

Artículo de investigación



Effects of macroeconomic aggregates on the functional distribution of income in Colombia between 2000 and 2020: A post-Keynesian approach¹

Efectos de los agregados macroeconómicos sobre la distribución funcional del ingreso en Colombia entre 2000 y 2020: un enfoque poskeynesiano

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Abstract. The study aims to contribute to the discussion of the economic variables that determine the functional distribution of income –measured as the share of wages in value added– in the three main sectors of Colombia, based on the theoretical position of the Post-Keynesian school. This school argues that this measure of income distribution may present a better measurement approximation than traditional distribution measures such as the Gini –since wage compensation and value added would be obtained from taxpayers' information and not from surveys such as the Gini. Therefore, a sectoral analysis of the functional income distribution is presented, and a panel data model is estimated for the period 2000-2020. The results allow us to infer that the functional income distribution is explained and in fact improves with an increase in output, trade balance, taxes, and investment; however, the individual effect of each of these variables on the distribution is inelastic. Thus, it is concluded that the Post-Keynesian postulate is partially fulfilled in Colombia in the period under study.

Keywords: Functional Income Distribution, Macroeconomic Development Models, Post- Keynesian School.

Resumen. El estudio pretende generar un aporte a la discusión de las variables económicas que determinan la distribución funcional del ingreso –la cual se mide como la participación de los salarios en el valor agregado– en los tres principales sectores de Colombia, a partir de la postura teórica de la escuela Post-Keynesiana. Dicha escuela arguye que esta medida de distribución del ingreso puede presentar una mejor aproximación de medición que las medidas de distribución tradicionales como el Gini, ya que la remuneración a los salarios y el valor agregado se obtendrían de la información de los contribuyentes y no de encuestas como el Gini. Por consiguiente, se presenta un análisis sectorial de la distribución funcional del ingreso y se estima un modelo de datos de panel para el periodo 2000-2020. Los resultados permiten inferir que la distribución funcional del ingreso se explica y, de hecho, mejora ante un incremento en el producto, en la balanza comercial, en los impuestos y en la inversión; sin embargo, el efecto individual de cada una de estas variables sobre la distribución es inelástico. De esta manera, se concluye que el postulado Post-Keynesiano se cumple parcialmente en Colombia en el periodo de estudio.

Palabras clave: Distribución funcional del ingreso, modelos de desarrollo macroeconómico, escuela Post - Keynesiana.

Resumo. O estudo visa gerar uma contribuição para a discussão das variáveis econômicas que determinam a distribuição funcional da renda -que é medida como a participação dos salários no valor agregado- nos três principais setores da Colômbia, a partir da posição teórica do Post-Escola keynesiana. A referida escola argumenta que essa medida de distribuição de renda pode apresentar uma aproximação de medição melhor do que medidas tradicionais de distribuição como o Gini - já que a remuneração dos salários e o valor adicionado seriam obtidos a partir de informações dos contribuintes e não de pesquisas. Assim, apresenta-se uma análise sectorial da distribuição funcional do rendimento e estima-se um modelo de dados em painel para o período 2000-2020. Os resultados permitem inferir que a distribuição funcional do rendimento se explica e de facto melhora com o aumento da o produto, na balança comercial, nos impostos e no investimento; no entanto, o efeito individual de cada uma dessas variáveis na distribuição é inelástico. Desta forma, conclui-se que o postulado pós-keynesiano é parcialmente cumprido na Colômbia durante o período de estudo.

Palavras-chave: Distribuição funcional de renda, modelos macroeconômicos de desenvolvimento, escola pós-keynesiana.

Introduction

The economic and social situation in which part of the world's population finds itself is evidence of the unfavorable scenario of income and wealth distribution, which undoubtedly increases the levels of poverty and inequality in the regions. Fischer (1991) argues that countries that have shown greater macroeconomic stability have registered higher growth rates in their economies, concluding that less economic volatility leads to greater efficiency in the allocation of resources. On the other hand, Nolan (1989) and Blejer and Guerrero (1990; 1989) state that income distribution can be affected in different ways by the conditions of economic activity in the countries. It is the concentration of income in the hands of a few that causes gaps to widen and inequality to increase; therefore, it is no coincidence that the highest incomes and wealth are concentrated in the skilled labor force. The diverse literature on income distribution questions the premise that growth improves income distribution, which would undoubtedly lead to a decrease in poverty and economic inequality. For this reason, a theoretical and empirical study is presented in order to generate a concept regarding the economic determinants of the functional distribution of income in Colombia, which proves or refutes the theoretical approaches of the Post-Keynesian school.

This paper reviews the literature on works and studies that have investigated the subject of income distribution and the elements that determine it, and it further analyzes various hypotheses of income distribution and its measurement over time.

Once the pertinent conceptual theoretical study was carried out, a descriptive analysis was prepared, and finally, statistical techniques were used to estimate a panel data model, using the functional income distribution measure as the dependent variable and the unemployment rate, inflation rate, real exchange rate, GDP growth rate, trade balance and taxes, among others, as independent variables. Thus, it can be affirmed that the functional distribution of income in Colombia in the period between 2000 and 2020 reacts in a little sensitive way to the growth rate of the product, net exports, tax revenues and private investment.

