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Abstract

This study examines two recent tax reforms in Peru aimed at fostering economic growth. A Dynamic Computable General Equilibrium (DCGE) model calibrated with 2023 data is employed to evaluate their macroeconomic and sectoral impacts. The results show that the Municipal Compensation Fund Law generates limited aggregate effects, with some notable exceptions: it tends to reduce the value added of the construction sector while increasing public expenditure on goods and services. In contrast, the New Agrarian Law stimulates agricultural and agro-industrial production, enhancing exports and value added. However, it slightly reduces tax revenues and public spending and produces negative spillover effects on sectors not directly benefiting from the reform.

Keywords: Dynamic Computable General Equilibrium Model; Tax Reform; Fiscal Policy; Peru; Municipal Compensation Fund (FONCOMUN); New Agrarian Law

JEL: C68, E62, H20, O23

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1. INTRODUCTION

In recent years, Peru has experienced a persistent contraction in productivity, a growing level of informality, and the absence of productive development policies that clearly define a path for economic growth. This policy gap has encouraged the emergence of various public and private initiatives focused on tax reductions, with potential implications for the country's fiscal stance. To examine these dynamics, a multisectoral Dynamic Computable General Equilibrium (DCGE) model for Peru was developed and calibrated using 2023 data as the benchmark year.

This study analyzes the latest tax initiatives implemented in Peru: Law No. 32387, the Municipal Compensation Fund (FONCOMUN), and Law No. 32434, the New Agrarian Law (2025). Both policies aim to foster local and national economic growth, yet they differ in orientation and policy intent. The FONCOMUN reform emphasizes resource redistribution and fiscal strengthening at the local level, whereas the New Agrarian Law focuses on consolidating the development of strategic sectors that underpin productivity and national competitiveness.

The results from the simulations provide insights into the potential effects of these initiatives on the national economy. Considering the features of the DCGE framework, the analysis yields results for a range of macroeconomic and sectoral variables, including value added, exports, private consumption, imports, public expenditure, and both public and private investment. The model also distinguishes between different types of investment—such as construction and machinery or other capital assets—and captures changes in tax revenue. For analytical purposes, the government sector is divided into two agents: (i) the central government, which includes both the national and regional administrations, and (ii) the local governments, treated collectively as a separate agent. The distinction between them rests on the nature of the taxes they collect and the magnitude of their expenditures on domestic goods—mainly public administration services. On the other hand, the dynamic approach of the model makes it possible to analyze results over a medium- to long-term horizon. To introduce this dynamic dimension, the model assumes a balanced growth path from the reference period (year) used for calibration. Percentage deviations are then computed based on the assumed dynamics of the model's variables.

To this end, two counterfactual simulations are conducted: (1) a gradual four-year reduction in the Value Added Tax (VAT)—the central government's primary source of revenue—from 16% to 14%, coupled with a progressive increase in the Municipal Promotion Tax (IPM) from 2% to 4%, in accordance with Law No. 32387 (Municipal Compensation Fund, FONCOMUN); and (2) the implementation of preferential Income Tax (IR) rates for a ten-year period, together with the permanent VAT early recovery on intermediate-goods purchases by agricultural firms, as established in Law No. 32434 (New Agrarian Law).

In the first counterfactual scenario, the value added of the construction sector is projected to decline by 2.4% relative to balanced growth during the first year of the reform, with the contraction intensifying to 3% over a ten-year horizon. Similarly, the value added of the public administration sector is expected to decrease by 1.4% in the initial year, followed by a smaller decline of 1% at the end of the ten-year calibration period.

Gross domestic product would remain largely unchanged, whereas investment is projected to contract by 1.3% during the first year of the reform. This reduction would be offset by an average increase of 4% in public expenditure on goods and services—excluding public administration expenditure. Over the long term, investment is expected to increase by 1.5% after ten years, driven exclusively by subsidies funded through newly allocated resources to local governments. Finally, the reform would generate primarily redistributive effects through fiscal revenue, significantly enhancing the resources of the FONCOMUN. Over a ten-year period, this fund is projected to collect 82% more than it would under a balanced growth scenario.

