PRODUCTIVITY AND EFFECTIVE DEMAND:
ASSESSING THE DISAGGREGATE PUBLIC SPENDING

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ABSTRACT

In this paper, we attempt to support the argument regarding the endogeneity of productivity to effective demand. Unlike most of the works on the topic, we focus on the role that both public investment and public consumption have on productivity. We suggest, at the theoretical level, that public investment has unambiguously positive effects on productivity, whereas the effect of public consumption is ambiguous, being not necessarily large or positive. Our econometric results, using data of selected Latin American economies, support the previous argument. The policy recommendation that follows from these results is that an expansionary fiscal policy based on public investment can indeed enhance the productivity evolution and consequently economic growth and development.

Key words: Productivity, aggregate demand, public spending, Latin America.

JEL Classification: O11, O23, O47.

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PRODUCTIVIDAD Y DEMANDA EFECTIVA:
EVALUANDO EL GASTO PÚBLICO DESAGREGADO

RESUMEN

En este trabajo nos proponemos sustentar el argumento referente a la endogenidad de la productividad respecto a la demanda agregada. A diferencia de la mayoría de los trabajos en el tema, nos enfocamos en el papel que el gasto público tanto en consumo como en inversión tiene sobre la productividad. Sugerimos, a nivel teórico, que el gasto público en inversión tiene sin lugar a dudas efectos positivos en la productividad, mientras que el gasto público en consumo tiene efectos ambiguos, siendo no necesariamente grandes o positivos. Nuestros resultados econométricos, usando datos de una muestra selecta de economías de América Latina, validan el argumento previo. La recomendación de política que sigue a estos resultados es que para incrementar la productividad, así como el crecimiento y el desarrollo económicos, la política fiscal expansiva debe estar basada principalmente en gasto en inversión.

Palabras clave: productividad, demanda agregada, gasto público, América Latina.

Clasificación JEL: O11, O23, O47.

1. INTRODUCTION

In relation to the evolution of productivity, the demand-oriented approach states that the growth rate of effective demand explains the growth of productivity (Kaldor, 1966; León-Ledesma and Thirlwall, 2002). The underpinning of this argument is that as demand materialises in the form of sales, firms will increase their productivity because they will use a larger share of their installed productive capacity but also because the so-called static and dynamic economies of scale will be set in motion; these mechanisms will overall be reflected in the reduction of the capital-output ratio (Palazuelos and Fernández, 2009).

So, in this view, the way to promote productivity is via boosting effective demand, a situation that can be achieved by means of expanding public expenditure. This is, in other words, the policy prescription to promote productivity. This recommendation, however, generally assumes

that the burden of public expenditure must fall on public consumption, disregarding that this kind of expenditure might not have the expected effects on demand and thus on productivity. It may be the case, for example, that policy might not have large positive effects on demand due to a large propensity to save or to import. Additionally, the recommendation omits to consider the unambiguous positive effects that public investment has on productivity. In other words, the demand-oriented view has hardly discussed theoretically the effects of disaggregate public spending on productivity and has not provided abundant empirical evidence in this regard (for an exception, see Pressman, 1994). Discussing, at the theoretical level, the different effects that public consumption and investment might have on productivity is relevant because this enlightens about the best way to promote it.

There is, as can be seen, a gap both theoretical and empirical that needs to be filled. The main aim of this paper is to attempt to do so. So, on the one hand, we discuss the possible effects of disaggregate public spending on demand and as a result on productivity. On the other, we provide empirical evidence to these arguments. In this respect, we use data of Latin American economies to run an econometric regression for productivity using different panel data estimators. It is important to mention that in Latin America (like elsewhere), productivity has been a major concern, as it has remained stagnated since the early-1980s. So, the region is needy for an alternative advice about how to promote productivity.

The paper has five sections, including this introduction. Section 2 presents the main theoretical approaches, within the demand-oriented view, that sustain the endogeneity of productivity to effective demand. Then, in section 3, we discuss the pros and cons of promoting productivity via public consumption and public investment. Section 4, presents the empirical results of our econometric exercise. The concluding remarks are presented in the final section.

2. THE ENDOGENEITY OF PRODUCTIVITY

In what follows, we briefly outline the theoretical arguments that sustain that productivity responds mainly to aggregate demand growth (proxied by output growth). This will help to emphasise on the idea that, first,

productivity is driven mainly by the evolution of demand and, second, that the policy recommendation to promote it when is low or stagnate is primarily via demand, specifically via public expenditure.

According to Setterfield (2002), Kaldor was the first one, within the demand-oriented tradition, to suggest that the technological progress that induces productivity responds primarily to effective demand, via the growth rate of the manufacturing sector[1]. His idea came out following the work of Verdoorn, which turned out to be Kaldor's second law of growth or Verdoorn's law (Kaldor, 1966). This law proposes that the growth of the manufacturing sector —which is the engine of overall economic growth— determines the growth of labour productivity in that sector. So, the faster the manufacturing sector grows, productivity in this sector, and overall productivity, will follow suit. This idea is captured in the following equation:

$$q = q_0 + \lambda g$$

where q and q_0 represent, respectively, the rate of growth of productivity and autonomous productivity[2] and g is the rate of growth of the manufacturing sector, so λ is the Verdoorn's coefficient.