State of the art and theoretical framework

The Post-Keynesian current assumes that income distribution is a function of effective demand. Making use of the different margins of the propensity to save and to consume of workers and producers, it argues how the current income of entrepreneurs is largely allocated to savings, resulting in a greater production capacity, which becomes a relevant factor in the total expenditure of the economy; while in the case of workers, they allocate a greater proportion of their current income to consumption. The way in which the distribution of income would be given begins when at the equilibrium point, the availability of certain goods is equal to the total expenditure, this equilibrium is due to variations in price, that is, when there is an increase in expenditure, prices rise as well as the profits of the entrepreneur, causing that in real terms wages decrease, which would increase the expectations of organizations and their production, causing a decrease in the propensity to save of the capitalist due to an increase in the desired rate of investment, redistribution appears as a result of the aggregate level of demand.

Following Moore (1989) the orthodox theory of distribution has been subject to different types of criticism. Initially there was the accumulation problem, or the appropriateness and realism of assuming constant returns to scale, which was required to guarantee that output would be exhausted in equilibrium. Secondly, since the worker could only bargain for his nominal pay and not his true wage, Keynes defined true salary as being equal to the marginal disutility of effort. A third criticism stems from Sraffa's development of the traditional idea of prices of production, according to which it was unnecessary to consider marginal productivity or disutility in order to determine a price equilibrium. Furthermore, he denied the logical underpinnings of the demand curve for factor services based on marginal productivity. Regarding the modern school of post-Keynesianism, Kalecki is one of its greatest exponents, in terms of the study of income, he affirms that the working class spends its salary obtained from work, while the owners of capital receive what they spend on goods and services; in such a way that, national income is formed on the one hand by the income obtained by both capitalists and workers and on the other hand, by the level of consumption made by workers and investment and the corresponding consumption made by capitalists. For Kalecki there are two economic sectors, a small one where manufacturing and services are located, which has rigid prices, and a large sector formed by the production of agricultural and primary goods. This sector is large, so prices are flexible. In this respect, Kalecki argues that the profit margin and the share of profits and wages in national income are determined by the level of investment of capitalists and the degree of monopoly.

However, Moore (1989) further suggests that profits could outpace investments in a similar manner to how much money capitalists spend on consumption. As a result, Moore contends that aggregate demand, rather than the level of real or nominal wages, determines how many people are employed. From a Post-Keynesian view of distributional theory, the effects of functional redistribution on changes in the interest rate focus directly on the responsiveness of the profit margin to the interest rate, as a result, changes in aggregate demand and output have no effect on prices, but they do have an impact on net profits.

Continuing with the theme of sector identification, Galbraith (2001) assumes that there are two firms: a) A first firm represents sector S, which is the sector with a competitive market structure, characterized by generating a low margin over the minimum wage level, by demanding current employment, and by having the largest share within the economy. b) The second firm represents the monopoly sector C, which produces manufactured goods, making use of machinery -which have property rights- and the labor factor; monopoly power is reflected by manufacturing output and differentiated consumer demand.

Galbraith (2001) also states that industrialized countries are producers of means of production, capital goods and knowledge, which make up the K sector. The income generated in this sector refers

to the flow of profits postulated by Keynes, Kalecki and Kaldor; therefore, the variation of income in this sector is mainly caused by the variation in the demand for investment goods made by the capitalist. In this respect, Keynes and Kalecki argue that the profits of capitalists also increase due to the increase in consumption expenditure on non- wage or luxury goods, which is called: capitalist consumption. Thus, Keynes and Kalecki claim that the business cycle is mainly explained by this sector K, so that the cycle itself is a cycle of capitalist class spending.

Sector K has a Schumpeterian-type monopolistic market structure, i.e., it has unstable market power, which means that a firm must destroy its competition through the generation of better production processes and product innovation, so that the prices of goods in this sector are high, and therefore wages are high. The level of production in the K sector depends on the accumulation and skills of human capital.

In addition, Galbraith (2001) includes the external sector in his analysis, arguing that in developing countries the K sector is scarce or limited, causing investment demand to be concentrated in importable goods, so that economic growth in these countries would be equal to that of the national economy. The following is a review of the international and national background:

According to Srinivasan (1995), his study aims to highlight weaknesses in concepts, data distortions in the Systems of National Accounts (SNA), measurement errors, glimpses of the different views of households used in distributional analysis by reviewing various methodologies that relate income distribution to macroeconomics and other contributions to econometric modeling of general equilibrium. Second, it examines the concept of income used in systems of national accounts, as well as the choices of individuals, households and extended families in distributional analysis and the respective measures in interpretations of income inequality for public policy.

The author additionally explores methodologies and empirical tools to link income distribution with macroeconomic policies and processes using theoretical, econometric, and general equilibrium models. The author concludes that modeling income distribution and macroeconomics requires data modeling exercises over time lapses through the implementation of concept tests. In this sense, Srinivasan (1995) argues that unemployment, inflation, exchange rates, capital underutilization, are macroeconomic variables that can affect income distribution, through differential effects both in the branches of economic activity and in socio-economic groups.