To explain the limited variation observed in most of the indicators analyzed in this counterfactual, it can be argued that the overall VAT rate (including both the base tax and the Municipal Promotion Tax) remains unchanged, and therefore no supply-side incentives are generated. Instead, the increase in the Municipal Promotion Tax operates as a demand-side stimulus for local governments, to the detriment of the central government. This shift indirectly affects private income, likely because the contraction of central government revenues reduces its spending on public administration services. The central government is relatively more intensive in this type of expenditure compared to local governments, and public administration services are, in turn, highly labor-intensive—representing 83% of their value added. Consequently, the reduction in private spending capacity negatively impacts key sectors such as agriculture and construction.

Furthermore, in the case of the second counterfactual, the tax incentives targeted specifically at agricultural firms generate stronger synergies and complementarities among certain productive sectors—mainly agriculture, agroindustry, hunting and forestry, construction, and services—both in terms of production (value added) and exports (excluding construction and services).

On the other hand, the remaining industrial sectors, as well as the extractive industries—particularly mining, oil, and natural gas—are slightly adversely affected as a consequence of these incentives. These productive sectors compete for labor and capital, and in particular for the use of fuel (mainly diesel), machinery rental, and land freight transport services, with the agricultural, forestry, and agro-industrial sectors. Consequently, the fiscal incentives that enhance the competitiveness of agriculture and related activities indirectly generate a negative flow of capital, labor, and intermediate goods away from the other sectors.

Empirical evidence from studies such as Dixon et al. (2005) and Groenewold (2000, 2002) on the Australian economy—using interregional CGE frameworks with detailed representations of government behavior at the federal and state levels—aligns with the findings obtained in the present study regarding the reform that benefits the FONCOMUN.

Conversely, studies such as Goulder and Summers (1987), Seldon and Boyd (1995), and Mardones (2012) demonstrate that fiscal policies or supply-side shocks—whether implemented across the entire economy or targeted at specific sectors—can produce heterogeneous effects among productive activities. Within the broader economic system, certain sectors tend to benefit while others are adversely affected, largely due to shifts in the utilization of shared production factors or the presence of adjustment costs. These findings are consistent with the results obtained from the simulations of the New Agrarian Law.

2. Literature Review and State of the Art

The literature on Computable General Equilibrium (CGE) models applied to tax reform analysis emphasizes the importance of incorporating informality, institutional heterogeneity, and measures of fiscal efficiency. Fiess, Fugazza, and Maloney (2010) demonstrate that by disaggregating current expenditures into wages and other types of spending according to the level of government, it is possible to approximate public administration service expenditures. In Latin American economies comparable to Peru, the effects of tax reforms are often influenced by the dynamics of informal employment, with outcomes depending on the type of macroeconomic shock and the degree of wage rigidity—thus functioning either as a shock absorber or an amplifier.

Complementarily, Busato, Chiarini, and Rey (2012) provide evidence that tax evasion and underground economic activities mitigate the contractionary effects of tax increases. This finding is particularly relevant for highly informal economies such as Peru, where models that fail to incorporate this duality may overestimate the adjustment costs of fiscal reforms.

In the Peruvian case, Alfaro and Rühling (2007) examine municipal fiscal effort in property tax collection and conclude that there is no generalized "fiscal laziness," but rather institutional differences linked to incentives and administrative capacity. This finding suggests that national CGE models should account for heterogeneity in revenue collection efficiency to avoid overestimating the government's capacity for fiscal generation. At the aggregate level, Vásquez Cordano and Balistreri (2010) implement a CGE model calibrated with national tax data, showing that energy and fuel taxes are highly distortionary compared to broad-based taxes. They propose the Marginal Cost of Public Funds (MCPF) as a key metric for assessing the efficiency of future tax reforms. Finally, Lahura and Castillo (2016), using a narrative approach and VAR models, estimate that exogenous tax increases in Peru reduce both GDP and relative tax revenues, revealing a trade-off between economic efficiency and fiscal sustainability. Although their analysis does not employ a CGE framework, their empirical estimates provide valuable inputs for the calibration and validation of such models.

Overall, the literature converges on the conclusion that a CGE model designed to analyze tax reforms in Peru should incorporate the interaction between formal and informal sectors, institutional heterogeneity in revenue collection, and the measurement of tax efficiency, while benchmarking its outcomes against macroeconomic evidence.

In the case of international studies, research conducted on the Australian economy is particularly noteworthy. In this regard, Dixon et al. (2005) develop a general equilibrium model to analyze the efficiency of fiscal revenue distribution between the central government (Commonwealth government) and the state governments.