Labour productivity in the manufacturing sector grows thanks to the static and dynamic economies of scale associated with the process

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[1] It is important to mention that one can trace back the proposal of the primacy of demand on productivity to the work of Smith (1776 [1976]). In his work, he sustained that as a long as the size of the market (or demand) expands, there will be room for increasing labour and capital specialization, which are primary sources of productivity. His well-known statement that the division of labour (that allows mechanisation or the adoption of specialised machinery, learning by doing and reduction in transition costs) is limited by the extent of the market makes clear this point. It is also worthy to note that Smith referred to productivity stemming mainly from the non-traditional (manufacturing) sector. In other words, he was also the first to point out that productivity emerges primarily from a specific productive sector. Smith's proposal, nevertheless, remained muted for long time, until Kaldor brought it back into the debate.

[2] According to Smith (2012), competition among firms to attain a higher market share and increasing profits is one of the autonomous forces that drives productivity. This autonomous force could even occur in hard times, when demand is low. If firms are considering increasing their profits once the downturn is over, they may consider investing in technological progress.

of capital accumulation and the well-known process of learning by doing related to increasing production. On the other hand, aggregate productivity will grow due to the existence of macroeconomics of scale which imply strong backward and forward linkages of the manufacturing sector with the rest of the productive sectors and because labour can be transferred from low to high productive activities without losing output (Young, 1928; León-Ledesma and Thirlwall, 2000, 2002). This phenomenon, the transfer of labour from low to high productive activities, is in fact Kaldor's third law of growth, which explains why productivity of the non-manufacturing sector will also grow as a result of the growth of the manufacturing sector. In sum, the growth of this sector expands aggregate productivity. Within the demand-oriented growth approach, in sum, Kaldor's second law of growth has underpinned and led the argument that productivity responds to output growth.

It is important to notice that Kaldor (1966) distinguishes the manufacturing sector as the engine of economic growth, meaning the one that *pulls along* the rest of the economy, due to its unique properties. One of them is its capacity to incorporate economies of scale easily and homogeneously. This implies that in the manufacturing sector productivity grows faster than elsewhere. Growing productivity allows the production of complex goods and services, which is a hallmark of economic success. Another property of the manufacturing sector is that it offers unique opportunities for capital accumulation and it is, generally, capital intensive. This last property results in a sector that strongly promotes investment, a variable that is, as has been repeatedly argued, crucial for growth and development goals. In this context, it is important to recall that the lack of capital accumulation is the main constraint of growth in developing economies (Kalecki, 1963 [1993]), so the expansion of the manufacturing sector turns out to be particularly relevant.

Now, recently, a complete theoretical development explaining how effective demand is the main driver of productivity has been developed by Palazuelos and Fernández (2009). This proposal is more complete in the sense that it incorporates a characteristic Kaleckian component that also drives aggregate demand and thus productivity. This component is the use of installed productive capacity. Recall that for Kalecki (1963 [1993], pp. 16-17), growth is explained by investment, depreciation and the degree of utilisation of existent equipment, which in a capitalist

economy depends first and foremost on the relation between effective demand and the volume of productive capacity. So, as long as more installed productive capacity is used, due to growing demand, the higher, everything else remaining the same, the rate of economic growth[3]. At the same time, the usage of more productive capacity, given the same amount of labour, results in increased labour productivity.

Having in mind this, the proposal of Palazuelos and Fernández (2009) includes both Kaldorian and Kaleckian effects on the evolution of productivity. This occurs via three channels which they dubbed the scale, capitalisation and modernization effects. To formalize their point, they start from the identity $Y/L = (K/L)/(K/Y)$. From here, the labour productivity growth rate (q) equals the difference between the rates of growth of both ratios: Capital-labour (k) and capital-output (s), that is $q = k - s$. The latter ratio can be seen as the inverse of $(K_u/K)\times(Y/K_u)$, where K_u is the degree of capital effectively used, so that K_u/K is a proxy of the rate of utilisation of productive capital (a), while Y/K_u is a constant variable for a fixed technological level (b). This relationship can be expressed in terms of the rates of growth of each variable: $-s = a + b$ (Palazuelos and Fernández, 2009, p. 4).

The scale effect works when aggregate demand rises and makes a to grow, so s declines. As a result, q increases. On the other hand, the capitalisation effect works when investment increases, leading to augmented potential supply, via productive capital. As a result, k will increase, and q will follow suit. Finally, the modernisation effect assumes b is no longer constant, so this variable can be increased via the incorporation of technical innovations, organisational improvements, learning by doing and so on. The result is that as b rises, s declines and q increases (*Ibidem*).