In another instance, he concludes that income and wealth transfers are important from an intragenerational and intergenerational perspective in poverty analysis when the starting point is the family rather than the household. Similarly, he concludes that distributional analyzes based on consumption expenditures can be better justified in assessing inequality and poverty. The author also mentions that in countries with sufficient reliable data, it is possible to empirically combine income distribution and macroeconomics as a method to predict the development of inequality or poverty. Finally, the author states that the process of long-term income distribution must consider social, economic, demographic, political, technological, and environmental processes, all of which are random and interdependent.

Lindenboim's study (2008) focuses on "drawing attention" to the fact that the debate on the determinants of inequality in Latin America had focused on measuring the concentration of income received by families, but how the factors of production appropriate wealth in the countries of the region has not been extensively studied. The paper presents the share of the wage bill in GDP for high-income countries and for Latin American countries, as well as the share of wage earners in Latin America. Based on these data, it is argued that increased technology displaces wage workers, reducing their socioeconomic well-being, and that large differences in output lead to unsatisfied labor demand in some industries and oversupply in others. However, a key point in this debate, which has not been thoroughly investigated, is, firstly, the relationship between a greater concentration of income and the apparent oversupply of labor and, secondly, the quantification of the appropriation

of the factors of production. Essentially, the author argues that the improvement of inequality has its origin in the production process itself. The paper concludes that there is evidence of a low participation of wages in the appropriation of income, which translates into greater inequality and an impediment to the sustainability of economic growth.

Amarante (2008) advances in the deepening of the relationship between economic growth and income distribution in Latin America, analyzing how social conflict affects this relationship. Consequently, the study seeks to establish whether the low rates of economic growth in the Latin American region are related to the high levels of economic inequality that have been recorded. The paper presents a theoretical review of the literature which mentions that the academy studied the distribution of individual income in more detail, but there was no progress in the study of the functional distribution of income. The author presents a descriptive analysis of Latin American growth rates for the four decades between 1961 and 1999, and estimates panel data models for the period 1960-2000, evaluating the Kuznets curve. The study concludes that the effect of income on inequality is negative in low-income countries in Latin America, while it is positive in high-income countries.

Finally, when we speak of income distribution, we refer to the monetary expression of distributing a value from the employers to the employees known as salary and its surplus, and to achieve the latter, the productive capacity of society must be increased through the maximization of profits. This is achieved by improving technology, which is reflected in a decrease in costs, resulting in higher profits. It is important to note that this productive improvement leads to an improvement in wages, and consequently the functional distribution of income is determined by the relationship between the average price of production for each worker and what they receive as a salary.

In accordance with the above, Lindenboim, Kennedy y Graña (2010) express this idea in the following formula:

$$Participation = laboral\ cost * \left(\frac{1}{Productivity} \right) * wage\ rate \quad [1]$$

This would result in actual wage costs, ie., the ratio of wages to income, considering productivity, and making wages adjust to income and total employment reflected in productivity. According to this approach, it is considered that a decrease in wages does not necessarily harm the worker as long as the rate of productivity increases.

Abeles, Arakaki and Villafañe (2017) carry out an ECLAC study in which they state that in recent years there has been a greater interest in re-studying the distribution of income based on the remuneration of the factors of production, mainly because the working class has registered a reduction in the share of their wages in national income since the 80s. The work is carried out for eight Latin American countries, analyzing the share of aggregate income appropriation by workers, and inferring that this proportion changes from one sector to another, with the highest appropriation in the social and public services sector and the lowest in mining. From this perspective, the authors argue that the differences in the functional distribution of income between two countries or in two time periods are associated with the changes in the distribution of income between capital and labor factors; and they agree with Lindenboim (2008) in the sense that research on this topic is scarce. The objective of the study is to determine to what extent the participation of the labor factor for the eight Latin American countries is affected by distributive factors or by changes in the composition of the economic sectors in terms of value added, during the 2000-2010 period. The main result reached by the paper is that in the period under study, the functional distribution of income has changed, mainly explained by the distributive dynamics immersed in each sector, among which are the technological factor, the regulation of the labor market, institutional factors, and the forms of organization of the labor factor. At the national level, academic publications on functional income distribution are also limited and scarce; however, some documents on income distribution are presented below:

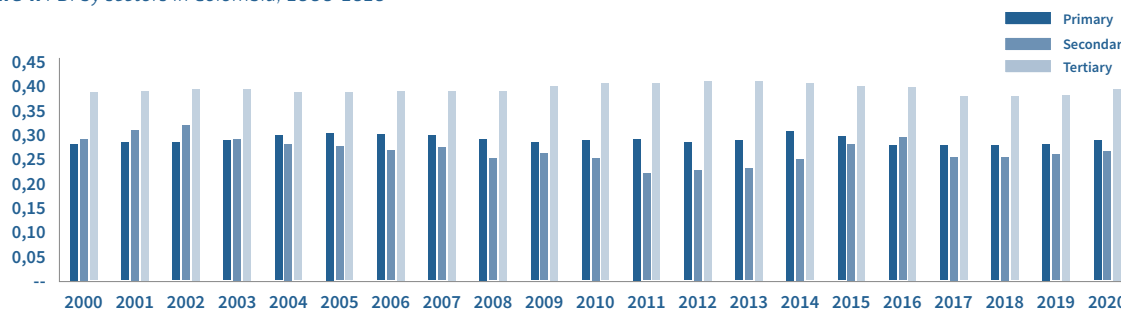
The study of Ocampo et al. (1998) presents an analysis of how poverty and income distribution are affected by structural reforms and the macroeconomic cycle. The paper analyzes different macroeconomic aggregates for the years 1975 to 1997, relating them to structural reforms. On the other hand, it shows a comparison of human development indicators for urban, rural, and total zones, with cuts in different years (1973, 1985 and 1993). Subsequently, it analyzes the distribution of *per capita* income, the distribution of total income of the working age population and the distribution of wage income of the working age population, complementing this analysis with labor market indicators.