The authors use simulations to examine the effects of shifting from a transfer system designed to standardize public service provision across states to one in which transfers are directly proportional to each state's population. The study finds that the resulting welfare gain is small—approximately 0.3% of total transfers in monetary terms—and remains robust when the model accounts for factors such as inter-state population mobility, commuting congestion (assumed to occur at each state's central area), and reductions in the unit costs of providing state-specific goods.

Groenewold et al. (2000, 2002) extend an interregional general equilibrium model by adopting a two-stage approach. In the first stage, a standard model is constructed in which the behavior of regional governments is treated as exogenous. In the second stage, government behavior is endogenized by incorporating the governments into a non-cooperative game framework, where they optimize their actions subject to constraints defined by the interregional CGE model. Using Australian data, simulations are conducted in which transfers to one of the six states are increased while those to the remaining states are reduced. This procedure is applied to each state, and the results indicate that such scenarios do not produce significant changes in welfare, per capita consumption, or wages.

Regarding the study of fiscal incentives on productive sectors, research such as Goulder and Summers (1987), using a CGE model that captures firms' investment decisions, shows that the effect of corporate income tax reductions—a form of income tax—can vary depending on the level of adjustment costs in each sector. Similarly, Seldon and Boyd (1995), employing a CGE model that includes land as an additional production factor, simulate reductions in capital gains taxation. They find that sectors more exposed to or benefiting from higher capital returns, such as forestry in the United States, are the primary beneficiaries, while other sectors, such as agriculture, may be adversely affected due to the displacement of land use.

On the other hand, studies such as Storm (1994) compare the efficiency of irrigation investment with policies that subsidize agricultural product prices, concluding that the former is more effective in promoting economic growth. Similarly, Mardones (2012) examines the effect of a negative supply shock on the fishing sector, finding that Chile's productive structure shifts toward the wood and pulp industries. In addition, Botero-García (2021) investigates the impact of a positive productivity shock on the agricultural sector and finds a corresponding positive effect on average GDP growth in Colombia over a ten-year period.

Regarding the methodology employed, Dynamic Computable General Equilibrium (DCGE) models have become one of the primary tools for evaluating the macroeconomic effects of tax reforms (Burfisher, 2021). Their strength lies in their ability to capture interactions among agents, sectors, and markets within a coherent equilibrium framework, incorporating both behavioral responses of economic agents and government budgetary constraints (Shoven & Whalley, 1984; Ballard et al., 1985).

Empirical evidence has shown that these models can be used to generate ex-ante projections of proposed tax policies. For example, Bhattarai et al. (2018) demonstrate their application in comparing and evaluating the effectiveness of proposed tax reforms during the U.S. presidential campaign, highlighting that such proposals often lack internal consistency. Similarly, studies such as Jung et al. (2017) apply a dynamic CGE model to examine the long-term effects of technological change on employment distribution and economic growth in the Korean economy. Their findings indicate that while technological progress can promote growth, it may also exacerbate socioeconomic disparities by favoring skilled labor over other types of work, underscoring the need for labor and education policies to mitigate labor market inequalities.

3. Design of the Dynamic General Equilibrium Model for the Peruvian Economy

The general equilibrium model consists of a set of resource endowments in the economy, producers or firms that determine the supply of one or more goods and the demand for production factors, and consumers who determine the demand for goods. Producers utilize labor, capital, and intermediate goods in the production process.

On the other hand, consumers hold endowments of goods and derive utility from the use of labor and capital, with their aggregate income allocated to the consumption of goods. The model assumes perfect competition, zero profits in productive sectors, and that each agent spends their entire income. These assumptions, along with additional specifications regarding production technologies and consumer preferences, ensure the existence of prices that clear all goods markets—i.e., where excess demand functions are zero (Arrow & Debreu, 1954). The subsequent sections provide a detailed exposition of each component constituting the model.

3.1 Domestic Production

he model incorporates 53 productive sectors (s=1,…,53) and 53 corresponding goods (Qc in one of the 53 categories of goods, c=1,…, 365), referred to as basic goods, produced by these sectors. Each sector employs 2 types of labor—dependent and independent—capital, and intermediate goods. Each productive sector produces basic goods ($Q_{c,s}$) using value added (VA_s) and intermediate consumption (CI_s), which are aggregated according to a Leontief production function.

