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Article

Is Keynesianism still increasingly relevant? The importance of the economic multiplier

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Abstract: Cyclically, the debate on Keynes' economic policies reemerge. The economic impact of the pandemic caused by COVID-19 has relaunched the discussion about the importance of Keynesian policies, the multipliers effects, and their impact on stimulating economies. This paper aims to analyze the importance and relevance of the Keynesian multiplier before the pandemic, in a period without experiencing exceptional aggregate shocks. The main focus of the research is to examine the shortcomings of the public investment multiplier, which plays a central role in Keynesian theory. Despite the undeniable relevance of the concept, the issue is to understand the extent to which the multiplier is still relevant in specific contexts. The research presents empirical evidence which suggests that the effects of public investment depend on structural characteristics of economies specifically trade liberalization, the dimension of internal markets, the question of countries having the freedom to issue their currency, and the issue of currencies being accepted as an international reserve. A sample of 35 OECD countries was used for the period 2010–2018. The Keynesian public investment multiplier was calculated for several countries and the obtained values were related to various correlations carried out to assess the relationship between public investment, national income, and specific characteristics of the economies to which the multipliers are sensitive. The results obtained contrast in terms of short-term and long-term impacts so, is at least dubious, that one can rely on Keynesian public policies to boost economies at least in the absence of substantial shocks to aggregate demand.

Keywords: Keynes; economic multiplier; public investment; internal market; trade liberalization

1. Introduction

Time and again, the relevance of Keynes' policies and his thoughts are scrutinized. The economic crisis caused by COVID-19 has revived the debate on state intervention in economies. Even the most liberal had to surrender to the evidence of the need for massive intervention plans to avoid a catastrophic economic and social collapse. The debate on Keynesian policies was once again on the agenda. John Maynard Keynes (1883–1946) was probably the most important economist of the 20th century and has proved to be influential until today. Keynes created macroeconomics in the 1930s and his theories are still relevant. During the period of the Great Depression (1929–1933), the developed capitalist countries faced a dramatic fall in GDP, resulting in severe unemployment. Keynes believed in government intervention through public policies to achieve full employment and price stability. Later, in the 1970s, with the rise of neoliberalism, Keynesian economics was abandoned and macroeconomics reinvented itself as the study of economic growth (Temin and Vines, 2014). In the aftermath of the global financial crisis in 2007–2008, Keynes gained

renewed interest and proved again to have the right diagnosis (Bello, 2017). Today, Keynesianism is still very important. The COVID-19 pandemic has produced a severe recession with shockwaves of extreme magnitude. As a result, many countries have implemented policy actions of a Keynesian nature (Byrialsen et al., 2021). We can gain by calling these Keynesian models again, at least in so far as policy response is concerned in times of crisis (Eichengreen, 2020). Keynesian theory has four fundamental blocks. First, the condition of equilibrium in the goods market, with the level of income, in addition to the interest rate, setting savings and investment equal. Here, the multiplier appears as the corollary for changes in expenditure and income. The multiplier is an economic concept or theory that asserts that an increase in private consumption or government spending raises the Gross Domestic Product (GDP) by more than the amount of the increase. Second, the condition of equilibrium of the money market, with the demand for money, which is indicative of the liquidity preferences of economic agents, is a function of national income and interest rates. Third, the volatility of private investment reflects changes in long-term expectations and emphasizes uncertainty about the future. Fourth, there is Keynes' analysis of the labor market and the fact that nominal wages do not clear the labor market (Dimand, 2010).

The main focus of this paper is to analyze the shortcomings of the economic multiplier, which plays a central role in Keynesian theory. Despite the undeniable importance and relevance that the concept plays in economic theory, the issue is to understand the extent to which the multiplier is still relevant in certain contexts. The analysis focuses on the pre-COVID period, i.e., a period without major economic shocks. The research question is: can we rely on Keynesian public policies to stimulate the economy in the absence of significant economic shocks? We will prove that the importance and relevance of the economic multiplier depend to some extent on the size of a country's domestic market, the liberalization of trade, and the autonomy of its monetary policy.

2. Literature review

Empirical investigations have been conducted to measure the efficacy of Keynesian policies in various economic conditions.

In economic theory, we find various types of multipliers, as many as possible variations in the components of aggregate demand. Our work is based on analyzing the public investment multiplier. The literature on multipliers reemerged in the aftermath of the global financial crisis, when many governments implemented extensive fiscal stimulus packages, later changing direction to fiscal consolidation. However, the values found in the literature for multipliers are often disparate and inconclusive, suggesting that investment multipliers are mostly country, time, and circumstance-specific (Aschauer, 1989; Auerbach et al., 2010; Batini et al., 2014; Mineshima et al., 2014; Ramey, 2019). The effects of public investment depend above all on the structural characteristics of the economy, as well as the point in the business cycle.

