inflation countries*) are considered. Beyond the thresholds for both groups the inflation effect is negative and significant.
Sepehri and Moshiri (2004)	92 developed and developing countries, 1960-1996	Spline technique		Yes (+) (significant)	15%-21% for lower-income countries; 4%-5% for upper-middle income countries; 9% for developing countries; and no threshold effect for OECD countries. For upper-middle income countries and developing countries the inflation effect below the threshold is positive and marginally significant. Beyond the thresholds the inflation effect is negative and significant for all the groups.
Pollin and Zhu (2006)	80 developed and developing countries, 1960-2001	Quadratic model		Yes (unknown)	19%-23% for low-income countries and no threshold effect for OECD countries. Inflation below the threshold for low-income countries is positive and significant but thereafter turns negative and significant.
Bick (2010)	40 developing countries, 1960-2004	Panel threshold model with regime intercepts		Yes (insignificant)	12.03% for developing countries. Below the threshold the inflation effect is positive and significant but beyond the threshold the effect becomes negative and significant.
López-Villavicencio and Mignon (2011)	44 developed and developing countries, 1961-2007	Panel smooth transition regression model		Yes (+) (significant)	2.7% for developed countries and 17.5% for developing countries. The inflation effect below the threshold for developed is positive and statistically significant, but above the threshold it is negative and statistically significant. For developing countries the inflation effect below the threshold is statistically insignificant, but thereafter becomes negative and statistically significant.
Baglan and Yoldas (2014)	92 developing countries, 1975-2004	Flexible semiparametric panel data model		Yes (+) (significant)	12% for developing countries. Below the threshold the inflation effect is statistically insignificant, but thereafter turns negative and statistically significant.
Espinoza, Leon, and Prasad (2012)	165 developed and developing countries, 1960-2007	Panel smooth transition regression model		Yes (+) (significant)	10% for developing countries and no significant threshold for developed countries. Below the threshold for developing countries the inflation effect is statistically insignificant, but above the threshold the effect is negative and statistically significant. For developed countries, the inflation effect is negative and significant in the linear model.

Table 1. A Selective survey of empirical studies on the inflation-growth nexus (concluded)

Authors	Sample	Method		Investment as a control	Threshold findings
Kremer, Bick, and Nautz (2013)	124 developed and developing countries, 1950-2004	Dynamic panel threshold regression model		Yes (+) (significant)	2.5% for developed countries and 17.2% for developing countries. The inflation effects above the thresholds are negative and significant for both groups of countries. Below the thresholds the inflation effect is positive and statistically significant for developed countries and insignificant for developing countries.
Seleteng, Bittencourt, and van Eyden (2013)	Countries belonging to the Southern African Development Community (SADC), 1980-2008	Panel smooth transition regression model		No	18.9% for the SADC region. Below the threshold the inflation effect is statistically insignificant, but above the threshold the inflation effect is negative and statistically significant.
Baharumshah, Slesman, and Wohar (2016)	94 developing and emerging economies, 1976-2010	Panel threshold regression model		Yes (+) (significant)	The net inflation/inflation uncertainty effect between the two thresholds 5.55% and 15.9% is positive and significant. Below 5.55% and above 15.9% the net inflation effect is negative and significant.
Ibarra and Trupkin (2016)	138 developing and developed countries, 1950-2009	Panel smooth transition regression model		Yes (+) (significant). But only in the developing country group.	4.5% in developed countries and 19.1% in developing countries. Below the thresholds for both groups the inflation effect is statistically insignificant, but above the thresholds the effect becomes negative and statistically significant.
Ndoricimpa (2017)	47 African countries, 1970-2013	Dynamic panel threshold regression model		Yes (+) (significant)	6.7% for the full sample, 9% for the low-income group and 6.5% for the middle-income group. The inflation effects above all the thresholds are negative and statistically significant. Below the thresholds for the full sample and low-income sample the effect is statistically insignificant. For the middle-income group the inflation effect below the threshold is positive and statistically significant.
Yemba, Kitenge, and Woodburne (2020)	Developing economy, Democratic Republic of the Congo (DRC), 1975-2017	Continuous threshold model		No	17.2%. Below the threshold the inflation effect is positive and statistically significant, but above the threshold the effect turns negative and statistically significant.
Azam and Khan (2022)	27 developed and developing economies, 1975-2018	Quadratic model		Yes (+) (significant)	5.3% for developed countries and 12.2% for developing countries. Below the thresholds for both groups of countries the inflation effect is positive and significant, but above the thresholds the effect is negative and significant.

does not necessarily mean that some inflation is not beneficial for growth, seems prophetic in the context of more recent evidence that draws on much longer time spans (see the time periods in column 2 of Table 1).

It is further noteworthy that several studies report statistically insignificant inflation effects for developing countries, or different income groups within developing countries, up until relatively high inflation thresholds of 6% to 21% (Sepehri and Moshiri, 2004; López-Villavicencio and Mignon, 2011; Baglan and Yoldas, 2014; Espinoza, Leon, and Prasad, 2012; Kremer, Bick, and Nautz, 2013; Seleteng, Bittencourt, and van Eyden, 2013; Ibarra and Trupkin, 2016; Ndoricimpa, 2017). At first, it would be tempting to conclude from these results that disinflationary policy is costless in terms of output and employment losses, and that restrictive demand-side measures could be justified to reduce the welfare costs of inflation (see Thirlwall, 1974b and Briault, 1995 for more on the welfare costs of inflation).

Such an analysis, however, disregards the underlying reason why the threshold inflation rates of 6%-21% in developing countries are much higher than the 1%-5% identified in developed countries. As emphasised throughout this paper, with specific reference to Thirlwall's (1974b) ISGD book, inflation thresholds in developing countries would tend to be higher than developed countries because structural sources of inflation (supply bottlenecks between expanding and contracting sectors, foreign exchange bottlenecks, an underdeveloped agriculture sector and a widening budget deficit from autonomous increases in food prices) are more dominant in underdeveloped economies. The overview of the empirical evidence for African countries in section 2 suggests that structural and cost-push sources of inflation tend to dominate monetary factors (Nell, 2004, 2018; Heintz and Ndikumana, 2011; Durevall, Loening, and Yohannes, 2013; Nguyen *et al.*, 2017; Ndikumana *et al.*, 2023). In addition, there is growing evidence that the money supply in developing economies is endogenously determined (Vera, Guijarro, and Pérez, 2022)[3]. It is important to reiterate that money supply endo-

[3] Nguyen *et al.* (2017) acknowledge the dominance of supply-side sources of inflation in SSA countries but claim that demand has become more important in recent years, following institutional reforms and greater reliance on market-based policies. They interpret their results, which show the increasing importance of output shocks in more recent years,

geneity does not necessarily mean that monetary policy is ineffective in controlling inflation, but rather that Central Banks may *choose* to accommodate structural and cost inflation, otherwise slow growth and high unemployment may well be the inevitable outcomes[4].