In this sense, the methodology used by the authors was a descriptive analysis of the mentioned statistics, as well as the estimation of ordinary least squares econometric models, in which the effects of macroeconomic aggregates on the Gini coefficient and on poverty are estimated. Thus, the document concludes that in the period studied, Colombia recorded an improvement in poverty indicators in urban areas and an increase in poverty in rural areas, maintaining high rates of economic inequality, reporting improvements in the human development indexes and in the unsatisfied basic needs indexes.

Birchenall (2007) analyzes the effects of macroeconomic aggregates on income distribution, determining the transmission and propagation mechanisms of aggregate economic shocks. The author states that income distribution is a multiple dependent variable which depends on several explanatory variables. In methodological terms, a dynamic model of cross-section indexes is estimated, in which macroeconomic variables are composed of individual variables, which implies that they are not exogenous; for the period between the first quarter of 1980 and the second quarter of 1997, and with databases of the working age population for the seven main Colombian cities. The author states that inflation is the aggregate that has the greatest power to predict income distribution, since it has a negative effect on sectoral income for all productive sectors in both the short and long term. With respect to the real interest rate, it is argued that changes in it reflect changes in the inflation rate, therefore, the positive effect of interest rates can generate changes in inflation. It is evident that the inflation rate has a negative effect on income distribution in Colombia. The study argues that the most important result is the negative and significant effect that inflation has on income distribution in the short and long term, since higher inflation decreases sectoral and educational income for all population groups.

Characterization of the functional distribution of income in Colombia

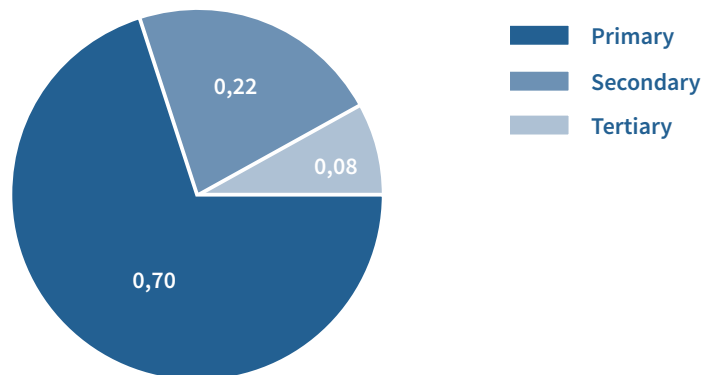
To analyze and estimate the functional distribution of income (FDI) in the three major sectors of the Colombian economy, this study was based on the ECLAC FDI indicator provided by Abeles et al. (2017), measured as the share of remuneration to wage labor in income at constant prices. In this sense, the higher the share of wages in value added, the higher the FDI, i.e., the better the distribution of income generated by the factors of production (capital and labor). This measure of FDI from Abeles et al. (2017) is also used by Colombian studies such as that of Loaiza, Tobón and Hincapié (2017), however, they study the effect of the FDI on GDP for the period from 1970 to 2011. Below are some facts that characterize the behavior of the FDI and its components for the three main branches of economic activity in the country, namely the primary sector is agriculture, the secondary sector is industry and the tertiary sector is the services sector.

Figure 1. FDI by sectors in Colombia, 2000-2020

Source: Own elaboration, based on DANE.

Figure 1, shows that the tertiary sector has the highest FDI of the three sectors with an average over time of 39%, followed by the primary sector with an average of 29% and, finally, the tertiary sector with an average of 26%. On the other hand, it can be seen that the participation of wages in the value added of each sector has remained stable in the study period, inferring that in these two decades there has been no improvement in the FDI, i.e., that capitalists in each of the sectors have appropriated most of the value added generated by each sector.

This persistent inequity in the FDI can be explained from the Post-Keynesian school, based on the following aspects: First, the degree of market concentration in the tertiary sector. As Pinzón (2011) states, there is a degree of monopoly in the financial system determined by conglomerates, which influence the determination of market prices, so that high interest rates in credit placement generate a greater transfer of income from workers (wages) to bankers (capitalists). Second, the agricultural sector is characterized by a low level of private investment, mainly explained by insecurity –armed conflict²–, low industrialization (innovation and technology), persistence of inadequate infrastructure, and a low level of financing for agricultural activities (Leibovich & Estrada, 2017). Finally, the manufacturing sector has been showing a process of deindustrialization³, which is explained by a lower level of private investment, which has led to the export of low value-added goods and low labor productivity (Avila & Jaramillo, 2015).