There are numerous studies in the literature that focus on certain country characteristics. Barrel et al. (2012) and Ilzetzki et al. (2013) analyze multipliers

according to the degree of openness to trade, Koh (2017) and Spilimbergo et al. (2009) analyze the development of the fiscal market. Borne et al. (2013) analyze exchange rate regimes and their influence in detail. Studies show that fiscal multipliers tend to be higher in economies with better governance and more efficient fiscal institutions (Abiad et al., 2016; Miyamoto et al., 2020). The literature also shows that multipliers can be higher in periods of recession and lower in periods of expansion, potentially because constraints are reduced in more severe periods (Gbohoui, 2021). Studies also show that public investment multipliers are higher than consumption multipliers (Abiad et al., 2016; Gechert and Rannenberg, 2018; Ilzetzki et al., 2013). Public investment has multiple effects on the economy and these impacts can be typified in three successive phases (Gbohoui, 2021). Economic theory suggests that a first effect occurs during the construction phase, where an increase in public investment stimulates aggregate demand through a short-term multiplier, with the expansion of consumption, boosted by the increase in workers' income, as well as other spending. Evidence following the 2008 financial crisis can be found in Azam et al. (2012) for Latvia, CBO (2015) for the US, and Zimmermann (2020) for India. A second effect occurs when capital expenditure effectively turns into capital formation, increasing productive capacity and consequently increasing the economy's growth potential (Fournier, 2016; Petrović et al., 2021). These supply-side effects depend on the effectiveness of public administration, in particular the efficiency of the institutions that manage public investments and the absorption capacity. This analysis can be found in Abiad et al. (2016), Gurara et al. (2020), IMF (2014), Miyamoto et al. (2020), Presbitero (2016), among others. A third effect is evidenced by the potential of public investment to boost long-term growth if it manages to generate externalities in other sectors, boosting innovation (Agenor et al., 2015; Moretti et al., 2019). The literature on multipliers also shows that increases in public investment increase output in both the short and long term, attract private investment, and reduce unemployment (Abiad et al., 2016; IMF, 2014, 2020; Miyamoto et al., 2020).

3. What is Keynesianism

3.1. Historical context of Keynesianism

The central point of this school of economic thought is that state intervention can stabilize the economy. During the Great Depression of the 1930s, existing economic theory was unable to explain the causes of the severe economic collapse or to provide an adequate public policy that would act as a trigger point for production and employment. Keynes sparked a revolution in economic thinking that overturned the idea that the free market could automatically achieve full employment, i.e., the idea that everyone who wanted a job would get one, as long as long as their wage demands were flexible (Hanlu, 2022). At the core of Keynesian theory is the certainty that aggregate demand, which consists of the sum of spending by private individuals, the state, and companies, is the driving force behind the economy. Keynes also argued that free markets do not have self-regulating mechanisms that lead to full employment. In this perspective, government intervention is justified with public policies to attain full employment and price stability (Jahan, 2014).

John Maynard Keynes is probably the most important economist of the 20th century. His theory had a decisive influence on the policies that led to the recovery of the world's main economies following the Great Depression which began with the stock market crash of 1929. Policies which, it should be noted, remained at the center of governments' agendas for many decades.

The basis of his thinking is simple: the principle of permanent budget balance makes no sense. On the contrary, what the state should do is stimulate the economy in times of recession by reducing the tax burden and increasing public spending, even if this means running budget deficits. Of course, Keynes also added that these same deficits should be offset by budget surpluses achieved in times of expansion. Keynesianism, or the Keynesian School, is therefore a political-economic doctrine that defends the state as an active economic agent in the fight against recession and unemployment.

At the beginning of the 20th century, the dominant economic thought was still that of classical economics, based on liberalism, which supported the idea that the economy should recover on its own in periods of crisis, a thought known as the laissez-faire principle. With the collapse of the New York Stock Exchange in 1929, the world entered a severe crisis of unprecedented proportions. In general, the prices of goods and services fell, but initially, wages did not, thus increasing unemployment. Keynes was one of the first economists to realize that the free market, as advocated by the liberal theories in force at the time, would never be able, on its own, to solve a problem on such a scale. Keynes' ideas are based on the principle that the economic cycle does not regulate itself with the famous Invisible Hand, as the neoclassicals maintain, since it is determined by the animal spirits of entrepreneurs. Keynes' animal spirits can be understood as the emotional effects that regulate human behavior, or as the states of mind that influence investment decisions by entrepreneurs (Barnett, 2017).

For Keynes, the solution was to expand the economy again through new government spending, which would create jobs. With this, the state would play an active role in achieving full employment, a scenario in which there is only a natural level of unemployment, outside of a crisis context. Keynes criticizes classical theory for its long-term pursuit of stability, equilibrium, and automaticity in full employment (Hanlu, 2022). According to Keynes, the long term is a sequence of short terms, and in the long term, we are all dead. With this statement, one of the most famous in economics, Keynes affirmed his opposition to the laissez-faire logic of classical theory and its self-regulating market mechanisms. What Keynes advocates is solving problems in the short term, with state intervention whenever necessary, and not waiting for a possible automatic adjustment to take place in the distant long term (Bello, 2017).