Khan and Senhadji (2001) recognize the relevance of a traditional 'structural' source of inflation —*i.e.* inelasticities in the tax system and the need to revert to an inflation tax— as an explanation for the higher threshold values observed in underdeveloped economies[5]. Generally, however, studies tend to emphasise conventional explanations such as differences in institutional quality and institutional arrangements (*e.g.* the

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as evidence that demand has become more relevant as an explanation of inflation in SSA countries, and therefore support a more active role for monetary policy as a demand management tool. This interpretation, however, is not well supported by the actual evidence in Nguyen *et al.* (2017). They show that the monetary policy instruments to control demand, such as interest rates and the money stock, have become *less* important in recent years. Moreover, because the authors use output rather than *excess* demand in their empirical analysis, the increasing importance of output as an explanation of inflation in SSA countries may capture supply-side shocks rather than demand-side shocks.

4 If Central Banks in underdeveloped economies tend to *accommodate* structural and cost inflation, then the evidence obtained from structural vector-autoregressive (VAR) models may yield statistically insignificant monetary policy transmission mechanisms. Indeed, this is what the empirical evidence for low-income countries typically shows (see the comprehensive survey in Mishra and Montiel, 2013). Mishra and Montiel (2013) interpret the evidence in terms of an underdeveloped banking system in low-income countries rather than accommodating monetary policy. However, if the insignificant monetary policy transmission mechanisms in low-income countries reflect accommodating monetary policy, then Mishra and Montiel's (2013) interpretation would not be entirely accurate. As an alternative to the structural VAR methodology, it would be preferable to use the 'narrative approach' of Romer and Romer (1989), with its focus on specific events, to evaluate the effectiveness of monetary policy. Berg *et al.* (2013) apply this approach to four East African Community (EAC) countries (Kenya, Uganda, Tanzania, and Rwanda). Their 'non-statistical procedure' suggests that, in response to the surge in inflation from the 2010-2011 commodity price shock, restrictive monetary policy measures in the EAC economies were largely successful in moderating inflationary pressure. Thus, the Central Banks in these economies *chose* to intervene in reaction to excessive inflation from a specific event, but generally may *choose* not to intervene when structural and cost inflation are less pervasive.

5 The inflation tax model is a demand-side theory of inflation. However, in some way it can also be associated with 'structural' inflation because underdeveloped economies with rigid tax systems would tend to inflate at a faster rate than developed economies with more flexible tax systems to generate additional tax revenue.

degree of central bank independence) in developed relative to developing economies, and the absence of well-developed financial intermediaries in the latter to transmit monetary policy shocks in an effective way. (Durevall, Loening, and Yohannes, 2013; Mishra and Montiel, 2013; Seleteng, Bittencourt, and van Eyden, 2013; Ibarra and Trupkin, 2016; Nguyen *et al.*, 2017; Bhattacharya and Jain, 2020).

But the more fundamental policy issue is to recognize that structural inflation and, to a lesser extent, cost inflation, are the *natural* and *unavoidable* outcomes of the growth and development process in developing economies. To reduce structural inflation with restrictive demand-side policy measures is to impair growth, even in developing countries where the inflation effect is insignificant below the threshold. The only way to squeeze structural inflation out of the system without harming growth is to design measures that *directly* address the rigidities in the real economy.

From the above, a useful and policy relevant way of interpreting the relatively high inflation thresholds of 6%-21% in developing countries is the following. For illustrative purposes only, assume that inflation of up until 7% originates from structural and cost-push sources. Superimposing demand inflation of 7% gives a threshold inflation of 14%, which is roughly the midpoint of the actual threshold range identified by the studies in Table 1. In some of the studies reviewed above, the demand component of inflation dominates, giving a positive inflation effect up until the threshold. In other studies, with different samples of developing countries and time periods, the positive growth effect of demand inflation is obscured by structural and cost-push forces, hence the insignificant growth effect up until a relatively high threshold.

Finally, the results in Table 1 show that the effect of inflation above all the threshold values identified for developed and developing countries is unambiguously negative and statistically significant. Using the insights in Thirlwall's (1974b) ISGD book, the unambiguous nature of the results above the thresholds in developing economies is not surprising. We know that the growth benefits come from demand inflation. However, below the threshold values in developing economies the results may be more mixed because the growth stimulus of demand inflation is masked by structural and cost inflation. In contrast, above the thresholds *all* types of inflation are harmful to growth, including demand inflation.

3.2. Investment in physical capital as the operative channel

The models in Thirlwall's (1974b) ISGD book generally emphasise the importance of investment in physical capital and how the costs and benefits of inflation on growth operate via the investment channel. Nevertheless, the vast majority of studies in Table 1 include either total gross investment or gross fixed investment as a control variable. Column 4 in Table 1 shows that in most cases the investment variable is positive and statistically significant, implying that inflation affects the *productivity* or *efficiency* of investment[6]. Or put in another way, inflation affects growth through a productivity channel rather than an investment channel. On the surface, these findings would seem to contradict the theoretical models in ISGD with their emphasis on a direct investment channel.

Nevertheless, it is easy to reconcile the findings in Table 1 with theoretical models that predict a direct effect of inflation on investment. It is plausible to assume that a rise in the nominal rate of return on physical capital from mild demand inflation, as well as the redistribution of income from wage earners to profit earners in the Kaldor-Thirlwall model and from the private sector to the government sector in the inflation tax model involve a change in the composition of investment. In the case of total gross investment, mild inflation in these models implies a shift out of residential investment and inventories into productive structures (infrastructure), machinery and plant. Thus, inflation raises the efficiency of investment by changing its composition rather than the total quantity of investment. In this way, the efficiency channel also captures the investment channel, as envisaged by the theoretical models in ISGD. The opposite occurs when inflation becomes 'excessive'. In this case, there would be shifts out of productive machinery and plant into inventories, unproductive structures and residential investment (see Feldstein, 1983; Temple, 2000; Madsen, 2003).