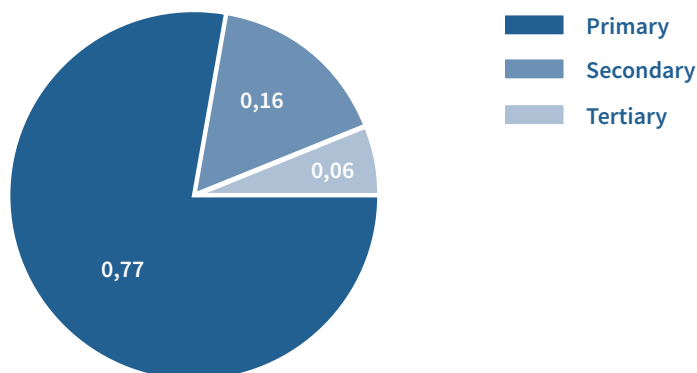
Figure 2. Average share of each sector in Colombia's value added. 2000-2020

Source: Own elaboration, based on DANE.

2. Peace agreement signed in Cartagena on September 26, 2016.

3. In this regard, Ortiz (2009) affirms that at the beginning of the 21st century, Colombia went from a process of industrialization to a process of deindustrialization, presenting a much lower level of technological autonomy, which led from an accelerated and slight economic growth to an economic deceleration.

Figure 3. Average participation of each sector in the remuneration of employees in Colombia. 2000-2020.

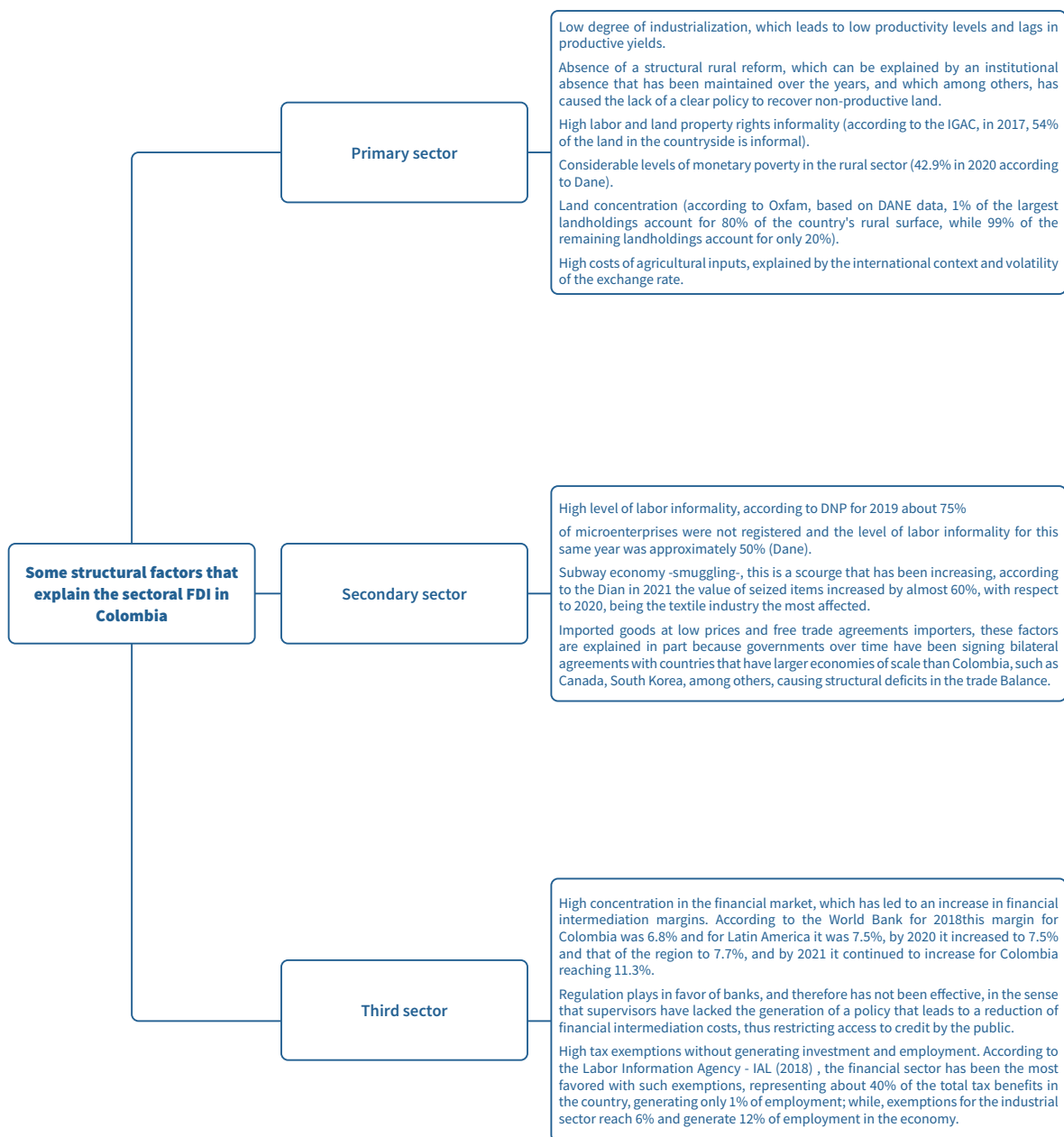


Source: Own elaboration, based on DANE.

Figures 2 and 3 show that between 2000 and 2020, the tertiary sector is the branch of economic activity with the highest average share in the value added generated by the economy (70%) and the highest average share in the total wages paid to the country's workers (77%). Thus, there is a great distance between this sector and the other two economic sectors, indicating a high concentration of added value and wages in the tertiary sector, compared to the secondary sector and the marginalized primary sector.