The interventionist economic policies were inaugurated by Roosevelt with the New Deal and took the form, in the early 1930s, of state intervention in the economy through a massive increase in public spending, to reverse the serious economic and social crisis. About three years later, in 1936, these economic policies were theorized and rationalized by Keynes in his seminal work, The General Theory of Employment, Interest and Money.

Keynesianism has established itself as an open opposition to liberalism, an economic trend that advocates the smallest possible state, i.e., the smallest possible weight in decision-making.

The simple Keynesian model aims to explain the determination of the level of economic activity (output, income, or expenditure) by taking the price level and the interest rate as exogenous data. The central simplification of the model is the assumption that there is enough productive capacity to satisfy all demands. In other words, companies are willing to produce and sell any quantity of product at the prevailing price level, and supply is perfectly elastic. Therefore, only demand matters when determining output. This simplification is acceptable if the actual output is lower than the potential output. Otherwise, production capacity necessarily sets a limit on the volume of production (Jahan, 2014). Based on his theory, Keynes formulated his model explaining how an increase in state spending reduces the risk of recession.

3.2. The multiplier effect

The concept of the multiplier plays an important role in the modern economic theory of income and employment. The concept was first developed by Kahn in the early 1930s and further developed by Keynes in a coherent format.

The multiplier effect of the Keynesian model is a fundamental part of the theory developed by Keynes and explains how the expansion of a specific component of national income generates a final result in GDP that is greater than the variation that gave rise to it. In other words, it indicates the impact that a change in consumption, investment, government spending, net exports, or another variable will have on total GDP. The effect of the increase in planned autonomous expenditure on income is amplified because inducing an increase in production increases the remuneration of factors. This increase in remuneration, in turn, leads to a further increase in demand and a consequent increase in income, thus generating a chain reaction that dissipates over time. Government investment has a multiplier effect on aggregate demand because, for every monetary unit spent by the government, the economy's aggregate demand for goods and services increases by more than one monetary unit. An increase in public investment, whether in infrastructure, productive investment, health, education, etc., will lead to an increase in production which, in turn, will require an increase in labor. This increased labor force will have to be rewarded and this reward will, in turn, serve to increase consumer spending and/or savings. In the case of an increase in consumption, it can be seen that the income increases are introduced back into the economy, giving rise to a new expansionary cycle (Gbohoui, 2021). In the case of income that is channeled into savings, even though it isn't allocated directly to the productive activity straight away, it will end up being reintroduced into the economy later in the form of new investments, once again generating increases in production and consumption (Cardoso et al., 2023). The logic of the multiplier effect can be applied to any phenomenon that changes one of the components of GDP.

Much of the literature on multipliers focuses on public spending and its impact on income. The multiplier has a reference value of one. This happens, for example, when an increase in public spending leads to a proportional increase in national income. If the multiplier is greater than one, the increase of one monetary unit in public the

initial increase. In other words, the change in government spending has a more than proportional effect on national income. So, the multiplier shows us that an increase in income, output, or employment is greater than the initial increase in investment or other autonomous expenditure that initially caused it.

At the basis of Keynesianism is the economic multiplier, whose simplest formula is below with disposable income being the income families receive deducted from the taxes they pay. Spending leads to an increase in private spending, and therefore income, greater than.

$$\text{Economic multiplier} = \frac{1}{\frac{savings}{disposable\ income} + \frac{imports}{national\ income}} \quad (1)$$

In Equation (1) there are two noticeable aspects. First, the higher the savings and the higher the imports, the greater the first and second ratios in the denominator. Consequently, the denominator increases and the whole Keynesian multiplier decreases. With the increasing trade liberalization among economic unions (EU, NAFTA, Mercosur, ASEAN, etc.) and even more so within these economic unions, the percentage of imports in national income tends to augment and thus the multiplier becomes ever smaller. That is, the Keynesian effect is wasted through the open window of foreign trade (Marglin, 2018). This, naturally, varies from country to country, as some have large internal markets (e.g., Brazil and the USA), while in smaller countries, trade represents a higher weight (Temin and Vines, 2014).

So, as can be seen in **Figure 1**, imports represent a higher percentage of national income in Ireland, Portugal, and Greece than in the UK (a mid-sized country) and even less in the USA (15%) and Brazil (14%).

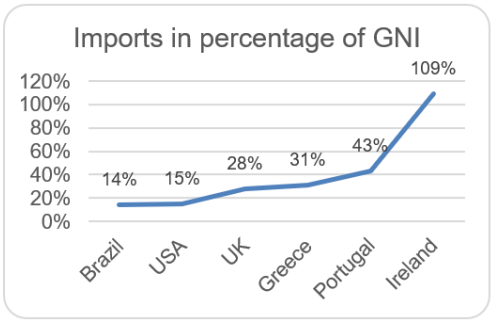

Figure 1. Imports in percentage of GNI (2019).

Source: OECD, 2023.