Some empirical support for the proposition that inflation changes the composition, rather than the quantity of investment, can be found in

[6] Nell and Thirlwall (2017, 2018) formally show that, when Barro-type (Barro, 1991, 2013) growth regressions include investment as a control variable, all the other explanatory variables determine the productivity or efficiency of investment.

Ghosh and Phillips (1998) and Wallich (1969). They find that the effect of inflation on growth remains virtually unchanged, irrespective of whether investment is included in the regression or not. Nevertheless, in line with Thirlwall's (1974b) emphasis on the investment channel, it would be informative to explicitly examine the linear and non-linear effects of inflation on total investment and its different sub-components for future research purposes. Although a more in-depth empirical analysis of the investment channel has already been identified by Temple (2000) as an important research area, studies still tend to focus on the direct effect of inflation on GDP per capita growth, notwithstanding some notable exceptions (see *e.g.* Fischer, 1993; Madsen, 2003; Barro, 2013).

4. CONCLUSION

The hallmark of a good economics book is whether its theoretical content and empirical predictions made several decades ago remain relevant when assessed against more recent evidence. Indeed, all these attributes are standout features of Thirlwall's (1974b) ISGD book. A key insight of ISGD is that the growth benefits come from *mild* demand inflation, as predicted by the Kaldor-Thirlwall model of forced saving and the inflation tax model, whereas structural inflation and, to a lesser extent, cost inflation, should be seen as the inevitable outcomes of the growth and development process. Although the Kaldor-Thirlwall model of forced saving and the inflation tax model have had their critics, the review in this paper suggests that they remain highly relevant in today's developing economies.

Thirlwall's (1974b) ISGD book makes specific predictions about the threshold inflation rate one might expect in developing economies. Since observed inflation is a composite of different types of inflation, the growth-enhancing effect of demand inflation may be obscured by structural and cost inflation in developing economies. Moreover, because structural and cost inflation are more prevalent in developing economies, their threshold inflation rates should be higher than developed economies. Indeed, these predictions are strongly supported by the evidence of more recent studies. For developed countries, the thresholds vary between relatively low values of 1% and 5%, with a positive and significant effect of inflation on growth up until the thresholds and a

negative and significant effect thereafter. In contrast, for developing countries the threshold values of 6%-21% are noticeably higher, with many studies reporting a positive and statistically significant growth-effect up until the threshold ranges, while other studies obtain a statistically insignificant effect up until the threshold values.

The different threshold ranges across developed and developing countries can be explained by the dominance of structural and cost-push inflation in the latter. This contention is further supported by the literature review on the drivers of inflation in African countries and the general finding that the money supply is endogenously determined in developing economies. In those developing country studies that report a positive and significant effect up until the threshold values, the demand component of inflation dominates the structural and cost components, whereas the contrary is true for those studies that find an insignificant effect below the threshold values.

A useful and policy relevant way of interpreting the evidence for developing countries is to take the midpoint of the 6%-21% threshold values and to decompose it into different sources of inflation. A main message in this paper and in Thirlwall's ISGD book is that the structural part of the inflation threshold is the natural and unavoidable outcome of the growth and development process. To squeeze structural inflation out of the system with restrictive demand management policies is to harm growth. What is required are policies that *directly* address the structural rigidities in the real economy, such as supply bottlenecks between expanding and declining sectors, foreign exchange bottlenecks, an underdeveloped agricultural sector and rigidities in the tax system. These policy implications differ markedly from a monetarist interpretation, in which excess demand is the underlying cause of inflation and under the direct control of the Central Bank through its control over the monetary base or monetary policy (interest) rate.

An interesting result of all the studies reviewed in this paper is that the inflation effect on growth above *all* the thresholds identified for developing and developed countries is unambiguously negative and statistically significant. ISGD again provides useful guidelines to interpret the evidence above the thresholds. The evidence below the thresholds for developing countries is more mixed because structural and cost inflation mask the positive growth effects of demand inflation. Above

the thresholds, however, *all* types of inflation are harmful to growth, including demand inflation.

The analysis further argues that inflationary finance of development, as advanced in ISGD, remains a viable development strategy when open-economy constraints are considered. The main purpose of inflationary finance is to generate domestic resources for investment purposes, as formalised in the Kaldor-Thirlwall model of forced saving, and thus to reduce the economy's dependence on foreign borrowing to supplement deficient domestic saving. Inflationary finance may further raise additional tax revenue through an inflation tax and supplement shortages in normal tax revenue from a rigid tax system to finance high-yielding infrastructure projects and R&D activities.

However, faster demand growth from inflationary finance policies relative to the BPC growth rate invariably implies a growing current account deficit, as predicted by Thirlwall's (1979) seminal paper. To support the inflationary finance policy during the *initial* stages, would require foreign capital inflows, as argued in Chapter 8 of ISGD. The updated literature review in this paper suggests that foreign aid and remittances from abroad have the potential to support the balance-of-payments deficit during the initial stages in low-income countries, while mild demand inflation that raises the nominal rate of return on physical capital may attract a stable source of finance, such as FDI. Over the medium to long run, the capacity-creating effect of inflationary finance would improve the fundamental determinants of the internal real exchange rate and relax the BPC growth rate through an increase in the income elasticity of demand for exports and a decrease in the income elasticity in demand for imports.

The vast majority of inflation-growth studies reviewed in this paper include investment as a control variable. In most of these studies the investment variables is positive and statistically significant, implying that inflation affects the *productivity* of investment. This finding, however, is entirely consistent with the models in ISGD that predict a direct channel from inflation to investment, once it is recognised that mild demand inflation affects the composition of total investment, with shifts out of inventories and residential investment into productive machinery, structures and plant. For future research purposes, as suggested by Temple (2000) many years ago, it would be informative to test more directly

the potential non-linear effects of inflation on total investment and its sub-components.