As mentioned, in sum, the proposal of Palazuelos and Fernández (2009) captures quite well why productivity growth is promoted via output growth or via the use of installed productive capacity and at the same time via the static and dynamic economies of scale, which occur

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[3] According to Kalecki (1963 [1993]), the rate of growth of national income (g) can be expressed as $g = i/s - a + u$, where i is the share of investment in the national income, s is the capital-output ratio, a is the capital depreciation coefficient and u is the degree of utilization of installed capital. So, g depends positively on u, although it may take a negative sign if negative expectations cause an underutilization of the productive capacity.

mainly in the manufacturing sector. It also captures the relevance of productive capital or investment to promote productivity.

Most of the empirical work to support the endogeneity of productivity to output growth has been based on Kaldor's second law of growth. This has been done mainly through econometric exercises using labour productivity on the left-hand side of the equation whereas on the right-hand side some proxied of aggregated demand growth (like manufacturing growth or output growth) is used. According to León-Ledesma and Thirlwall (2000), Verdoorn's relationship has been extensively tested, finding that an expansion of demand by 1% leads to a 0.5% increase in productivity induced by economies of scale (see, for more recent empirical evidence, Atesoglu and Smithin, 2006; Alexiadis and Tsagdis, 2010).

It is worthy to note that there is also an empirical stream of works that links both productivity and distribution to effective demand. This neo-Keleckian literature derives from the well-known work of Bhaduri and Marglin (1990), which, in fact, has been the departing point for the discussion of wage-led *vs* profit-led demand regimes. Although in this literature the idea that the growth of productivity is driven by demand is adopted, no discussion is made on this point, it assigns a relevant role of productivity in its modelling. In this sense, one of its main aims has been to go one step further and to analyse how the growth of productivity impacts the wage and profit shares and thus overall economic growth, a result that could be in either direction. For example, productivity growth has a positive effect on capital accumulation by raising the profit share but may reduce effective demand by affecting the wage share negatively (Cassetti, 2003; Naastepad, 2006; Hein and Tarassow, 2010; Hartwing, 2013).

There is, finally, another stream of empirical works that aims to show how public spending affects productivity (for example, Aschauer, 1989a, 1989b; Nourzad and Vrieze, 1995; Ramírez, 2002; Wang, 2002). This literature, nonetheless, is not underpinned on the idea that productivity is endogenous to output growth. In addition, it focuses mainly on the effect of public investment on productivity, omitting to test the effect of public consumption on productivity at the same time. In other words, their econometric exercises focus exclusively on how public capital or a proxy of it (contemporary or lagged) affects labour productivity. All

these works unambiguously show that public capital expenditure affects productivity positively.

3. EFFECTIVE DEMAND AND PRODUCTIVITY: REVISITING THE POLICY IMPLICATION

The relevance of the argument that productivity is endogenous to effective demand is its policy implication. That is, if policymakers want to promote or increase productivity when it has been stagnated or declining (due to low or stagnated economic growth), they must first accelerate somehow the growth of effective demand. Within the demand-oriented tradition, the best way to stimulate effective demand is via government spending (López and Carvalho, 2008). The logic behind this policy recommendation is that once output growth shrinks or stagnates, the government can reactivate it through higher spending. The expected effect of increasing public expenditure is to regain both firms' profits and their positive expectations about the level of their future sales as well as to recover the level of household`s consumption.

One general assumption behind this policy prescription, however, is that the bulk of government spending must fall on the form of consumption and that this has unambiguously positive and large beneficial effects on demand. By accepting this assumption, it is hardly discussed the possibility that this kind of expenditure might not affect largely both demand and productivity. At the same time, it disregards the most beneficial effects of government investment on productivity. Keynes himself, by the way, was aware of the superiority of government investment over government consumption to address growth and developmental goals (Smithin, 1989; Skidelsky, 2001; Davidson, 2007). Moreover, according to Smithin (1989, p. 210), "there is little or not advocacy [in Keynes' Treasury memoranda] of the policy of fiscal fine-tuning which later came to be regarded as characteristically Keynesian". On the contrary, "Keynes showed a clear preference for government policies which would encourage investment spending rather than consumption; including both a relatively larger direct contribution by the state to fixed capital formation and (…) initiatives by which the authorities would be able to 'influence' a substantial portion of total investment spending". In sum, despite Keynes' advocacy for government investment, there has been

little concern to analyse separately the effects of government spending on productivity, even within the demand-oriented growth approach (Pressman, 1994, is an exception in this regard).

We believe it is worthy to discuss this because the influence of government consumption (meaning injections of income to households via wages and to firms via purchases of goods and services) and government investment (meaning spending on projects that substitutes or complements the private sector investment, particularly infrastructure projects on health, education and/or transport like roads, ports, airports, hospitals, schools, research centres, etc.) impact differently the *k* and *s* ratios of the equation described in the previous section.