Value added is composed of dependent labor (LD_s), independent labor (LI_s), mobile capital (K_s) and sector-specific capital (KE_s), which are combined via a Cobb-Douglas function. Intermediate consumption consists of domestic goods ($D_{c,s}$) and imported goods ($M_{c,s}$), aggregated using a Leontief function. Consequently, the model features two levels of aggregation corresponding to specific production technologies, as well as an upper level in which the gross value of production (E_s) is disaggregated across all goods produced by a given sector s . Formally, these relationships can be expressed as follows:

(1) $$E_s = \varphi_s\left(\{Q_{c,s}\}_c\right)$$

(2) $$E_s = f_s(VA_s, CI_s)$$

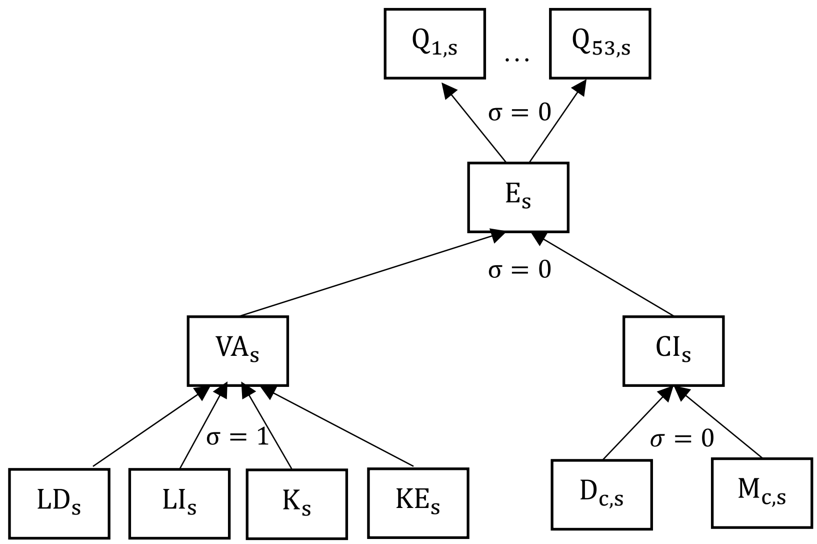
(3) $$VA_s = g_s(LD_s, LI_s, K_s, KE_s)$$

(4) $$CI_s = h_s\left(\{D_{c,s}, M_{c,s}\}_c\right).$$

φ_s, f_s y h_s represent Leontief functions, while g_s denotes a Cobb-Douglas function. In the intermediate consumption function CI_s, $D_{c,s}$ represents the use of domestic good c in the intermediate consumption of sector s, $M_{c,s}$ has a similar interpretation for imported goods of the same category.

Each productive sector maximizes its profit—the value of (valor de $\{Q_{c,s}\}_c$at net-of-tax prices minus the cost of production—taking as given the prices of produced goods and the factors employed in production. It is at this stage of the production process that taxes on output and production factors are applied. From this optimization process, the factor demand and supply functions for basic goods are derived. Figure 1 illustrates the productive structure of the basic goods.

Figure 1. Production of Basic Goods



Source: Own elaboration. Where σ indicates the value of the elasticity

To model the imposition of taxes on domestic products, marketing sectors for the basic goods are introduced. These sectors produce the domestic good D_c using the basic good $Q_c = \sum_s Q_{c,s}$, as well as transportation and marketing services. It is assumed that these services and the basic good are complementary in the production of the domestic good. It is at this stage of the production process that product taxes are applied, through ad valorem rates on the use of the basic good.

3.2 Private Consumption

To introduce dynamics and household behavior, the methodology of Paltsev (2004) and Rutherford (2002) is followed. A representative consumer is modeled who maximizes intertemporal utility over an infinite time horizon:

$$\max \sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^{t} U(c_t)$$

Where ρ represents the intertemporal preference parameter, and $\frac{1}{1+\rho}$ denotes the period discount factor t. Each c_t corresponds to a composite of final consumption goods (such as food, personal services, fuels, etc.) aggregated via a Cobb-Douglas function, these composites in turn consist of domestic and foreign goods that exhibit a certain degree of substitutability (this approach to modeling consumption is commonly referred to as the Armington assumption; Armington, 1969). The representative agent chooses the consumption path $\{c_t\}_t$ that maximizes utility subject to an intertemporal wealth constraint:

$$A_0 + \sum_{t=0}^{\infty}\left(w_t^{ld} LD_t + w_t^{li} LI_t\right) = \sum_{t=0}^{\infty} p_t c_t$$

Where each price is measured in present value (at time $t = 0$ o 2023), and A_0 represents the initial value of the assets held by households; these may include endowments of goods and also incorporate the initial value of the capital stock K_0.