To conclude, Thirlwall's (1974b) ISGD book provides invaluable insights to interpret the more recent inflation-growth studies in a theory-consistent and policy relevant way. These major insights should be fully acknowledged in the literature to provide a better understanding of the inflation-growth nexus in developing economies. ◄

REFERENCES

Addison, T., and Baliamoune-Lutz, M. (2017). Aid, the real exchange rate and why policy matters: The cases of Morocco and Tunisia. *Journal of Development Studies*, 53(7), pp. 1104-1121. https://doi.org/10.1080/00220388.2017.1303673

Aghevli, B.B., and Khan, M.S. (1977). Inflationary finance and the dynamics of inflation: Indonesia, 1951-72. *American Economic Review*, 67(3), pp. 390-403. https://www.jstor.org/stable/1831408

Agur, I., Capelle, D. Dell'Ariccia, G., and Sandri, D. (2022). *Monetary finance: Do not touch, or handle with care?* [Research Department DP/2022/001] International Monetary Fund, Washington, DC. [online] Available at: <https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2022/01/11/Monetary-Finance-Do-Not-Touch-or-Handle-with-Care-464862>.

Ahmad, A.H., Pentecost, E.J., and Stack, M.M. (2023). Foreign aid, debt interest repayments and Dutch disease effects in a real exchange rate model for African countries. *Economic Modelling*, 126(September), pp. 1-11. https://doi.org/10.1016/j.econmod.2023.106434

Akerlof, G., Dickens, W., and Perry, G. (1996). Low inflation or no inflation: Should the Federal Reserve pursue complete price stability? *Challenge*, 39(5), pp. 11-17. https://doi.org/10.1080/05775132.1996.11471920

Akerlof, G.A., Dickens, W.T., Perry, G.L., Bewley, T.F., and Blinder, A.S. (2000). Near-rational wage and price setting and the long-run Phillips curve. *Brookings Papers on Economic Activity*, 1, pp. 1-60. [online] Available at: <https://www.jstor.org/stable/2667348>.

Akinsola, F.A., and Odhiambo, N.M. (2017). Inflation and economic growth: A review of the international literature. *Comparative Economic Research*, 20(3), pp. 41-56. https://doi.org/10.1515/cer-2017-0019

Argy, V. (1970). Structural inflation in developing countries. *Oxford Economic Papers*, 22(1), pp. 73-85. https://doi.org/10.1093/oxfordjournals.oep.a041153

Arndt, C., Jones, S., and Tarp, F. (2015). Assessing Foreign aid's long-run contribution to growth and development. *World Development*, 69(May), pp. 6-18. https://doi.org/10.1016/j.worlddev.2013.12.016

Azam, M., and Khan, S. (2022). Threshold effects in the relationship between inflation and economic growth: Further empirical evidence from the developed and developing world. *International Journal of Finance & Economics*, 27(4), pp. 4224-4243. https://doi.org/10.1002/ijfe.2368

Baglan, D., and E. Yoldas (2014). Non-linearity in the inflation-growth relationship in developing economies: Evidence from a semiparametric panel model. *Economics Letters*, 125(1), pp. 93-96. https://doi.org/10.1016/j.econlet.2014.08.015

Baharumshah, A.Z., Slesman, L., and Wohar, M.E. (2016). Inflation, inflation uncertainty, and economic growth in emerging and developing countries: Panel data evidence. *Economic Systems* 40(4), pp. 638-657. https://doi.org/10.1016/j.ecosys.2016.02.009

Bahmani, M., Harvey, H., and Hegerty, S.W. (2013). Empirical tests of the Marshall–Lerner condition: A literature review. *Journal of Economic Studies*, 40(3), pp. 411-43. https://doi.org/10.1108/01443581311283989

Bailey, M. (1956). The welfare cost of inflationary finance. *Journal of Political Economy*, 64(2), pp. 93-110. https://doi.org/10.1086/257766

Ball, L. (2013). The case for 4% inflation. *Central Bank Review*, 13(2), pp. 17-31. [online] Available at: <https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Publications/Central+Bank+Review/2013/Volume+13-2>.

Barro, R.J. (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5), pp. 103-126. https://doi.org/10.1086/261726

Barro, R.J. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics*, 106(2), pp. 407-443. https://doi.org/10.2307/2937943

Barro, R.J. (2013). Inflation and economic growth. *Annals of Economics and Finance*, 14(1), pp. 85-109. [online] Available at: <http://aeconf.com/articles/may2013/aef140105.pdf>.

Berg, A., Charry, L., Portillo, R., and Vlcek, J. (2013). *The monetary transmission mechanism in the tropics: A narrative approach* [IMF Working Paper 13/197]. International Monetary Fund, Washington, DC. [online] Available at: <https://www.imf.org/external/pubs/ft/wp/2013/wp13197.pdf>.

Bhattacharya, R., and Jain, R. (2020). Can monetary policy stabilise food inflation? Evidence from advanced and emerging economies. *Economic Modelling*, 89(July), pp. 122-141. https://doi.org/10.1016/j.econmod.2019.10.005

Bick, A. (2010). Threshold effects of inflation on economic growth in developing countries. *Economics Letters*, 108(2), pp. 126-129. https://doi.org/10.1016/j.econlet.2010.04.040

Blanchard, O.J., Dell'Ariccia, G., and Mauro, P. (2010). Rethinking macroeconomic policy. *Journal of Money, Credit, and Banking*, 42(s1), pp. 199-215. https://doi.org/10.1111/j.1538-4616.2010.00334.x

Blanchflower, D.G., and Bryson, A. (2023). Recession and deflation? *Review of Keynesian Economics*, 11(2), pp. 214-231. https://doi.org/10.4337/roke.2023.02.06

Blecker, R.A (2022). New advances and controversies in the framework of balance-of-payments-constrained growth. *Journal of Economic Surveys*, 36(2), pp. 429-467. https://doi.org/10.1111/joes.12463

Briault, C. (1995). The cost of inflation. *Bank of England Quarterly Bulletin*, 35(1), pp. 33-45. [online] Available at: <https://www.bankofengland.co.uk/quarterly-bulletin/1995/q1/the-costs-of-inflation>.

Buiter, H.W. (2014). The simple analytics of helicopter money: Why it works – Always. *Economics: The Open-Access, Open-Assessment E-Journal*, 8(2014-28), pp. 1-46. http://dx.doi.org/10.5018/economics-ejournal.ja.2014-28

Bullard, J.B. (1999). Testing long-run monetary neutrality propositions: Lessons from the recent research. *Review, Federal Reserve Bank of St. Louis*, 81(Nov), pp. 57-77. https://doi.org/10.20955/r.81.57-78

Cagan, P. (1956). The monetary dynamics of hyperinflation. In: M. Friedman (ed.), *Studies in the Quantity Theory of Money*. Chicago: University of Chicago Press.