For instance, an expansionary fiscal policy, based on government consumption, will have an important impact on domestic demand only if a high multiplier prevails (implying a large propensity to consume and a low propensity to import). If domestic demand in effect grows substantially, then it is expected that productivity will follow suit. That is, the scale and modernisation effects will operate (so the *s* ratio will decline). If this impulse of demand gains momentum and stays there long enough, then productivity growth will continue increasing via the capitalisation effect because the productive investment will grow (that is, the ratio *k* will increase). In other words, the expectations of investors about the near future would have shifted to positive ones, materializing their investment plans.

However, if we reckon the possibility that the new income that households receive is retained as savings or used to pay-off or service outstanding debts, which are not unexpected outcomes in the context of an economic downturn, neither domestic demand nor productivity will grow as much as expected. And even if the new income is spent, its effect on domestic demand will depend on the propensity to import. If it is high, then imports wil likely increase, with little or no effect on domestic demand. Since the early 1980s, with the adoption of free trade policies around the world, imports (gauged as a share of Gross Domestic Product [GDP]) have been increasing in most of the economies. This translates in a declining multiplier.

In addition, there is the possibility that the new income could be spent mainly in the tertiary sector (which is the sector that has a larger proportion in the economy). The tertiary sector does not characterise

for its high overall productivity due to the heterogeneity of the industries within the sector, that is, some industries with increasing returns but a large part with declining returns, so productivity might not rise as expected. Furthermore, in developing economies, a large proportion of the sector accounts for informal activities, which barely contribute towards productivity. So, it could be that even if demand grows, productivity may not follow the same trend. In fact, the opposite is more likely to occur because as its demand expands, these informal activities will grow as well, and because they are labour intensive, employment will grow faster than output, opening the possibility for a null or negative contribution towards productivity. So, in developing economies, even if the multiplier is high because the propensity to consume is high, the new demand will likely be reflected in null or negative productivity as income will be spent mainly in the tertiary (informal) sector.

If, on the other hand, the government decides to increase its spending purchasing goods and services to firms, then it is very likely that they will respond by augmenting the use of the installed productive capacity, increasing then productivity[4]. This effect might be short-lived if, once again, these firms need to import most of their inputs or final products. So, in sum, there is no guarantee that the final effect of public consumption on demand and productivity will be as expected. It could be short-lived, affecting only the *s* ratio or it can have little or no effect at all if the demand goes to the tertiary sector. In sum, it depends on the structural characteristics of the economy under concern, namely, developed or developing and the size of the multiplier. Whether firms or households receive the bulk of government spending also plays an important role in the final output.

Now, we can argue that the expected effects on demand and productivity may be unambiguously positive when a fiscal expansion is based mainly on public investment. This is because public capital increases and decreases the *k* and *s* ratios, respectively. One way to affect the *s* ratio is, of course, via the scale and modernisation channels. If demand in effect

[4] Hebous and Zimmerman (2016) provide supporting empirical evidence about how the United States government purchases on firms affects them positively. Using a novel database that includes 94 000 observations during the period 2001-2012, they found that 1 dollar of government spending increases firms` investment by 7 to 11 cents.

rises as a result of the increased public investment, then more installed productive capacity will be used, and productivity, as mentioned, is expected to increase as well. Evidently, it can be argued that demand may increase little if most of the inputs to carry on the investment projects are imported or the wages paid are saved, used to pay outstanding debts or to buy imported goods and services. If this is the case, alike the case of public consumption, the effect of public investment on productivity via the scale channel might not necessarily be as large as expected or can be short-lived.

Notwithstanding this potential shortcoming, what distinguishes public investment is that it can affect the *k* and *s* ratios *indirectly,* via the crowding-in effect. For example, public investment affects firms' production and distribution processes positively when it materialises in the infrastructure that is needed to do business in a more efficient way. When this occurs, the *k* ratio will grow, because the capitalization channel will be set in motion as firms decide to materialize their investment plans. In other words, the roads, highways, ports, railways, airports and so on that are built are to be used to deliver the goods and services faster and cheaper; also, the plants that the government builds to produce and provide energy, like dams, refineries, nuclear plants, impact either on the costs of production of firms or on their plans to materialize the investment projects. In addition, many centres where new technologies and innovations are researched and developed, are initially built and funded by public investment (Mazzucato, 2013); and some of the new technologies produced there, will underpin firms' projects to create brand-new products and services. This new technology will mean a decline of the *s* ratio (in this case via the modernization effect). Of course, the schools, hospitals and the means to commute to work, including mass transit, where labour is trained, keep healthy and move to work, respectively, will too diminish the *s* ratio (via also the modernization effect), so augmenting productivity. Finally, other utilities, technologies and/or institutions that governments fund and build, like water systems and communication networks, are also incentives for firms to continue expanding their productive capital, which will mean the *k* ratio grows.

In sum, the private factors of production benefit on the infrastructure created by public investment (see, among others, Wang, 2002; Pérez and

Steinbuks, 2017). As a result, the *k* and *s* ratios will grow and decline, respectively, promoting then productivity.