3.5 Balanced Growth

For the purpose of model calibration, it is assumed that the economy follows a balanced growth path starting in 2023 (Paltsev, 2004; Rutherford, 2002). This implies that the model's variables (consumption, investment, capital, etc.) grow at constant rates. A growth rate g of 1% is assumed, approximately equal to the average population growth rate, and all monetary quantities are discounted to present value using an interest rate r of 6%, which is close to the average reference rate of the Central Reserve Bank of Peru (BCRP) in 2023.

3.6 Capital Accumulation

The capital accumulation equation is given as follows:

$$K_{t+1} = K_t(1 - \delta) + I_t$$

where K_t is the capital stock at time t, I_t is investment at time t y δ is the depreciation rate. The model includes two prices associated with capital: the purchase price of new capital p_t^k and the rental price of capital r_t (It is assumed that sector-specific capital constitutes a fixed proportion of total capital, and its rental price is equal to that of mobile capital). Consequently, total returns—which can be obtained from input-output matrices—are given by $V_t = r_t K_t$.

The conditions of perfect competition and the first-order (Euler) condition yield the following relationship (Rutherford, 2002):

$$r_t^k = (\delta + r)p_t$$

This equation states that the cost of renting capital must equal the cost of maintaining it, which includes both the financial cost of investing in the capital (r) and the physical depreciation (δ) over time. Accordingly, the initial investment value consistent with the balanced growth path is given by:

$$I_0 = \frac{(\delta + g)}{(\delta + r)} V_0$$

In this context, the depreciation rate δ is calibrated to ensure consistency with the value of V_0 obtained from the national accounts.

3.5 Foreign Trade

In this model, the foreign sector is not represented as an additional agent; instead, foreign trade is modeled directly. To this end, the model includes a good, FX, representing U.S. dollars in the economy, along with trade sectors: an export sector for each basic good Q_c, which converts it into FX while also using marketing services; and an import sector for each category of good c, which converts FX into M_c, the imported good c, using marketing and land transportation services. Essentially, the model represents one use of the FX good: the "production" of imported goods. It is assumed that the use of trade services, transportation, and the basic good in an export sector (or FX in an import sector) is complementary in the production process.

3.6 Government

The government is incorporated into the model as an additional economic agent for the purpose of analyzing public policy. All tax revenues and other contributions, net of subsidies and social transfers, constitute the government's net fiscal income. Additionally, the government receives income from its endowments of production factors, specifically capital. On the expenditure side, the government consumes domestically produced goods $D_{c,g}$ and invests in construction (IC_g) and machinery (IM_g), which together constitute total public investment (I_g). The government's behavioral rule is analogous to that of the representative consumer: it uses its income to finance both current expenditures—on public consumption—and public investment.

The manner in which taxes are introduced is described as follows. Various types of taxes and subsidies are modeled through the application of ad valorem rates to the production of a good or the use of a factor. In addition, there are taxes applied to consumers' labor income (for further details, see Table 1).

For the purposes of this study, the government is divided into two agents: the central government, which includes regional governments, and local governments, grouped as a single agent referred to as the local government. For further details regarding taxes and the allocation of revenue by type of tax, see Table 1. The main distinction between these two agents lies in the taxes they collect and the level of expenditure they undertake on domestic goods and public investment.

Although public investment is explicitly modeled, it is assumed to be complementary to private investment; therefore, only total investment and its components—machinery and construction—are reported. Notably, expenditures on public goods and services (excluding public administration services), as well as on investment or capital expenditures, are estimated separately for the central and local governments, directly influencing the demand rules for each type of spending by the respective government agent. Furthermore, a fiscal rule is implemented that limits the public deficit to less than 2.5% of GDP, adjusting the variable representing expenditures on public goods and services (excluding public administration services) as needed; in the base period, the deficit stands at approximately 1.1%.