Campos, R. (1964). Economic development and inflation with special reference to Latin America. In: *Development Plans and Programs: Some Case Studies and Experiences*. Organization for Economic Cooperation and Development Studies in Development No. 1. Paris: OECD Development Center, pp. 127-41.

Canavese, A.J. (1982). The structuralist explanation in the theory of inflation. *World Development*, 10(7), pp. 523-529. https://doi.org/10.1016/0305-750X(82)90053-5

Cardoso, E. (1981). Food supply and inflation. *Journal of Development Economics*, 8(3), pp. 269-284. https://doi.org/10.1016/0304-3878(81)90016-X

Carruth, A., Dickerson, A., and Henley, A. (2000). What do we know about investment under uncertainty? *Journal of Economic Surveys*, 14(2), pp. 119-154. https://doi.org/10.1111/1467-6419.00107

Cavallo, E., Eichengreen, B., and Panizza, U. (2018). Can countries rely on foreign saving for investment and economic development? *Review of World Economics*, 154(2), pp. 277-306. https://doi.org/10.1007/s10290-017-0301-5

Cazachevici, A., Havranek, T., and Horvath, R. (2020). Remittances and economic growth: A meta-analysis. *World Development*, 134(October), pp. 1-17. https://doi.org/10.1016/j.worlddev.2020.105021

Chowdhury, A., and Sundaram, J.K. (2023). Inflation phobia, myths and dogma exacerbate policy responses. *Review of Keynesian Economics*, 11(2), pp. 147-171. https://doi.org/10.4337/roke.2023.02.03

Cimoli, M., Pereima, J.B., and Porcile, G. (2019). A technology gap interpretation of growth paths in Asia and Latin America. *Research Policy*, 48(1), pp. 125-136. https://doi.org/10.1016/j.respol.2018.08.002

Cobbe, J.H. (1976). Review of inflation, saving and growth in developing economies. By A.P. Thirlwall. *Economica*, 43(169), pp. 97-98. https://doi.org/10.2307/2553028

Conconi, P., Sapir, A., and Zanardi, M. (2016). The Internationalization process of firms: From exports to FDI. *Journal of International Economics*, 99, pp. 16-30. https://doi.org/10.1016/j.jinteco.2015.12.004

De Carvalho, A.R., Ribeiro, R.S.M., and Marques, A.M. (2018). Economic development and inflation: A theoretical and empirical analysis. *International Review of Applied Economics*, 32(4), pp. 546-565. https://doi.org/10.1080/02692171.2017.1351531

De Grauwe, P. (2020). The need for monetary financing of Corona budget deficits. *Intereconomics: Review of European Economic Policy*, 55(3), pp. 133-134. https://doi.org/10.1007/s10272-020-0885-1

De Grauwe, P., and Polan, M. (2005). Is inflation always and everywhere a monetary phenomenon? *Scandinavian Journal of Economics*, 107(2), pp. 239-259. https://doi.org/10.1111/j.1467-9442.2005.00406.x

DeLong, B. (2023). The first inflation problem of the twenty-first century. *Review of Keynesian Economics*, 11(2), pp. 117-128. https://doi.org/10.4337/roke.2023.02.01

Demir, F., and Razmi, A. (2022). The real exchange rate and development theory, evidence, issues and challenges. *Journal of Economic Surveys*, 36(2), pp. 386-428. https://doi.org/10.1111/joes.12418

Dorrance, G.S. (1966). Inflation and growth: The statistical evidence. *IMF Staff Papers*, 13(1), pp. 82-101. [online] Available at: <https://www.jstor.org/stable/3866409>.

Doucouliagos, H., and Paldam, M. (2009). The aid effectiveness literature: The sad results of 40 years of research. *Journal of Economic Surveys*, 23(3), pp. 433-461. https://doi.org/10.1111/j.1467-6419.2008.00568.x

Durevall, D., Loening, J.L., and Yohannes, A.B. (2013). Inflation dynamics and food prices in Ethiopia. *Journal of Development Economics*, 104(September), pp. 89-106. https://doi.org/10.1016/j.jdeveco.2013.05.002

Easterly, W. (2006). Reliving the 1950s: The big push, poverty traps, and takeoffs in economic development. *Journal of Economic Growth*, 11(4), pp. 289-314. https://doi.org/10.1007/s10887-006-9006-7

Easterly, W., and Rebelo, S. (1993). Fiscal policy and economic growth: An empirical investigation. *Journal of Monetary Economics*, 32(3), pp. 417-458. https://doi.org/10.1016/0304-3932(93)90025-B

English, W.B., Erceg, C.J., and Lopez-Salido, D. (2017). *Money-financed fiscal programs: A cautionary tale* [Finance and Economics Discussion Series 2017-060]. Board of Governors of the Federal Reserve System, Washington, DC. [online] Available at: <https://www.federalreserve.gov/econres/feds/money-financed-fiscal-programs-a-cautionary-tale.htm>.

Espinoza, R., Leon, H., and Prasad, A. (2012). When should we worry about inflation? *World Bank Economic Review*, 26(1), pp. 100-127. [online] Available at: <https://www.jstor.org/stable/4134249>.

Fedderke, J.W., Perkins, P., and Luiz, J.M. (2006). Infrastructural investment in long-run economic growth: South Africa 1875-2001. *World Development*, 34(6), pp. 1037-1059. https://doi.org/10.1016/j.worlddev.2005.11.004

Feldstein, M. (1983). *Inflation, Tax Rules and Capital Formation*. Chicago: Chicago University Press.

Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal Monetary Economics*, 32(3), pp. 485-512. https://doi.org/10.1016/0304-3932(93)90027-D

FitzGerald, V. (2006). Models of Saving, income and the macroeconomics of developing countries in the Post-Keynesian tradition. In: P. Arestis, J.S.L. McCombie and R. Vickerman (eds.), *Growth and Economic Development: Essays in Honour of A.P. Thirlwall*. Chapter 13 (pp. 247-264). UK (Cheltenham): Edward Elgar Publishing.

Friedman, M. (1959a). *A Program for Monetary Stability.* New York City: Fordham University Press.

Friedman, M. (1959b). The demand for money: Some theoretical and empirical results. *Journal of Political Economy*, 67(4), pp. 327-351. https://doi.org/10.1086/258194

Friedman, M. (1971). Government Revenue from Inflation. *Journal of Political Economy*, 79(4), pp. 846-856. https://doi.org/10.1086/259791

Friedman, M., and Schwartz, A.J. (1963). *A Monetary History of the United States, 1867-1960*. Princeton, NJ: Princeton University Press.