The following diagram shows some of the structural factors that may explain this fact, where the deterioration persists both in the generation of added value and in wages in the primary and secondary sectors of Colombia compared to the tertiary sector.

Figure 4. Some structural factors that explain sectoral FDI in Colombia.



Source: Own elaboration.

Model estimation and results

Taking into account, in the first place, the Post-Keynesian theoretical postulates, mainly those of Kalecki and Kaldor, quoted by Galbraith (2001), they argue that the FDI is explained by the effective demand variables. Kalecki (1977), for his part, states that investment affects profits and that firms set prices according to market power; additionally, he considers that the balance of trade is shaped by imports, which he defines as costs, and the distribution of capitalists' profits make up the export surplus. He also postulates that output increases in the long run due to an increase in population, which reduces wages, thus, reducing the vector of prices of goods and services. On the other hand, he argues that in the face of an excess of money supply, banks would reduce the interest rates of loans. Additionally, considering the empirical studies, especially the model of Cárdenas et al. (1998) and the corresponding literature review by authors such as Srinivasan (1995), the following initial specification of the panel data model is proposed, in order to establish the macroeconomic variables that explain the functional distribution of income jointly by the three economic sectors of the country.

$$FDI_{it} = \beta_0 + \beta_1 TD_{it} + \beta_2 INF_{it} + \beta_3 VAR_ITCR_{it} + \beta_4 PIB_{it} + \beta_5 BC_{it} + \beta_6 T_{it} + \beta_7 i_{it} + \beta_8 INV_{it} + e_{it} \quad [2]$$

Where:

- *FDI*= Measure of functional income distribution for sector *i* *TD*= Unemployment rate of the economy
- *INF*= Annual inflation by CPI of the economy
- *VAR_ITCR*= Growth rate of the real exchange rate index of the economy
- *PIB*= Annual growth rate of GDP of sector *i*
- *BC*= Annual trade balance growth rate of sector *i*
- *T*= Tax collection growth rate of sector *i*
- *i*= Economy placement interest rate
- *INV*= growth rate of private investment in sector *i*
- *e*= Is the random disturbance term
- The subscript *i* represents the primary, secondary and tertiary sectors.

The subscript *t* represents the time period, which ranges from 2000 to 2020 on an annual basis.

Following Green (1999), the estimation of panel data allows greater flexibility in modeling differences in behavior between groups than the estimation of cross-sectional models. For this study the group consists of the three economic sectors. The generalized panel data regression model is:

$$Y_{it} = \alpha_i + \beta' x_{it} + \varepsilon_{it} \quad [3]$$

Where:

- *X_{it}* is the vector made up of *K* regressors
- *α_i* is the constant of the model over the entire time period and is also specific for the individual cross-section unit.
- Subindex *i* represents the cross-section units (for this study, three Colombian economic sectors are taken: agriculture, industry and services).
- The subscript *t* stands for time, which starts at 1 and ends at *T* periods (which can be months, quarters, semesters, years).
- *β'* expresses the vector of parameters that unites each independent variable.

Before performing the respective model estimations, augmented Dickey-Fuller unit root tests were applied to ensure the stationarity of all time series.

The final estimation of the panel data econometric model with fixed effects is presented below, once the different tests required to validate its goodness of fit have been carried out⁴.

Table 1. Panel data model estimation with fixed effects.

Dependent Variable: FDI

Method: Panel Least Squares

Date: 05/28/22 Time: 00:06

Sample (adjusted): 2007 2020

Periods included: 14

Cross-sections included: 3

Total panel (balanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.093632	0.001958	47.81152	0.0000
PIB(-5)	0.144222	0.085275	1.691259	0.0997
BC(-7)	2.84E-18	1.37E-18	2.064673	0.0464
T(-4)	0.034141	0.017238	1.980561	0.0555
INV(-2)	0.036932	0.021827	1.692037	0.0995
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.993973	Mean dependent var		0.095064
Adjusted R-squared	0.992 940	S.D. dependent var		0.136568
S.E. of regression	0.011475	Akaike info criterion		-5.946283
Sum squared resid	0.004609	Schwarz criterion		-5.656671
Log likelihood	131.8719	Hannan-Quinn criter.		-5.840129
F-statistic	962.0566	Durbin-Watson stat		1.593987
Prob(F-statistic)	0.000000			

Source: Own elaboration.

According to the results of the econometric estimations expressed in the previous equation, it can be inferred that if GDP is increased by 1% *ceteris paribus*, the functional distribution of income improves jointly for the three sectors by 0.14%, five years later. On the contrary, before an increase in the trade balance of 1% *ceteris paribus*, a marginal improvement is generated seven years later in the FDI of 2.8E-18%; with respect to taxation, if these increase by 1% *ceteris paribus*, it is observed that after four periods the FDI in the three sectors as a whole increases by 0.03%; finally, if private investment increases by 1% *ceteris paribus*, it is evident that the FDI of the three sectors improves by 0.03% two years later.