Table 1: Description of Modeled Taxes, Contributions, and Subsidies

Tax classification	Description	Recipient
Income Tax (IR)	Applied to the returns from all factors of production—such as capital, land, and entrepreneurship—except dependent labor, as well as to labor income (wages and salaries).	Central Government
Value Added Tax (VAT)	Applied to sale of goods, provision of services, construction activities & importation of goods	Central Government
Selective Consumption Tax (ISC)	Applied to the production, sale, or importation of specific goods that are considered non-essential, luxury, or harmful	Central Government
Import Duties	Applied to imports	Central Government
Social Contributions	Applied to dependent labor	Central Government
Transfers	Payments or benefits provided by the government directly to individuals or families	Central Government

Subsidies	Applied to FOB value of exported goods. It includes tariff refunds (Drawback), which reimburse exporters for duties or taxes paid on inputs used in the production of goods destined for export.	Central Government
Municipal Promotion Tax	It represents 2/18 of the VAT collection and is allocated to the FONCOMUN to support local governments in financing municipal projects and public services.	Local Government

Source: Prepared by the authors using data from INEI (National Institute of Statistics and Informatics), SUNAT (National Superintendency of Tax Administration), and BCRP (Central Reserve Bank of Peru).

4. Social Accounting Matrix and Calibration of the Computable General Equilibrium Model

The behavioral rules specified in the previous section are determined by parameters such as the elasticity of substitution ρ and the elasticity of transformation τ, as well as by the weights of the functional components. Elasticities are typically estimated econometrically, whereas the remaining parameters are calibrated using national accounts data for a given reference period—in this case, the year 2023**.**

For model calibration, it is common practice to organize the data schematically within a Social Accounting Matrix (SAM), also referred to as a micro-consistent data matrix**.** This section presents an aggregated version of the SAM and outlines the model calibration procedure**.**

The aggregated Social Accounting Matrix (SAM) is presented in Table 2. Each variable listed in the first column corresponds to those described in the previous section (except for PUH, PUGC, and PUGL, which represent utility-related variables), but with the prefix P added and without subscripts, reflecting the aggregated structure. In the SAM, each positive entry denotes an inflow to the economy, whereas each negative entry represents an outflow. Accordingly, the first column, which corresponds to the 53 productive sectors, records expenditures on the goods PCI and PVA, representing outflows or purchases made in the production of *PBC*. Revenues from the sale of *PBC* are received by the *SBC* sector, appearing as inflows in the matrix. The SBC column sums to zero, reflecting the equilibrium condition under which the profits of productive sectors are null.

The SVA sector employs the production factors PLD, PLI, PK, and PKE (the latter is consolidated into PK in the SAM for simplicity) to generate value added. From the use of these factors, the sector pays taxes, social security contributions, and income tax in the case of PLD, and income tax only in the case of PLI and PK. As can be observed, the SVA column sums to zero, which is consistent with the accounting equilibrium condition. A similar interpretation applies to the remaining sectors included in the model.

With respect to households, each positive entry in the H column corresponds to the sale of their factor endowments, while negative entries represent expenditures on consumption utility goods (PUH), debt payments, and savings.

In the case of the government sectors, revenues arise from net tax collection after subsidies and transfers, whereas expenditures are directed toward consumption utility goods (PUGC & PUGL).

Each positive entry in the PDC row represents a positive flow of this good to the market, whereas each negative entry denotes an outflow or demand for the same good. Given the market equilibrium condition, the sum of this row must therefore be zero, a property that applies to all rows in the matrix.

In the case of PFX, there existed an imbalance prior to calibration. A positive flow of this good in the H column indicates that the consumer holds a positive endowment of the good, whereas a negative flow signifies that the consumer holds a debt position in that good.

The exception is explained by imbalances in the balance of payments, a phenomenon that is empirically observable. In such cases, the available options are known as macroeconomic closure rules. In practice, most computable general equilibrium (CGE) models for developing countries assume a fixed balance of payments deficit. This assumption is grounded in two main considerations: first, access to foreign credit is generally limited; and second, allowing the deficit to vary complicates the interpretation of welfare changes, since these variations could reflect additional borrowing rather than genuine economic gains, and the model does not account for the repayment of such debt. Consequently, the model assumes that the balance of payments deficit is fixed at zero. To achieve this, it is postulated that households and the government hold specific endowments of PFX, chosen such that equilibrium is attained in the PFX market. Under this assumption, the results of a counterfactual simulation can be interpreted as the economic effects of a policy given a fixed level of foreign borrowing.