Friedman, M., and Schwartz, A.J. (1982). *Monetary trends in the United States and the United Kingdom*. Chicago: University of Chicago Press.

Gala, P. (2008). Real exchange rate levels and economic development: Theoretical analysis and econometric evidence. *Cambridge Journal of Economics*, 32(2), pp. 273-288. https://doi.org/10.1093/cje/bem042

Galí, J. (2020). The effects of a money-financed fiscal stimulus. *Journal of Monetary Economics*, 115(November), pp. 1-19. https://doi.org/10.1016/j.jmoneco.2019.08.002

Ghatak, S., and Sánchez-Fung, J. (2007). *Monetary Economics in Developing Countries*. New York: Palgrave MacMillan.

Ghosh, A., and Phillips, S. (1998). Warning: Inflation may be harmful to your growth. *IMF Staff Papers*, 45(4), pp. 672-710. [online] Available at: <https://www.jstor.org/stable/3867589>.

Harrod, R.F. (1939). An essay in dynamic theory. *Economic Journal*, 49(193), pp. 14-33. https://doi.org/10.2307/2225181

Heintz, J., and Ndikumana, L. (2011). Is there a case for formal inflation targeting in Sub-Saharan Africa? *Journal of African Economies*, 20(suppl_2), pp. ii67–ii103. https://doi.org/10.1093/jae/ejq027

Herzer, D., Nowak-Lehmann, F., Dreher, A., Klasen, S., and Martinez-Zarzoso, I. (2015). Comment on Lof, Mekasha, and Tarp (2014). *World Development*, 70(June), pp. 389-396. https://doi.org/10.1016/j.worlddev.2014.06.012

Hussein, K.A., and Thirlwall, A.P. (1999). Explaining differences in the domestic savings ratio across countries: A panel data study. *Journal of Development Studies*, 36(1), pp. 31-52. https://doi.org/10.1080/00220389908422610

Ibarra, R., and Trupkin, D. (2016). Reexamining the relationship between inflation and growth: Do institutions matter in developing countries? *Economic Modelling*, 52(PB), pp. 332-351. https://doi.org/10.1016/j.econmod.2015.09.011

Jahan, S., and Papageorgiou, C. (2014). What is Monetarism? *Finance & Development*, 51(1), pp. 38-39. [online] Available at: <https://www.imf.org/external/pubs/ft/fandd/2014/03/pdf/basics.pdf>.

Johnson, H.G. (1967). *Essays in Monetary Economics*. London: Allen & Unwin.
Johnson, O.E.G. (1984). On growth and inflation in developing countries. *IMF Staff Papers*, 31(4), pp. 636-660. [online] Available at: <https://www.jstor.org/stable/3866989>.
Juselius, J., Møller, N.F., and Tarp, F. (2014). The long-run impact of foreign aid in 36 African Countries: Insights from multivariate time series analysis. *Oxford Bulletin of Economics and Statistics*, 76(2), pp. 153-184. https://doi.org/10.1111/obes.12012
Kaldor, N. (1955-1956). Alternative theories of distribution. *Review of Economic Studies*, 23(1), pp. 83-100. https://doi.org/10.2307/2296292
Khan, M., and Senhadji, A. (2001). Threshold Effects in the relationship between inflation and growth. *IMF Staff Papers*, 48(1), pp. 1-21. [online] Available at: <https://www.jstor.org/stable/4621658>.
Kremer, S., Bick, A., and Nautz, D. (2013). Inflation and growth: New evidence from a dynamic panel threshold analysis. *Empirical Economics*, 44(2), pp. 861-878. https://doi.org/10.1007/s00181-012-0553-9
Krugman, P. (2014). Inflation targets reconsidered. In: *ECB Forum on Central Banking*, *Conference Proceedings*, pp. 110-122. Frankfurt am Main: European Central Bank.
León-Ledesma, M.A., and Thirlwall, A.P. (2002). The endogeneity of the natural rate of growth. *Cambridge Journal of Economics*, 26(4), pp. 441-459. https://doi.org/10.1093/cje/26.4.441
Lof, M., Mekasha, T.J., and Tarp, F. (2015). Aid and income: Another time-series perspective. *World Development*, 69(May), pp. 19-30. https://doi.org/10.1016/j.worlddev.2013.12.015
López-Villavicencio, A., and Mignon, V. (2011). On the impact of inflation on output growth: Does the level of inflation matter? *Journal of Macroeconomics*, 33(3), pp. 455-464. https://doi.org/10.1016/j.jmacro.2011.02.003
Madsen, J.B. (2003). Inflation and Investment. *Scottish Journal of Political Economy*, 50(4), pp. 375-397. https://doi.org/10.1111/1467-9485.5004002
Mandeya, S.M.T., and Ho, S. (2022). Inflation, inflation uncertainty and the economic growth nexus: A review of the literature. *Folia Oeconomica Stetinensia*, 22(1), pp. 172-190. https://doi.org/10.2478/foli-2022-0009
Marconi, N., Araujo, E. Brancher, M.C., and Porto, T.C. (2021). The relationship between exchange rate and structural change: An approach based on income elasticities of trade. *Cambridge Journal of Economics*, 45(6), pp. 1297-1318. https://doi.org/10.1093/cje/beab039

McCombie, J.S.L. (1985). Economic growth, the Harrod foreign trade multiplier and the Hicks' super-multiplier. *Applied Economics*, 17(1), pp. 55-72. https://doi.org/10.1080/00036848500000005

McCombie, J.S.L. (2011). Criticisms and defences of the balance-of-payments constrained growth model: Some old, some new. *PSL Quarterly Review*, 64(259), pp. 353-392. [online] Available at: <https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/9405>.

McCombie, J.S.L. (2023). Why the conventional test of Thirlwall's law is *Still* not a 'Near-Tautology' a rejoinder to Professor Blecker. *Review of Keynesian Economics*, 11(3), pp. 400-415. https://doi.org/10.4337/roke.2023.03.06

McKinnon, R.I. (1973). *Money and Capital in Economic Development*. Washington, DC: Brookings Institution Press.

Mishra, P., and Montiel, P. (2013). How effective is monetary transmission in low-income countries? A survey of the empirical evidence. *Economic Systems*, 37(2), pp. 187-216. https://doi.org/10.1016/j.ecosys.2012.12.001

Missio, F.J., and Jayme, F.G. (2012). Structural heterogeneity and endogeneity of elasticities on the balance of payments constrained growth model. In: E. Soukiazis and P.A. Cerqueira (eds.), *Models of Balance of Payments Constrained Growth* (pp. 239-267). London: Palgrave Macmillan.