Second, the Keynesian impact is greater when governments can create money (simply drawing it from artificially created accounts at the central bank), than when they cannot do that because they do not issue their currency. Or they can issue it, but its currency is not accepted as an international reserve by other countries. Examples of countries that are monetary independent are the UK, Denmark, and Norway. Countries that cannot issue currency are all Eurozone members whose monetary supply is controlled by the European Central Bank. There are still countries whose currency is not accepted as an international reserve, like Brazil and Russia, by opposition to the US dollar and to a smaller extent the Japanese yen (Aiyar, 2002).

In the present article, we will provide some empirical evidence related to three actual streams of research: the persistent relevance of Keynesian policies in large

internal markets countries (Cogan et al., 2009); the need for coordination with monetary policies (Arestis et al., 2018); and consequently, the advantages and limitations of Keynesian policies in today's 21st century (Arestis, 1998; Bortz, 2021; Palley, 2017).

4. The hypothesis

There are some hypotheses related to the Keynesian multiplier.

In short, the multiplier tends to decrease: in general, due to trade liberalization and the consequent increase in imports; even more so in small rather than large countries, where the internal market plays a larger (and consequently imports a lesser) role; most especially in countries that cannot issue currency (and therefore have to use debt to finance public works programs); or whose currency is not accepted as an international reserve (such as the US dollar, British pound, or the Japanese yen), in substitution for gold.

Two aspects are here noteworthy. First, much of the above applies not only to public investment, but also to private (by firms) investment although less so, since private has over public investment two advantages: they are generally more productive (even in exports) as private companies must survive the market test of competition; and since investments done by firms are generally smaller than public works, they have a smaller component of imports and more of national, regional, and even local, purchases.

Second, besides public investment, Keynesian policies can assume other forms such as tax decreases, which augment disposable income and thus aggregate demand.

This article will focus solely on the public investment effect. But in any case, the effect of tax decreases is also limited by imports first, and then (national, not governmental) borrowing if trade deficits occur. Anyway, in terms of public investment, the expectation in terms of empirical evidence is that across all countries, there is in general terms a weak relation between the relative weight of public investment in national income and the level of national income per capita.

But then, and regardless of its value, the above relation, should be:

Maximum in countries: that are large; which control their money supply; and whose currency is an international reserve (e.g., the USA in **Table 1**);

Average in countries: somewhat smaller, but still with an independent monetary policy; a currency accepted as an international reserve (UK in **Table 1**); or still in large countries with a very large internal market (and consequently lower weight of imports on national income) such as Brazil, although its currency is not an international means of payment;

Smallest in: small countries; and without an independent monetary policy, the case of most Eurozone countries including Portugal, Greece, and Ireland.

To test the above hypotheses, we began by quantifying the value of the multiplier shown in (1) for some countries. The data was taken from the OECD database with values for 2019, the pre-COVID year. The countries selected were the USA, the UK, Brazil and Portugal. The choice of these four countries was not random as they matched the characteristics we are testing, namely in terms of country size, control of the money supply, and the weight of foreign trade.

Table 1 seems to confirm the hypothesis. The Keynesian multiplier is minimal in a small country such as Portugal, where it assumes a minimum value of 2. Not only is Portugal a small country, but because it is in the Eurozone, it does not have monetary autonomy. The Keynesian multiplier is average in the UK, a medium-sized country with monetary independence and whose currency is accepted as an international reserve of value (2.6). The multiplier is large in the USA due to a large internal market and the fact that the dollar is the most preferred international reserve (3.61). The surprise is Brazil with the largest multiplier of all (4.55). Brazil is a large country with monetary autonomy but whose currency is not accepted as an international reserve. This surprising result may be due to its very low percentage of imports on GDP (12.1% against 15.3% in the USA). On the other hand, it should be noted that the percentage of savings is larger in the USA (12.4%) than in Brazil (9.9%).

Table 1. Keynesian multiplier.

Can issue an international reserve currency	**Internal Market**	
	Large	**Small**
Yes	USA—3.61	UK—2.60
No	Brazil—4.55	Portugal—2

Sources: Ameco, 2023. Brazilian Institute of Geography and Statistics—National Accounts System. Consulted on February 2023. OECD National Accounts Statistics: National Accounts at a Glance. Consulted on February 2023.

$$\text{The multiplier used was the Keynesian Multiplier for an Open Economy} = \frac{1}{(MPS+MPZ)} \quad (2)$$

$$\text{MPS = gross saving rate of households} = \frac{Gross\ Savings\ of\ Households}{Adjusted\ Gross\ Disposable\ Income} \quad (3)$$

$$\text{MPZ} = \frac{Imports}{GDP} \quad (4)$$

The values of the two components of the multiplier are shown in **Table 2**: the gross saving rate of households (MPS) and the weight of imports in total GDP (MPZ).

Table 2. Values for the Keynesian multiplier.