The model calibration is performed as part of the numerical solution routine of the computable general equilibrium model using the MPSGE framework embedded within the GAMS modeling system. The main data source used for calibration is the disaggregated Social Accounting Matrix (SAM) covering all production sectors. The model comprises a total of 12,069 variables, classified into price indices, activity levels, and income levels.

This categorization of model variables follows the formulation introduced by L. Mathiesen (1985), who demonstrated the effectiveness of computing equilibrium numerically by formulating the problem as one of mixed complementarity. This approach is adopted in the present study to obtain the numerical solution of the CGE model. In this formulation, activity levels are complementary to profits, and price levels are complementary to excess supply functions; similarly, income levels are constrained to equal consumers' total expenditures.

The functional calibration of the CES nests relies on observed base-year quantities and prices derived from the Social Accounting Matrix (SAM). In order to determine the specific form of a Constant Elasticity of Substitution (CES) function, it is sufficient to use the information corresponding to a single observation of the production process—namely, the quantities of inputs and outputs, the associated prices, and the elasticity of substitution. Assuming unit prices (which can vary according to the relevant tax or subsidy rates) and given plausible elasticity parameters—which can be easily modified within the MPSGE modeling framework—all required calibration data are obtained directly from the SAM, ensuring consistency between the functional representation and the empirical structure of the base-year economy.

Table 2. Peru 2023: Social Accounting Matrix (millions of soles)

	SBC	SDC	SE	SM	SVA	SCI	SUH	SUGC	SUGL	H	GC	GL	I	SUM
PBC	1,673,942	-1,436,190	-266,044							28292				0
PDC		1,496,247	-6,687	-45,651		-592,265	-553,589	-119,203	-16,363				-162,488	0
PFC				297,893		-158,027	-83,718			-8208			-49,334	0
PVA	-916,653				916,653									0
PCI	-750,292					750,292								0
PLD					-242,339					242,339				0
PLI					-205,332					205,332				0
PK					-396,889					396,889				0
PFX			271,203	-236,368						-25,847	-17979	8991		0
PUH							637,307			-637,307				0
PUGC								119,203			-119,203			0
PUGL									16,363			-16,363		0
SAV										-211,822			211,822	0
TAXES	-6,997	-60,057	1,528	-15,874	-72,093					10,332	137182	7,372		0
SUM	0	0	0	0	0	0	0	0	0	0	0	0	0	

Agents: The modeled agents include **households (H)**, the **Central Government (GC)**, and **Local Governments (GL)**.
Sectors: The first row identifies the model's sectors, including the productive sectors of basic goods (SBC) and domestic goods (SDC), as well as additional artificial sectors created to represent foreign trade (SE and SM), value-added formation (SVA), intermediate consumption (SCI), investment (I), and the utility of final consumption for households, the Central Government, and Local Governments (SUH, SUGC, and SUGL, respectively).
Goods: The first column lists the goods and accounts included in the model, as well as taxes (TAXES) and savings (SAV). Goods produced by the SBC sectors are the basic goods (PBC); imported goods are PFC; domestic goods, composed of PBC, transaction margins (trade and transport), and taxes, are denoted PDC; PCI represents intermediate consumption goods; PVA corresponds to value added; PLD and PLI are formal and independent labor, respectively; PK represents capital; PUH, PUGC, and PUGL correspond to the utility levels of households, the Central Government, and Local Governments, respectively; PFX represents the foreign currency good; and the remaining goods correspond to welfare and tax accounts.
Source: Authors' elaboration using data from National Institute of **Statistics (INEI), Ministry of Finance (MEF),** National Superintendency of Tax Administration (SUNAT) & Central Reserve Bank of Peru (BCRP).

5. Counterfactual Simulation

The study conducts simulations of two counterfactual scenarios to address the central hypothesis: associated to measuring the effects of two policies designed to promote local and national growth while imposing a significant fiscal cost on the country. These involve two structural tax reforms on the most important sources of public revenue: The value added tax (VAT) and Income Tax (IR). The first measure, FONCOMUN, prioritizes the redistribution of resources and the fiscal strengthening of local governments, while the second, the New Agrarian Law, aims to consolidate the development of strategic sectors related to productivity and competitiveness. Both measures are particularly relevant in the current Peruvian context (2025), where the country faces a complex political environment and a persistent breach of the fiscal deficit limit. Below, **we describe** each counterfactual scenario in detail**.**

Counterfactual 1: Law No. 32387 ("FONCOMUN Law")

The Value Added Tax (**VAT)** has traditionally been composed of a 16% base tax allocated to the Central and Regional Governments and 2% as the Municipal Promotion Tax (IPM) allocated to Local Governments. The enactment of Law No. 32387 modified this distribution without changing the overall tax burden, gradually increasing the IPM rate to 4% by 2029 while reducing the base tax to 14%. This measure aims to promote decentralization and boost local public investment thereby generating a positive impact on local growth.