Government investment thus clearly is supportive of productivity. In this context, and in the face that productivity around the world has stagnated since the mid-1970s and its evolution has indeed deepened since the global crisis of 2008 (see, for example, Carlin and Soskice, 2018), it is unsurprising that a growing number of voices is advocating for government infrastructure projects to promote it (see, for example, International Monetary Fund [IMF], 2014; Organisation for Economic Co-operation and Development [OECD], 2016; Pérez and Steinbuks, 2017). This policy recommendation is in fact opposite to the orthodox one that suggests exclusively supply-side policies (see, for example, Pages, 2010)[5].

4. PUBLIC SPENDING AND PRODUCTIVITY: AN EMPIRICAL EXERCISE FOR LATIN AMERICA

The relevance of studying Latin America is that productivity in general has been its "Achilles' heel" since the early 1980s (Palma, 2011; Pages, 2010). In fact, Palma (2011) points out that the economic growth observed in the region since the early 1980s has been supported exclusively by employment. In other words, growth has been coupled with sluggish productivity. In effect, Latin America's labour productivity has grown on average less than half percentage point, that is 0.44%, during the period 1992-2017. This rate contrasts poorly with the 4% growth rate attained during the period 1950-1975 in the region (Pages, 2010). Relative to that

[5] In the conventional view only if supply factors are improved (for example, providing better education or making more flexible the labour or financial market) it is possible to expect a boost on productivity. Importantly, these policies have been in fact occurring around the world since the mid-1980s, but as we mentioned productivity has remained stagnated. Perhaps because of the failure of this policy, alternative theses have been put forward to explain the lack of productivity growth. For instance, that there are productivity gains, but they just are not measured correctly; that some individuals and companies make productivity gains, but these come at the expense of others, so there is no net gain; that there is a time lag before productivity gains show up; that there are no productivity gains because it is so hard to manage; and finally that as service industries increase their share, it is harder to squeeze out productivity from these overall low productive industries.

Figure 1. Latin America's labour productivity, 1992-2017
(GDP constant 2010 US$)

Source: International Labour Organization database, <www.ilo.org>.

of United States, labour productivity has declined from around 24% in 1991 to less than one fifth in 2017 (see Figure 1). In sum, the evolution of productivity has been dramatically slow and has lagged with respect to one of its most important trade patterns, the US. If this scenario continues without a change, it will be very hard, if not impossible, to climb up the ladder of economic development, especially when the region has embraced, since the mid-1980s, trade (and financial) openness as strategy of growth and development. In this kind of strategy, the main aim is to compete in foreign markets successfully; to do so, what is needed in the short and long term, is growing productivity, the most powerful source of competitiveness.

It is interesting to note, on the other hand, that in regions where there has been recent economic success like East Asia (namely Hong Kong, South Korea, Singapore, Taiwan, Indonesia, Malaysia and Thailand), labour productivity growth has fluctuated around 4% during the period

1980-2008 (Palma, 2011). Perhaps unsurprisingly, in these economies government investment alone reached around 15% of GDP during the early-1980s, and although eventually declined, it remained well above the highest level attained in Latin America during the period 1990-2017. In effect, during this period, government consumption and government investment, grew, as a share of GDP, around five and two percentage points, respectively. In 2017, government consumption was 17.3% of GDP whereas government investment was only 3.8% of GDP.

In terms of growth, nevertheless, government investment has had a better performance, growing at an average rate of 12.8% during the period 1992-2017; public consumption, on the other hand, has grown on average at a rate of 9%.

To explore how public consumption and public investment affect productivity, an aspect that has not been widely explore within the demand-oriented approach, particularly in developing regions, like Latin America, we proceed by estimating an equation that has as dependent variable the growth rate of productivity and as main explanatory variables public consumption and private investment growth; we also include other macro variables in the right-hand side of the equation (see below). We use information of 16 selected Latin America economies (Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela) for the period 1992-2017. The selection of the economies is based chiefly on data availability. Gathering all the data, we conform an unbalanced panel.

For the sake of robustness, we use four panel data estimators (fixed and random effects, instrumental variables, and panel-corrected standard errors) and we introduce successively the independent variables to our initial estimation, to check whether the sign, the size and the statistical significance of the parameters associated to government consumption and government investment change (Asteriou and Hall, 2011). In other words, we initially formulate an equation where the growth rate of labour productivity (q_{it}) is explained by the growth rate of government consumption (gc_{it}) and government investment (gk_{it}). To these variables, we add a set of control variables which also affect the evolution of productivity. These variables are: The growth rate of the manufacturing sector (gm_{it}), which as we described earlier capture the Verdoorn's law;

trade openness (to_{it}), which is expected to influence positively productivity via efficiency gains stemming from increasing competition, and, finally, foreign direct investment (fdi_{it}) and domestic capital formation (k_{it}). These variables are also expected to influence productivity positively. This occurs, in both cases, via the static gains of investment described in section 2. Trade openness and foreign direct investment (FDI) are gauged as a share of GDP whereas for capital formation we used its growth rate. All the variables come from the *World Development Indicators* from the World Bank (https://databank.worldbank.org/data/source/world-development-indicators) and the United Nations Economic Commission for Latin America and the Caribbean (http://estadisticas.cepal.org/cepalstat/Portada.html).