Values	**MPS**	**MPZ**	**Multiplier**
USA	0.124	0.153	3.61
UK	0.066	0.318	2.60
Brazil	0.099	0.121	4.55
Portugal	0.066	0.434	2

Sources: Ameco, 2023. IBGE: Brazilian Institute of Geography and Statistics—National Accounts System. Consulted on February 2023. OECD National Accounts Statistics: National Accounts at a Glance. Consulted on February 2023.

5. Results and discussion

One of the most straightforward approaches to measuring the effect of public investment on a country's economic growth is to calculate the value of the two types of correlation coefficients Spearman and Pearson. The Spearman coefficient evaluates the relation between the ranking, that is, the order, 1st/2nd/3rd/etc. among variables,

and the Pearson coefficient measures also the relation, but now in terms of absolute, cardinal values, not ordinal values.

In either case, the correlation coefficients, vary between −1 meaning that there is an inverse, a negative, relation between the variables (when one variable increases the other decreases proportionally), and +1 in which case the association is perfect and positive: both variables move in the same sense and proportionally; when the coefficient correlation is zero that means that there is no relation whatsoever between the variables.

Below brackets is the level of statistical significance of the correlation coefficients that is the probability that its value is due to pure chance. So the lower the value the greater the significance of the correlation. The interval of the value is between zero (no probability of being due to chance) and one (absolutely sure).

In **Table 3** we measure the association between the percentage of public investment in national income and the national income per capita. The period of analysis runs from 2000 to 2018, for a sample of 41 OECD members or associated countries, using the OECD database. Years 2019 and 2020 were excluded to avoid the impact of the COVID crisis. Normally, the literature on public expenditure multipliers does not disaggregate the various components of public spending and that was our rationale.

Table 3. Relation between yearly values of percentage public investment in National Income and National income per capita (period 2000–2018).

Years	Correlation Coefficients	
	Spearman (ranking)	**Pearson (absolute value)**
Both variables same year	−0.05 (0.16)	0.00 (0.98)
National income per capita next year	−0.05 (0.17)	0.00 (0.98)
National income per capita two years after	−0.06 (0.17)	−0.01 (0.87)

Note: 1) Between parentheses significance values. Source: OECD, retrieved on February 2023.

The pandemic represents a major disruption in the normal course of economic life. Even though economic history has proven that Keynesianism is suitable for policy response in times of crisis, it is our intention in the present paper to show the effect of Keynesian public investment policies across the world in normal periods.

The OECD currently has 38 member countries (until 2020 only 36), of which 35 were included in this analysis (there was no data available for public investment in Iceland in the OECD database). The countries are Austria, Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Lithuania, Luxembourg, Latvia, Mexico, Netherlands, Norway, New Zealand, Poland, Portugal, Russia, Slovakia, South Africa, Slovenia, Spain, Sweden, Switzerland, South Korea, Turkey, United Kingdom, United States. Data was also available for 6 other countries. Costa Rica and Colombia were “Candidates for Accession” at the time, while Brazil, China, and South Africa were “Key Partners” of the OECD. Russia has the status of

Associate or Participant in several OECD Committees, Working Groups, and other bodies at the time of the data used.

Data used in the analysis was GNI and GNI per capita—in dollars and current PPPs, and Total Investment—in dollars and current PPPs, where Investment is defined as Gross Fixed Capital Formation and general Government Investment as a percentage of total Investment.

The tests developed next are divided into three parts: short-term general effects, long-run general effects, and the distinction between different types of countries. A key policy issue concerns the different outcomes of Keynesian policies associated with time frames. Different results emerge depending on whether you analyze the short-term or the long-term.

5.1. Short-term general effects

Keynesian policies are supposed to produce results in the short term. Changes in aggregate demand have their greatest short-run impact on real output and employment (Blinder, 2008). That's their aim, as John M. Keynes put it: in the long run, we are all dead.

Tables 3 and **4** provide empirical evidence of the impact of Keynesian public investment policies. **Table 3** works with annual values, and not the average of the period 2001–2018. The percentage of public investment, in national income, is correlated with the national income per capita, of that same year, the next year, and two years later.

The results are the inexistence of high positive correlations, besides the high probability that whatever the correlations, they are due to chance (values between brackets), all suggesting that public investment has no significant impact on national income per capita. The conclusions hold if instead of working with absolute yearly values like in **Table 3**, one relates growth rates, the percentage of public investment in the national income, and national income per capita, as shown in **Table 4**. Here, the values become positive but close to zero and therefore irrelevant.

It is so that regardless if the growth rates are from the same year, or if there is a year or two-year lag (first, second, and third rows, respectively in **Table 4**), there is no empirical evidence for the Keynesian effect.

Table 4. Relation between annual growth rates of percentage public investment in national income and the national income per capita (in the period 2000–2018).

Years	Correlation Coefficients	
	Spearman (ranking)	**Pearson (absolute value)**
Both variables same year	0.01 (0.73)	0.03 (0.44)
National income per capita next year	0.02 (0.65)	0.02 (0.68)
National income per capita two years after	0.03 (0.5)	0.02 (0.63)

Note: 1) average values for each variable (both in the same year) of each country over the period 2000–2018. 2) Between parentheses significance values. Source: OECD, retrieved on February 2023.