Missio, F., Araujo, R.A., and Jayme, F.G. (2017). Endogenous Elasticities and the impact of the real exchange rate on structural economic dynamics. *Structural Change and Economic Dynamics*, 42(C), pp. 67-75. https://doi.org/10.1016/j.strueco.2017.06.002

Moore, B.J. (1988). *Horizontalists and Verticalists*. Cambridge: Cambridge University Press.

Mundell, R.A. (1965). Growth, stability, and inflationary finance. *Journal of Political Economy*, 73(2), pp. 97-109. https://doi.org/10.1086/258999

Ndikumana, L., Nkurunziza, J.D., Martín, M.E.S., Mulugeta, S., and Kelbore, Z.G. (2023). Monetary, fiscal, and structural drivers of inflation in Ethiopia: New empirical evidence from time series analysis. *Review of Development Economics*, 27(2), pp. 924-962. https://doi.org/10.1111/rode.12958

Ndoricimpa, A. (2017). Threshold effects of inflation on economic growth: Is Africa different? *International Economic Journal*, 31(4), pp. 599-620. https://doi.org/10.1080/10168737.2017.1380679

Nell, K.S. (2000a). *Money, inflation and growth in South Africa*. PhD Thesis. University of Kent, School of Economics. [online] Available at: <https://kar.kent.ac.uk/86164/>.

Nell, K.S. (2000b). *Is low inflation a precondition for faster growth? The case of South Africa* [Studies in Economics 0011]. School of Economics, University of Kent, Canterbury, UK. [online] Available at: <https://ideas.repec.org/p/ukc/ukcedp/0011.html>.

Nell, K.S. (2000-2001). The endogenous/exogenous nature of South Africa's Money supply under direct and indirect monetary control measures. *Journal of Post Keynesian Economics*, 23(2), pp. 313-329. https://doi.org/10.1080/01603477.2000.11490283

Nell, K.S. (2004). The structuralist theory of imported inflation: An application to South Africa. *Applied Economics*, 36(13), pp. 1431-1444. https://doi.org/10.1080/0003684042000204467

Nell, K.S. (2018). Re-examining the role of structural change and nonlinearities in a Phillips curve model for South Africa. *South African Journal of Economics*, 86(2), pp. 173-196. https://doi.org/10.1111/saje.12187

Nell, K.S., and Thirlwall, A.P. (2017). Why does the productivity of investment vary across countries? *PSL Quarterly Review*, 70(282), pp. 213-245. [online] Available at: <https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/14005>.

Nell, K.S., and Thirlwall, A.P. (2018). Explaining differences in the productivity of investment across countries in the context of 'new growth theory'. *International Review of Applied Economics*, 32(2), pp. 163-194. https://doi.org/10.1080/02692171.2017.1333089

Nelson, E., and Schwartz, A.J. (2008). The impact of Milton Friedman on modern monetary economics: Setting the record straight on Paul Krugman's 'Who was Milton Friedman?' *Journal of Monetary Economics*, Elsevier, 55(4), pp. 835-856. https://doi.org/10.1016/j.jmoneco.2008.01.001

Nguyen, A.D.M., Dridi, J., Unsal, F.D., and Williams, O.H. (2017). On the drivers of inflation in Sub-Saharan Africa. *International Economics*, 151(October), pp. 71-84. https://doi.org/10.1016/j.inteco.2017.04.002

Orphanides, A., and Solow, R.M. (1990). Money, inflation and growth. In: B.M. Friedman and F.H. Hahn (eds.), *Handbook of Monetary Economics*, volume 1, Chapter 6 (pp. 223-261). Elsevier.

Palley, T.I. (1994). Competing views of the money supply process. *Metroeconomica*, 45(1), pp. 397-403. https://doi.org/10.1111/j.1467-999X.1994.tb00013.x

Palley, T.I. (2000). The case for positive low inflation: Some financial market considerations with special attention to the problems of Japan. *Eastern*

Economic Journal, 26(3), pp. 277-295. [online] Available at: <https://www.jstor.org/stable/40325998>.

Perrotini-Hernández, I., and Vázquez-Muñoz, J.A. (2019). Endogenous growth, capital accumulation and Thirlwall's dynamics: The case of Latin America. *Review of Keynesian Economics*, 7(4), pp. 444-462. https://doi.org/10.4337/roke.2019.04.03

Phylaktis, K., and Taylor, M.P. (1993). Money demand, the Cagan model and the inflation tax: Some Latin American evidence. *Review of Economics and Statistics*, 75(1), pp. 32-37. https://doi.org/10.2307/2109623

Pindyck, R.S. (1991). Irreversibility, uncertainty, and investment. *Journal of Economic Literature*, 29(3), pp. 1110-1148. [online] Available at: <https://www.jstor.org/stable/2727613>.

Pollin R., and Zhu, A. (2006). Inflation and growth: A cross-country non-linear analysis. *Journal of Post Keynesian Economics*, 28(4), pp. 593-614. https://doi/abs/10.2753/PKE0160-3477280404

Rapetti, M. (2020). The real exchange rate and economic growth: A survey. *Journal of Globalization and Development*, 11(2), Article 20190024. https://doi.org/10.1515/jgd-2019-0024

Ridhwan, M.M., Ismail, A., and Nijkamp, P. (2023). The real exchange rate and economic growth: A meta-analysis. *Journal of Economic Studies*. Forthcoming. https://doi.org/10.1108/JES-10-2022-0548

Rob, R., and Vettas, N. (2003). Foreign direct investment and exports with growing demand. *Review of Economic Studies*, 70(3), pp. 629-648. https://doi.org/10.1111/1467-937X.00259

Romer, D. (2019). *Advanced Macroeconomics*. 5th edition. New York: McGraw-Hill.

Romer, C., and Romer, D. (1989). Does monetary policy matter? A new test in the spirit of Friedman and Schwartz. *NBER Macroeconomics Annual* 4, pp. 21–184. https://doi.org/10.1086/654103

Sachs, J.D., McArthur, J.W., Schmidt-Traub, G., Kruk, M., Bahadur, C., Faye, M., and McCord, G. (2004). Ending Africa's poverty trap. *Brookings Papers on Economic Activity*, 35(1), pp. 117-240. [online] Available at: <https://www.jstor.org/stable/3217964>.