4. See Annex 1.

$$FDI = 0.0936^{***} + 0.1442PIB(-5)^* + 2.84E - 18BC(-7)^{**} + 0.0341T(-4)^* + 0.0369INV(-2)^* \quad [4]$$

(0.0019) (0.0852) (1.37E-18) (0.0172) (0.0218)

Additionally, the results of the model show that for the three main sectors of the Colombian economy, the FDI reacts with a certain number of lags inelastically to the variations of each of the estimated effective demand control variables.

Conclusions and proposals

A comparison of the FDI between the country's three main branches of economic activity shows that the tertiary sector has the highest average FDI in the period under study, i.e., this sector recorded the highest wage share with respect to its generated income. Consequently, the secondary and primary sectors show a persistent deterioration over the years, both in the share of value added and in the remuneration of the labor factor, with a more acute detriment in the primary sector.

This problem can be explained, in the first place, by cross-cutting factors in these two sectors – primary and secondary– such as the low level of private investment, a high level of labor informality, a trade balance affected by a high dependence on the exchange rate and by free trade agreements that have boosted imports more than exports. Second, structural factors specific to each sector, as mentioned in the section on the characterization of the FDI, where the primary sector lacks structural rural reform, a high level of land concentration, among others, and the secondary sector is significantly affected by the scourge of smuggling and manufactured products that arrive from abroad at a lower price than domestic goods.

Moreover, according to the results of the estimated model, it can be affirmed that the Kaleckian postulate of the Post-Keynesian school that argues that effective demand explains the functional distribution of income, partially applies to Colombia, since only the demand variables that explain the FDI jointly for the three sectors of the economy are GDP, the trade balance, taxes, and private investment. In addition, it can be affirmed that the FDI responds inelastically to each of the macro variables mentioned and with wide lags over time. Thus, it could be said that the set of structural factors analyzed for the country's agricultural, industrial and service sectors may be explaining the non-dependence of the FDI on effective demand variables such as the unemployment rate, the real exchange rate and the placement interest rate.

The functional distribution of income from the Post-Keynesian school is determined, among others by the interest rate that reflects the conditions of preference for liquidity in the local money market, and the dynamics of the fundamental factors of gross operating surplus (GOS) and compensation of employees (REM), which determine the gross domestic product of the economy in turn. Under this approach, capitalists obtain the GOS quantified in the profitability of the sector (financial and non-financial), while workers obtain the income from labor, i.e., the EMR. From the Post-Keynesian perspective and assuming that the placement interest rate does not explain the FDI in the three sectors of the Colombian economy as a whole, the public policies defined by the Board of Directors of the Central Bank should be aimed at reducing the central bank's policy interest rate in order to improve the liquidity of the national money market, with the purpose of: a) Increase aggregate supply and demand through the possibility of increasing private investment and consumption of salaried employees, with which private investment would have better profitability expectations due to the decrease in the costs of use of the capital factor, further leading this decrease in costs to a reduction in supply inflation. b) Incentivize the consumption of goods for salaried employees with a lower cost in their credits, and c) a progressive effect on FDI, increasing the share of wages in the value added

of the economy. This economic policy proposal goes in the direction of one of the main conclusions exposed by Moreno (2014) who argues that the monetary policy interest rate of the Banco de la República de Colombia has distanced itself from the fair interest rate rule, leading to non-neutral effects on the economy, thus generating a regressive result in the FDI benefiting capitalists.

Private investment –the main variable of the FDI for Post-Keynesians– improves the FDI as a whole for the three economic sectors of Colombia, but it does so inelastically, therefore, a public policy is proposed across the primary, secondary and tertiary sectors, which generates incentives for private investment through foreign exchange futures market mechanisms to expand the coverage and international indebtedness of non-financial institutions of the national economy, weighing the restrictions to the financing of such investment.

Given that the FDI reacts in a way that is not very sensitive to some aggregate demand variables, it is pertinent to continue deepening these topics, including in subsequent research the degree of monopoly of the economic sectors and its effect on the FDI, as postulated by the Post-Keynesian school, so that a contribution can be made in terms of sectoral policy recommendations.

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Annexes

Annex 1. Econometric Estimates

Model estimation with random effects. Wallace-Hussain Method - Cross Section

Dependent Variable: FDI

Method: Panel EGLS (Cross-section random effects)

Date: 05/27/22 Time: 23:52

Sample: 2000 2020

Periods included: 21

Cross-sections included: 3

Total panel (unbalanced) observations: 61

Wallace and Hussain estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.094782	0.085673	1.106331	0.2733
PIB	-0.032538	0.321363	-0.101251	0.9197
BC	-2.59E-18	5.41E-18	-0.479245	0.6336
T	-5.27E-13	7.17E-12	-0.073513	0.9417
INV	-0.010077	0.102759	-0.098061	0.9222
Effects Specification				
			S.D.	Rho
	Cross-section random		0.147989	0.9104
	Idiosyncratic random		0.046425	0.0896
Weighted Statistics				
R-squared	0.055051	Mean dependent var		0.006706
Adjusted R-squared	-0.012446	S.D. dependent var		0.015069
S.E. of regression	0.015210	Sum squared resid		0.012956
F-statistic	0.815607	Durbin-Watson stat		1.061514
Prob(F-statistic)	0.520614			
Unweighted Statistics				
R-squared	-0.018197	Mean dependent var		0.098193
Sum squared resid	1.160181	Durbin-Watson stat		0.011854

Cross-Section Random Effects Test (Hausman)

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0.000000	4	1.0000
* Cross-section test variance is invalid. Hausman statistic set to zero.				
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
PIB	-0.047085	-0.032538	-0.096627	NA
BC	-0.000000	-0.000000	-0.000000	NA
T	-0.000000	-0.000000	-0.000000	NA
INV	-0.009277	-0.010077	-0.009880	NA

The Panel Random Effects Test shows that the model is not consistent by means of Cross-Section Random Effects in the Wallace-Hussain method.