In short, although Keynesian policies are aimed at producing results in the short, not long run, the results of the tests do not support the expectations. The results found

corroborate the evidence provided by other authors. Scandizzo and Pierleoni (2020) state that short-term effects seem to be limited in their scope for several reasons, mainly to do with the time it takes for public investment to materialize. Issues such as announcement effects, public contracts, and administrative difficulties can explain the lack of results in the short term. There is a time lag between public investment or at least its announcement, and its real effect on the economy, measured here by national income. Public investment, in the sense that it is a productive investment, appears to be moving slowly, conditioned by administrative and regulatory issues and with inevitable implementation lags. This justifies the absence of strong positive correlations between public investment and national income.

5.2. Long-term general effects

To test for long-run effects two types of tests were performed: for average values and rates of growth. **Table 5** presents the results for the same sample of countries and periods but now using the average values of the period.

As can be seen, values of both types of correlation coefficients are neither positive numbers, nor close to +1 as expected and the probability that they are due to chance (between brackets) is very high too, far from zero. Thus the empirical results do not support that there is a positive and strong association between the percentage of public investment in national income and national income per capita and thus we cannot find any evidence for the Keynesian effect.

Table 5. Long-term relation between the percentage of public investment in GNI and national income per capita (average values of the period 2000–2018).

Correlation coefficients	Spearman (Ranking)	Pearson (Absolute Values)
Period 2000–2018	−0.08 (0.60)	0.02 (0.92)

Note: 1) average values for each variable (both in the same year) of each country over the period 2000–2018. 2) Within parentheses significance values. Source: OECD, retrieved on February 2023.

However, if instead of absolute values, we analyze rates of growth, one does indeed find a beneficial impact of Keynesian programs in the long run. That is what **Table 6** indicates: correlations that are positive, reasonably high, and statistically significant at the 10% level.

Table 6. Long-term relation between annual growth rates of percentage public investment in national income and the national income per capita (2000–2018).

Years	Correlation Coefficients	
	Spearman (ranking)	Pearson (absolute value)
Average growth in the period for each country	0.28 (0.07)	0.30 (0.06)

Note: 1) average values for each variable in the period 2000–2018. 2) Between parentheses significance values. Source: OECD, retrieved on February 2023.

As a conclusion, no support was found for Keynesian programs in the short term, only some in the long run, over almost two decades. Here Keynesianism seems to have a positive, although mild effect eventually because public programs provide countries with better infrastructures thus raising their competitiveness in the long run. The

results are in line with the conclusions found by Scandizzo and Pierleoni (2020). They also corroborate that the long-term effects of public investment are less limited. Public investment takes time to materialize. The process of propagation to the rest of the economy depends not only on the original public impulse but also on the investment development process. To this overall process, we must necessarily consider all the unexpected contingencies that are encountered along the road. Several other studies seem to corroborate these outcomes, although the results are not uniform and seem to depend on the specific circumstances of the countries and the type of investment. Also in an IMF study (2014), the results seem to prevail in the long term, although only for emerging economies. For advanced markets, the impacts seem to be stronger in the short term. Mourougane et al. (2016) in a study of OECD countries also conclude that the short-term effects are lower than the long-term effects, although the analysis is based on a low interest rate scenario. Pereira A. and Pereira R. (2017) in a study for Portugal also find discrepancies in the short- and long-term results. Their conclusions are based on the type of investment and they conclude that investment projects such as railways, health, and telecommunications have a greater impact in the long term.

The question remains: why is the impact of Keynesian programs so fragile in the short term? Given the multitude of reasons identified in the literature, we will analyze the reasons discussed in the introduction, namely the dimension of internal market and the existence of an independent monetary policy or international currency. That is the subject of the next section.

5.3. Distinguishing several types of countries

The existing literature shows that there are a multitude of reasons that constrain the impact of public investment in the short term. To answer the question of why the impact of Keynesian programs seems to be so fragile in the short term, **Tables 7** and **8** repeat the previous analysis, but now distinguish among four types of countries:

With a large internal market and an independent monetary policy of a currency that is an international reserve, like the USA;

A somewhat smaller countries but which issues an international reserve currency, such as the UK;

A large country whose currency is not an international reserve like Brazil;

Small countries such as Portugal, Greece, and Ireland without an independent monetary policy.

In **Table 7** the values are for the Spearman (of ranking/order) correlation coefficient and in **Table 8** for the Pearson (of absolute/cardinal values) correlation coefficient.

In both tables, the first number next to the country's name is the correlation between absolute values and the second between growth rates. Both the first and second numbers are the simple average of three correlations: same year; one year lag; and two years lag.

Table 7. Spearman correlation between percentage public investment in national income and national income per capita—growth rates and absolute values (2000–2018).