The results of our econometric exercise are shown in Table 1. In this table, we concentrate on the results when we used all the independent variables. So each column presents the results of each estimator[6]. As can be seen, in the first place, the sign of the parameter associated with government consumption is positive, but in the instrumental variables estimation it turns negative. In any case, in all the estimations, it is statistically not significant. This result is not necessarily surprising according to what we described earlier in the sense that the extra demand that the government consumption provokes could leak abroad through imports or that the extra-demand could go mainly to the tertiary sector, having in both cases little or no effect on productivity. Interestingly, these scenarios are occurring in Latin America. In the first case, the Latin American selected economies have steadily and swiftly opened to trade since the mid-1980s, as a result the share of imports in GDP has increased, reaching 38% in 2008, although this share declined to 30% in 2017 due to the global economic stagnation that followed the Great Recession of 2008. This increase in imports implies a reduction of the multiplier, so the effect on demand (and thus on productivity) via public spending has reduced.

In addition to this, the large informal sector that these economies kept has to be taken into account. In effect, in Latin America the informal

[6] In Tables A1 to A4, in the Appendix, we present the results as we were adding successively independent variables to the basic estimation.

Table 1. Determinants of labour productivity in Latin America (selected economies), 1992-2017

Independent variables	Fixed effects	Random effects	Panel-corrected standard errors	Instrumental variables
gc	0.0235	0.0267	0.0175	–0.0100
	(0.0167)	(0.0165)	(0.0175)	(0.0100)
gk	0.0043***	0.0042**	0.0033*	0.0043*
	(0.0018)	(0.0018)	(0.0018)	(0.0023)
gm	0.1536***	0.1536***	0.1675***	0.1573***
	(0.0394)	(0.0388)	(0.0384)	(0.0212)
to	0.0062	–0.0021	–0.0037	0.1120***
	(0.0166)	(0.0073)	(0.0054)	(0.0276)
fdi	0.0931	0.1282**	0.1567**	0.1439
	(0.0668)	(0.0602)	(0.0667)	(0.0910)
k	0.0808***	0.0809***	0.0774***	0.0446***
	(0.0152)	(0.0150)	(0.0152)	(0.013)
constant	–0.4518	–0.0774	–0.0135	–6.1529
	(1.0259)	(0.6019)	(0.5196)	(2.0132)
L1				–0.4300***
				(0.069)
L2				–0.4189***
				(0.0613)
Observations	407	407	407	359
Groups	16	16	16	16
F (6 385)	33.65***			
Test Wald χ^2 (6)		209.48***	187.7***	
Test Wald χ^2 (8)				1 212.82***
Instruments				30

Table 1. Determinants of labour productivity in Latin America (selected economies), 1992-2017 (continued…)

Independent variables	Fixed effects	Random effects	Panel-corrected standard errors	Instrumental variables
Test Sargan χ^2 (21)				6.8590
				(0.9984)
R^2 within	0.3440	0.3432		
R^2 between	0.2652	0.3886		
R^2 overall	0.3371	0.3447	0.3192	
Autocorrelation				
First order				–2.2015
				(0.0277)
Second order				1.3039
				(0.1923)

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. Standard errors are in parenthesis.

sector represents around half of the total output. In some countries of our sample, informal employment accounts for 60% of total employment (this is the case of Mexico). So, every time that government consumption increases, the demand in the informal sector necessarily grows, leading to a marginal or null increase of productivity. Recall that the bulk of government consumption falls into wages, subsidies and income transfers, so some part of the extra demand that the public consumption generates is going to the informal sector. There are, in sum, sensible reasons to expect that government consumption, via demand, does not have an effect on productivity.

The parameter associated with trade openness is similar to the government consumption's one in the sense that its sign changes along with the four estimators and it is statistically significant only in the instrumental variables estimation. A potential explanation for the lack of correlation among the variables can be thought in terms of the negligible competitiveness among firms that trade openness is supposed to generate.

On the other hand, the result regarding government investment suggests, as expected, that it has influenced productivity positively. In this case, the estimated parameter is statistically significant along with the four estimators. This result is quite important because it supports the theoretical argument presented above: In a nutshell, that government investment unambiguously affects positively productivity. Nevertheless, the size of the parameter is rather small, indicating that productivity has not a strong response to public investment. A potential explanation for this is that public investment is relatively small, so its influence on productivity despite being positive is tiny.