Model Estimation (Random Effects = “Wansbeek-Kapteyn” Method - Cross Section)

Dependent Variable: FDI

Method: Panel EGLS (Cross-section random effects)

Date: 05/27/22 Time: 23:55

Sample: 2000 2020

Periods included: 21

Cross-sections included: 3

Total panel (unbalanced) observations: 61

Wansbeek and Kapteyn estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.094830	0.097342	0.974197	0.3341
PIB	-0.046360	0.081527	-0.568642	0.5719
BC	-2.61E-18	1.37E-18	-1.899859	0.0626
T	-6.16E-13	1.82E-12	-0.338569	0.7362
INV	-0.009317	0.026059	-0.357525	0.7220
Effects Specification				
			S.D.	Rho
Cross-section random			0.168579	0.9951
Idiosyncratic random			0.011773	0.0049

Weighted Statistics			
R-squared	0.099498	Mean dependent var	0.001496
Adjusted R-squared	0.035176	S.D. dependent var	0.011979
S.E. of regression	0.011770	Sum squared resid	0.007757
F-statistic	1.546876	Durbin-Watson stat	1.788756
Prob(F-statistic)	0.201257		
Unweighted Statistics			
R-squared	-0.021228	Mean dependent var	0.098193
Sum squared resid	1.163635	Durbin-Watson stat	0.011925

Cross-Section Random Effects Test (Hausman)

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	4	1.0000

* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
PIB	-0.047085	-0.046360	0.000000	0.1614
BC	-0.000000	-0.000000	0.000000	0.8427
T	-0.000000	-0.000000	0.000000	0.4110
INV	-0.009277	-0.009317	0.000000	0.1901

The Panel Random Effects Test shows that the model is not consistent by means of Cross-Section Random Effects in the Wansbeek-Kapteyn method.

Estimation Model with fixed effects

Dependent Variable: FDI

Method: Panel Least Squares

Date: 05/28/22 Time: 00:06

Sample (adjusted): 2007 2020

Periods included: 14

Cross-sections included: 3

Total panel (balanced) observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.093632	0.001958	47.81152	0.0000
PIB(-5)	0.144222	0.085275	1.691259	0.0997
BC(-7)	2.84E-18	1.37E-18	2.064673	0.0464
T(-4)	0.034141	0.017238	1.980561	0.0555
INV(-2)	0.036932	0.021827	1.692037	0.0995
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.993973	Mean dependent var		0.095064
Adjusted R-squared	0.992 940	S.D. dependent var		0.136568
S.E. of regression	0.011475	Akaike info criterion		-5.946283
Sum squared resid	0.004609	Schwarz criterion		-5.656671
Log likelihood	131.8719	Hannan-Quinn criter.		-5.840129
F-statistic	962.0566	Durbin-Watson stat		1.593987
Prob(F-statistic)	0.000000			

Fixed Effects Redundancy Test - Cross Section and Periods

Redundant Fixed Effects Tests

Equation: MODELO_PANEL_FIJOS

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2244.682106	(2,34)	0.0000
Cross-section Chi-square	298.329697	2	0.0000
Period F	1.404907	(20,34)	0.1867
Period Chi-square	36.743682	20	0.0126
Cross-Section/Period F	328.336710	(22,34)	0.0000
Cross-Section/Period Chi-square	327.168464	22	0.0000

The Panel Fixed Effects Data in time periods is not consistent with the model because the series are variances, however, the model is consistent with cross-section, which is corroborated in the following test:

Cross-Section Fixed Effects Redundancy Test

Redundant Fixed Effects Tests

Equation: MODELO_PANEL_FIJOS

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.	
Cross-section F	1851.601542	(2,35)	0.0000	
Cross-section Chi-square	196.182515	2	0.0000	
Cross-section fixed effects test equation:				
Dependent Variable: FDI				
Method: Panel Least Squares				
Date: 05/28/22 Time: 00:18				
Sample (adjusted): 2007 2020				
Periods included: 14				
Cross-sections included: 3				
Total panel (balanced) observations: 42				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.069663	0.019281	3.613011	0.0009
PIB(-5)	2.603073	0.754237	3.451266	0.0014
BC(-7)	2.25E-17	1.32E-17	1.696637	0.0982
T(-4)	0.089667	0.173019	0.518248	0.6074
INV(-2)	0.337199	0.213686	1.578016	0.1231
R-squared	0.356297	Mean dependent var		0.095064
Adjusted R-squared	0.286707	S.D. dependent var		0.136568
S.E. of regression	0.115341	Akaike info criterion		-1.370509
Sum squared resid	0.492229	Schwarz criterion		-1.163643
Log likelihood	33.78068	Hannan-Quinn criter.		-1.294684
F-statistic	5.119977	Durbin-Watson stat		0.784779
Prob(F-statistic)	0.002193			