Country	Dimension	Large	Medium or Small
With independent monetary policy or international currency			
Yes		USA	UK
	Both variables same year	−0.51; −0.57 (0.03; 0.02)	0.60; 0.33 (0.01; 0.19)
	National income per capita next year	−0.52; −0.40 (0.03; 0.11)	0.60; −0.14 (0.01; 0.59)
	National income per capita two years after	−0.43; 0.07 (0.09; 0.80)	0.68; 0.31 (0.00; 0.24)
No		Brazil	Portugal
	Both variables same year	0.45; 0.42 (0.07; 0.11)	−0.81; −0.17 (0.00; 0.50)
	National income per capita next year	0.61; −0.02 (0.01; 0.95)	−0.82; − 0.09 (0.00; 0.73)
	National income per capita two years after	0.70; 0.12 (0.00; 0.68)	−0.84; −0.24 (0.00; 0.41)
			Greece
	Both variables same year		−0.15; 0.48 (0.55; 0.04)
	National income per capita next year		−0.13; 0.11 (0.61; 0.68)
	National income per capita two years after		−0.23; 0.00 (0.38; 0.99)
			Ireland
	Both variables same year		−0.59; 0.20 (0.01; 0.44)
	National income per capita next year		−0.72; −0.18 (0.00; 0.50)
	National income per capita two years after		−0.79; −0.13 (0.00; 0.63)

Note: 1) First number is the correlation between absolute values, while the second number is the correlation between annual growth rates. 2) Significance values are between parentheses. Source: OECD, retrieved on February 2023.

Table 8. Pearson correlation between percentage public investment in national income and national income per capita growth rates and absolute values (2000–2018).

Country	Dimension	Large	Medium or Small
With independent monetary policy or international currency			
Yes		USA	UK
	Both variables same year	−0.62; −0.56 (0.01; 0.02)	0.62; 0.20 (0.01; 0.43)
	National income per capita next year	−0.64; −0.43 (0.01; 0.09)	0.59; −0.32 (0.01; 0.22)
	National income per capita two years after	−0.55; −0.04 (0.02; 0.88)	0.60; 0.13 (0.01; 0.64)

Table 8. (*Continued*).

Country	Dimension	Large	Medium or Small
With independent monetary policy or international currency			
No		Brazil	Portugal
	Both variables same year	0.46; 0.55 (0.06; 0.03)	−0.82; 0.01 (0.00; 0.96)
	National income per capita next year	0.64; 0.08 (0.01; 0.79)	−0.84; −0.09 (0.00; 0.72)
	National income per capita two years after	0.73; −0.02 (0.00; 0.94)	−0.86; −0.40 (0.00; 0.12)
			Greece
	Both variables same year		−0.17 ;0.58 (0.50; 0.01)
	National income per capita next year		−0.07; 0.20 (0.77; 0.43)
	National income per capita two years after		−0.17; −0.06 (0.53; 0.84)
			Ireland
	Both variables same year		−0.64; 0.16 (0.00; 0.52)
	National income per capita next year		−0.73; −0.16 (0.00; 0.54)
	National income per capita two years after		−0.79; −0.27 (0.00; 0.32)

Note: 1) First number is the correlation between absolute values, while the second number is the correlation between annual growth rates. 2) Significance values are between parentheses. Source: OECD, retrieved on February 2023.

Some major observations can be drawn from **Tables 7** and **8**. First, positive, high, and statistically significant correlations can be found in the case of Brazil, a country with a large internal market, and the UK, a medium-sized country with an independent monetary policy and a currency that is an international reserve. This seems to corroborate the results found previously. In the case of Brazil, we are looking at a huge country with a large domestic market but without a currency capable of being an international reserve. Once again, the values found are increasing over time, which reinforces the idea that the impact of public investment policies is, to a certain extent and in certain circumstances, greater over a longer period. In **Table 7**, for the correlation with absolute values in the same year we find a value of 0.45 and this value increases to 0.70 with a time lag of two years. The same is true for the UK. As a medium-sized country, or even a small one compared to the USA or Brazil, it has the advantage of having an independent monetary policy and a currency that is used internationally. This explains the values of 0.60 for the correlation in the same year and 0.68 with a 2-year lag. **Table 8** follows the same path with almost similar results. It shows positive, high and significant values for Brazil, starting at 0.46 for a correlation in the same year and increasing until it reaches a value of 0.73 for a correlation with a two-year lag. A similar result follows for the UK in **Table 8**, where the correlation values are positive, high and significant. However, they show a slight drop, from 0.62 to 0.60. Although this is a practically insignificant development, it's

still worth wondering whether this minimal decrease isn't linked to the Brexit process. The whole process of announcing, campaigning and conducting the referendum corresponds to the time horizon under analysis, from 2000 to 2018. This certainly had an impact on the effects of public investment which, with the end of European funds, certainly changed its form.

The second major remark to be drawn concerns smaller countries such as Portugal, Greece and Ireland, where correlations are often non-positive. These results confirm expectations. In both **Tables 7** and **8** results are negative and increasing in absolute value, i.e., the correlation is strengthened with the 2-year time lag. The biggest increase in absolute value is registered in Ireland (**Table 8**) with a change from −0.64 to −0.79.