The rest of the parameters have the expected sign. In particular, both the dynamics of the manufacturing sector, foreign direct investment and private investment are important sources of productivity, in that order. In this context, it is interesting to note that despite the phenomenon of premature deindustrialization that some of these economies are undergoing (see, for example, Palma, 2005; Cruz, 2015; Castillo and Martins, 2016), the manufacturing sector is still the most important source of productivity growth.

Our results, we believe, bear a strong policy argument to promote productivity. First and foremost, government investment is an effective policy instrument to increase productivity. Second, knowing that government investment can increase productivity does not imply, of course, that it should be increased for its own sake. By just increasing public capital, there is the risk that the resources could be poorly assigned, having as a result costs that overcome the benefits (see, as a good example of this European Court of Auditors, 2014; see also Cavallo and Powell, 2018). Therefore, to have the expected impact, the expansion of public investment needs to be done within a well-planned strategy of growth and development, aimed for example at re-industrializing the economy, that is putting particular emphasis on the infrastructure for the manufacturing sector. It is an outstanding finding that this sector, as our results suggest, keeps its relevance as the main source of productivity. The final policy recommendation is that by increasing wisely public investment, private investment will follow suit, and for the selected economies of our sample, this means that its main growth constraint will vanish.

So, in sum, expanding public capital in a well-designed strategy of re-industrialization will indeed maximize its positive influence

on productivity. Latin America should wait no longer to act in this regard.

5. CONCLUDING REMARKS

In this paper, we presented both theoretical and empirical evidence regarding the endogeneity of productivity to effective demand. But, unlike most of the works in this regard, we focus on the effects of disaggregate public expenditure on productivity. We argued that, at the theoretical level, there exists the chance that the effect of public consumption on productivity can be small or inexistent. This depends on the size of the multiplier, which in turn depends on the propensity to consume and to import. If, for example, the propensity to import is large, then public consumption might have little or a short-lived effect on productivity. On the contrary, we argued that public investment has unambiguously positive effects on productivity. The relevance of these arguments is the policy recommendation that ensues them. In other words, to guarantee a positive effect on productivity, the burden of public expenditure should fall on investment.

To shed empirical light on our theoretical arguments, we used data of 16 Latin American economies during the period 1992-2017 and ran a regression, using static and dynamic data panel estimators for the sake of robustness, where the dependent variable was the growth rate of labour productivity whereas the vector of independent variables included the growth rate public consumption and public investment, trade openness, foreign direct investment and the growth rate of domestic capital formation and the manufacturing sector. Our results indicated that public investment has influenced positively productivity. This result is consistent along with the static and dynamic estimators. On the other hand, we find no statistical evidence regarding the effect of public consumption on productivity.

Our theoretical analysis and our econometric results led us to suggest that if Latin America really wants to insert successfully in the current wave of globalization, she needs to expand, within a well-designed strategy of re-industrialization, public investment. By doing this, productivity will increase, benefiting not only economic growth but also moving forward the region in developmental terms. ◄

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APPENDIX

Table A1. Determinants of labour productivity in Latin America (selected economies), 1992-2017

Instrumental variables

Independent variables	1	2	3	4	5
L1	–0.0511*	–0.1255***	–0.1001**	–0.0870**	–0.4300***
	(0.0314)	(0.0410)	(0.0510)	(0.0375)	(0.0761)
L2					–0.4189***
					(0.0613)
gc	**0.0305*** **	**0.0186** **	**0.0080**	**0.0051**	**–0.0100**
	(0.0047)	(0.0080)	(0.0091)	(0.0120)	(0.0100)
gk	**0.0053*** **	**0.0074*** **	**0.0044*** **	**0.0024*** **	**0.0043***
	(0.0013)	(0.0015)	(0.0007)	(0.0005)	(0.0023)
to		0.2309***	0.1373***	0.1102***	0.1120***
		(0.0266)	(0.0363)	(0.0281)	(0.0276)
gm			0.2983***	0.2260***	0.1573***
			(0.0248)	(0.0365)	(0.0212)
k				0.0563***	0.0446***
				(0.0111)	(0.0109)
fdi					0.1439
					(0.0910)
constant	1.1197***	–13.268***	–7.5818***		–6.1529***
	(0.1541)	(1.3686)	(2.4284)		(2.0132)
Observations	375	375	375	375	359
Groups	16	16	16	16	16
Instruments	27	28	29	29	30
Wald-statistic	75.85***	172.68***	916.90***	1 642.02***	1 212.82***
	$\chi^2(3)$	$\chi^2(4)$	$\chi^2(5)$	$\chi^2(6)$	$\chi^2(8)$
Sargan test of overindentification					
Sargan-statistics	14.77978	10.21731	8.653501	11.56181	6.85906
	chi2(23)	**chi2(23)**	**chi2(23)**	**chi2(23)**	**chi2(21)**
Probability	0.9024	0.9899	0.9970	0.9767	0.9984

Table A1. Determinants of labour productivity in Latin America … (continued)

Autocorrelation test					
First order	–2.8854	–2.6079	–2.4137	–2.7327	–2.2015
Probability	0.0039	0.0091	0.0158	0.0063	0.0277
Second order	–1.4975	–1.8069	–1.6349	–1.258	1.3039
Probability	0.1343	0.0708	0.1021	0.2084	0.1923

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. Standard errors are in parenthesis.