Sarel, M. (1996). Nonlinear effects of inflation on economic growth. *IMF Staff Papers*, 43(1), pp. 199-215. [online] Available at: <https://www.jstor.org/stable/3867357>.

Seleteng, M., Bittencourt, M., and van Eyden, R. (2013). Non-linearities in inflation-growth nexus in the SADC region: A panel smooth transition

regression approach. *Economic Modelling* 30(January), pp. 149-156. https://doi.org/10.1016/j.econmod.2012.09.028
Sepehri, A., and Moshiri, S. (2004). Inflation-growth profiles across countries: Evidence from developing and developed countries. *International Review of Applied Economics*, 18(2), pp. 191-207. https://doi.org/10.1080/02692170420000186679
Setterfield M. (2006). Thirlwall's Law and Palley's pitfalls: A reconsideration. In: P. Arestis, J.S.L. McCombie and R. Vickerman (eds.), *Growth and economic development: Essays in Honour of A.P. Thirlwall*. Chapter 2 (pp. 47-59). UK (Cheltenham): Edward Elgar.
Setterfield, M., and Ozcelik, S. (2018). Is the balance of payments constrained growth rate time-varying? Exchange rate overvaluation, policy-induced recessions, deindustrialization, and long run growth. In: P. Arestis (ed.), *Alternative Approaches in Macroeconomics: Essays in Honour of John McCombie* (pp. 331-353). Cham, Switzerland: Palgrave Macmillan.
Shaw, E. (1973). *Financial Deepening in Economic Development*. New York: Oxford University Press.
Sidrauski, M. (1967). Inflation and economic growth. *Journal of Political Economy*, 75(6), pp. 796-810. https://doi.org/10.1086/259360
Solow, R.M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), pp. 65-94. https://doi.org/10.2307/1884513
Stockman, A.C. (1981). Anticipated inflation and the capital stock in a cash-in-advance economy. *Journal of Monetary Economics*, 8(3), pp. 387-393. https://doi.org/10.1016/0304-3932(81)90018-0
Tanzi, V. (1977). Inflation, lags in collection, and the real value of tax revenue. *IMF Staff Papers*, 24(1), pp. 154-167. [online] Available at: <https://www.jstor.org/stable/3866540>.
Tanzi, V. (1978). Inflation, real tax revenue, and the case for inflationary finance: Theory with an Application to Argentina. *IMF Staff Papers*, 25(3), pp. 417-451. [online] Available at: <https://www.jstor.org/stable/3866679>.
Tanzi, V. (1982). Fiscal disequilibrium in developing countries. *World Development*, 10(12), pp. 1069-1082. https://doi.org/10.1016/0305-750X(82)90019-5
Temple, J. (2000). Inflation and growth: Stories short and tall. *Journal of Economic Surveys*, 4(4), pp. 395-426. https://doi.org/10.1111/1467-6419.00116
Thirlwall, A.P. (1974a). Inflation and the saving ratio across countries. *Journal of Development Studies*, 10(2), pp. 154-174. https://doi.org/10.1080/00220387408421482

Thirlwall, A.P. (1974b). *Inflation, Saving and Growth in Developing Economies*. London: Macmillan.

Thirlwall, A.P. (1978). Comments on the relation between savings, distribution and income. *Journal of Development Studies*, 14(3), pp. 366-369. https://doi.org/10.1080/00220387808421682

Thirlwall, A.P. (1979). The balance of payments constraint as an explanation of international growth rate differences. *Banca Nazionale del Lavoro Quarterly Review*, 32(128), pp. 45-53. [online] Available at: <https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/12804>.

Thirlwall, A.P. (2001). The relationship between the warranted growth rate, the natural rate, and the balance of payments equilibrium growth rate. *Journal of Post Keynesian Economics*, 24(1), pp. 81-88. https://doi.org/10.1080/01603477.2001.11490316

Thirlwall, A.P. (2011). Balance of payments constrained growth models: History and overview. *PSL Quarterly Review*, 64(259), pp. 307-351. [online] Available at: <https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/9404>.

Thirlwall, A.P. (2019). Thoughts on balance-of-payments constrained growth after 40 years. *Review of Keynesian Economics*, 7(4), pp. 554-567. https://doi.org/10.4337/roke.2019.04.09

Thirlwall, A.P., and Barton, C.A. (1971). Inflation and growth: The international evidence. *Banca Nazionale del Lavoro Quarterly*, 24(98), pp. 263-275. [online] Available at: <https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/12873>.

Thirlwall, A.P., and Pacheco-López, P. (2017). *Economics of Development: Theory and Evidence*. 10th edition. London: Palgrave Macmillan.

Tobin, J. (1965). Money and economic growth. *Econometrica*, 33(4), pp. 671-684. https://doi.org/10.2307/1910352

Turner, A. (2015). The case for monetary finance—An essentially political issue. Presented at the *16th IMF Jacques Polak Research Conference*. Washington, DC, November 5-6. [online] Available at: <https://www.imf.org/external/np/res/seminars/2015/arc/pdf/adair.pdf>.

Vera, L., Guijarro, J.C., and Pérez, B. (2022). Testing the global extent of the endogenous-money hypothesis: A panel vector autoregression approach. *Review of Keynesian Economics*, 10(3), pp. 1-11. https://doi.org/10.4337/roke.2022.03.02

Vernengo, M., and Pérez Caldentey, E. (2023). Price and prejudice: Reflections

on the return of inflation and ideology. *Review of Keynesian Economics*, 11(2), pp. 129-146. https://doi.org/10.4337/roke.2023.02.02

Wachter, S.M. (1976). *Latin American Inflation: The Structuralist-Monetarist Debate*. Massachusetts: Lexington Books.

Wallich, H.C. (1969). Money and growth: A country cross-section analysis. *Journal of Money, Credit and Banking*, 1(2), pp. 281-302. https://doi.org/10.2307/1991275

Woodfield, A., and McDonald, J. (1978). On the relation between savings, distribution and inflation. *Journal of Development Studies*, 14(3), pp. 357-365. https://doi.org/10.1080/00220387808421681

Yemba, B., Kitenge, E., and Woodburne, P. (2020). Non-linear Effects of inflation on economic growth in the Democratic Republic of the Congo. *South African Journal of Economics*, 88(4), pp. 536-550. https://doi.org/10.1111/saje.12249