The third consequence relates to the mild exception of Greece. Among all twelve correlations for Greece in **Tables 7** and **8**, two exceptions are statistically significant at a 5% level: the correlation of 0.48 in **Table 7** which respects ranking of the same year and growth rate; and the rating correlation in **Table 8**, with a value of 0.58. That may be because private investment in Greece is the lowest among all countries. The percentage of public investment in total investment is highest (see **Table 9**). This means that public investment may have a positive impact on national income only in the same year, regarding growth variables and if the other type of investment, the private one, is very low. Greece seems to rely more heavily on public investment than the other countries analyzed. From 2008 onwards, the country faced a severe recession. The consequences of the financial crisis and the subsequent implementation of severe fiscal measures caused income, consumption and domestic demand to sharply decline, with a subsequent rise in unemployment. At the same time, the significant reduction in productive activity led to a decrease in private investment, leaving the state, supported by the EU's financial reserves, with the responsibility for the country's economic recovery.

Table 9. Public investment as a percentage of total investment.

Country	Average values 2000–2018
Ireland	13.21
Brazil	13.46
UK	14.86
Portugal	16.12
USA	17.54
Greece	24.63

Source: OECD, retrieved on February 2023.

The fourth finding relates to the USA's values and is surprising since, contrary to expected, they are negative. The explanation may lie with the high percentage of US public investment which is nonproductive, namely military expenditures. In the period from 2000 to 2018, the average value of the percentage of military expenditures on total public investment was 26% with military expenditure accounting for an average of 3.9% of GDP in the period 2000–2018 (World Bank database).

Existing empirical literature highlights the relevance of military spending in total government expenditures, but is inconclusive about how and where military spending

affects economic growth (Rooney et al., 2021). Defense spending, a non-productive activity, can undermine economic growth and, consequently, the resources available in the long term. In the pre-pandemic period, defense spending was a major contributor to annual deficits. Although economists generally conclude that increasing public debt can have a detrimental effect on growth, they do not agree on the channels of transmission to the economy.

6. Conclusion

Keynes' importance in the history of modern economics, and more specifically macroeconomics, is undeniable. The concept of the multiplier, applied to public policies, has been discussed countless times. The COVID-19 pandemic has brought a shock to aggregate demand that has led us to rethink the impact and importance of state intervention in the economy. In this sense, we analyze the values of the pre-pandemic public investment multiplier, in a period without significant economic shocks, to understand the real importance and relevance of the multiplier.

Our results seem to suggest that, as trade liberalization increases, the effect of Keynesian public investment policies tends to fade, due to imports. However, there are a few exceptions, some instances where Keynesianism still seems to hold and maintain its relevance. We conclude that under certain circumstances in economies, positive, high, and statistically significant correlations can be found between public investment and national income.

First, in the long run. Time matters and this can be explained by the fact that public investment, by providing an economy with better infrastructure, can increase its competitiveness in the long run. Second, when internal markets are very large and trade represents a smaller percentage of national income. This is the case of Brazil. The results of the correlations found for Brazil match those previously found for the value of the multiplier. Of the multipliers calculated, the value for Brazil was the highest, and the high positive impact of public investment that we deduced from this is now reinforced by the higher positive values of the correlations. Third, if the country has an independent monetary policy and issues a currency that is an international reserve, just like in the UK. Fourth, when private investment is especially low, like in Greece. But even here the evidence is very mild and only for growth rates and not averages. Fifth, the type of public expenditures may matter with military nonproductive public expenditures being an explanation for the inexistence of any evidence of a Keynesian effect in the USA. What the data suggest is that, under certain characteristics, some economies seem to be more susceptible to the implications of Keynesian public policies. However, although it cannot be generalized, we found evidence to suggest that public investment enhances economic activity in the countries analyzed, with the public investment multiplier showing values above one and data showing strong positive correlations. The effects of public investment are therefore subject to a certain amount of uncertainty. Specific economic conditions can determine the success of public investment programs and stimulate growth. Time matters, the nature of the investment is a major factor, and the size and openness of the economy also have a bearing. Thus, and overall, it is at least dubious that one can rely on Keynesian public policies to boost economies in the absence of significant shocks in

aggregate demand but public investment plans can be recommended, with visible results, especially in the long term.

We can point to some limitations in this study and there are specific areas where further research is needed to address these shortcomings. Some of these issues concern the number of countries observed, the time frame chosen, and the methodology used. A broader sample of countries, also including middle-income countries, could prove useful as many of these countries are undergoing major public investment programs to stimulate their economic growth.

Regarding the time horizon chosen, it might also be useful to re-analyze the public investment multipliers in a post-COVID phase, when the effects of the economic crisis are already starting to dissipate and compare them with pre-COVID results. Finally, we cannot dismiss the existence of bilateral causality: government spending has an impact on GDP but it is also plausible that increases in GDP have an impact on public spending. To deal with this issue, the Structural Vector Autoregressive (SVAR) approach can be used.

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