Table A2. Determinants of labour productivity in Latin America (selected economies), 1992-2017

Fixed effects

Independent variables	1	2	3	4	5
gc	**0.0624*****	**0.0613*****	**0.0321***	**0.0231**	**0.0235**
	(0.0195)	(0.0195)	(0.0172)	(0.0167)	(0.0167)
gk	**0.0066*****	**0.0069*****	**0.0052*****	**0.0043****	**0.0043****
	(0.0021)	(0.0021)	(0.0018)	(0.0018)	(0.0018)
to		0.0382**	0.0178	0.0113	0.0062
		(0.0191)	(0.0168)	(0.0163)	(0.0166)
gm			0.3087***	0.1549***	0.1536***
			(0.0279)	(0.0395)	(0.0394)
k				0.0812***	0.0808***
				(0.0152)	(0.0152)
fdi					0.0931
					(0.0668)
constant	0.8533***	–1.5389	–0.8710	–0.4673	–0.4518
	(0.1901)	(1.2129)	(1.0599)	(1.0271)	(1.0259)
Observations	407	407	407	407	407
Groups	16	16	16	16	16
F-statistics	12.00***	9.39***	39.93***	39.89***	33.65***
	F (2 389)	**F (3 388)**	**F (4 387)**	**F (5 386)**	**F (6 385)**
R^2 within	0.0581	0.0677	0.2922	0.3407	0.3440
R^2 between	0.1890	0.0413	0.0812	0.1447	0.2652
R^2 overall	0.0631	0.0396	0.2630	0.3216	0.3371

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. Standard errors are in parenthesis.

Table A3. Determinants of labour productivity in Latin America (selected economies), 1992-2017

Random effects

Independent variables	1	2	3	4	5
gc	**0.0679*****	**0.0678*****	**0.0357****	**0.0259**	**0.0267**
	(0.0194)	(0.0193)	(0.0171)	(0.0165)	(0.0165)
gk	**0.0065*****	**0.0067*****	**0.0052*****	**0.0042****	**0.0042****
	(0.0021)	(0.0021)	(0.0018)	(0.0018)	(0.0018)
to		0.0110	0.0057	0.0028	–0.0021
		(0.0074)	(0.0075)	(0.0077)	(0.0073)
gm			0.3094***	0.1538***	0.1536***
			(0.0277)	(0.0390)	(0.0388)
k				0.0824***	0.0809***
				(0.0150)	(0.0150)
fdi					0.1282**
					(0.0602)
constant	0.8137**	0.1220	–0.1397	0.0401	–0.0774
	(0.2537)	(0.5290)	(0.5326)	(0.5445)	(0.5019)
Observations	407	407	407	407	407
Groups	16	16	16	16	16
Wald-statistics	26.03***	28.32***	161.53***	203.84***	209.48***
	chi2(2)	**chi2(3)**	**chi2(4)**	**chi2(5)**	**chi2(6)**
R^2 within	0.0580	0.0626	0.2911	0.3402	0.3432
R^2 between	0.2040	0.1385	0.1446	0.2348	0.3886
R^2 overall	0.0635	0.0689	0.2775	0.3297	0.3447

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. Standard errors are in parenthesis.

Table A4. Determinants of labour productivity in Latin America (selected economies), 1992-2017

Panel corrected standard error

Independent variables	1	2	3	4	5
gc	**0.0595*****	**0.0605*****	**0.0213**	**0.0171**	**0.0175**
	(0.0224)	(0.0222)	(0.0184)	(0.0176)	(0.0175)
gk	**0.0052***	**0.0055****	**0.0039****	**0.0033***	**0.0033***
	(0.0029)	(0.0029)	(0.0019)	(0.0018)	(0.0018)
to		0.0090**	0.0043	0.0014	–0.0037
		(0.0045)	(0.0060)	(0.0058)	(0.0054)
gm			0.3144***	0.1648***	0.1675***
			(0.0312)	(0.0390)	(0.0384)
k				0.0808***	0.0774***
				(0.0156)	(0.0152)
fdi					0.1567**
					(0.0667)
constant	0.8900**	0.3194	0.0378	0.1745	–0.0135
	(0.4033)	(0.5577)	(0.5094)	(0.4993)	(0.5196)
Observations	407	407	407	407	407
Groups	16	16	16	16	16
Wald-statistics	12.29***	15.99***	124.68***	178.70***	187.44***
	chi2(2)	**chi2(3)**	**chi2(4)**	**chi2(5)**	**chi2(6)**
R^2	0.0457	0.0516	0.2714	0.3192	0.3314

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$. Standard errors are in parenthesis.