Counterfactual 2: Law No. 32434 ("New Agrarian Law")

The New Agrarian Law modifies the tax regime established by Law No. 31110, which provides incentives for the agricultural, irrigation, agro-export, and agro-industrial sectors. The law primarily applies to individuals or legal entities that directly or indirectly (through third parties) engage in crop cultivation, livestock farming, or agro-industrial activities, as well as small agricultural producers and their associations. This group of actors is collectively referred to as Agrarian Enterprises.

The tax benefits introduced by the New Agrarian Law, which are considered in the simulation of the corresponding counterfactual, are as follows:

1. **Preferential Income Tax Rate:** The Income Tax rate is reduced by half for the fiscal years 2025 to 2030.
2. **Special Regimen for Value Added Tax (VAT) Early Recovery: The** Special Regime is permanently established for agrarian enterprises. This allows for the refund of VAT paid on intermediate goods used in activities subject to VAT and/or destined for export.

Simulation Strategy

The simulation covers 20 periods starting from the base year 2023. Following Lau et al. (2002), appropriate terminal conditions are imposed to approximate the behavior of the model under an infinite time horizon. The subsequent sections detail the implementation of each counterfactual scenario.

Counterfactual 1: In the first counterfactual, the share of VAT revenue allocated to the Municipal Promotion Tax (IPM) is gradually increased. Beginning in the year following the base calibration year, the rate rises from 2% to 2.5%, then to 3% the following year, and continues incrementally until reaching 4%. Additionally, it is assumed that any excess revenue collected is directed toward subsidies for public investment.

Counterfactual 2: In the second counterfactual, the Income Tax (IR) paid by agrarian enterprises is reduced by 50% for 10 periods from the base year, and subsidies are introduced for the intermediate consumption of agrarian enterprises, equivalent to the VAT rates calculated using national accounts data. This implies that each good—whether domestically produced or imported—used as intermediate input by these enterprises receives a specific subsidy. These subsidies are maintained throughout the 20 simulated periods.

5.1 RESULTS

The simulation results allow for a comparison of the differential effects of the analyzed tax reforms on productive structure, expenditure, revenue, and investment dynamics (see Tables 4–7 for further details). At the aggregate level, Counterfactual 1 (Law No. 32387) exhibits relatively limited and heterogeneous impacts across sectors, whereas Counterfactual 2 (New Agrarian Law) demonstrates more concentrated and positive effects on activities directly related to agriculture and its value chain.

In the first scenario, the changes introduced in the composition of the VAT—with a greater share allocated to the Municipal Promotion Tax (IPM) and a corresponding reduction in the VAT base—do not alter the overall tax burden, but they redistribute fiscal resources toward local governments. This results in a modest decline in value added across most productive sectors, partially offset only by the Other Services sector, and is accompanied by a contraction in exports. The sectors most sensitive to this tax reallocation are Agriculture (-1.2%), Construction (-2.4%), and Public Administration Services (-1.4%), all of which exhibit significant losses. In contrast, the Other Services sector experiences an increase of approximately 0.7% during the first period of the reform, rising to 1% nine years later.

In terms of real expenditure, all variables decline by up to 2.3% in the case of construction investment, with the exception of public spending, which increases by 4%. Overall, these effects result in minimal variations in real GDP after both one and ten years. This outcome can be explained by the fact that local governments allocate expenditure more intensively toward goods and services (see Table 3).

Table 3: Distribution of Current Expenditure by Type of Government

	Central Government	**Local Government**
Current Expenditure Net of Transfers	119,203	16,363
Public Administration Services[1]	60%	23%
Good and Services	40%	77%

Source: Own elaboration using data from INEI, BCRP, and Ministry of Finance (MEF). [1] Expenditures on public administration services are estimated using spending on remuneration. All amounts are reported in Peruvian Sol (PEN)

These relationships in current expenditure across government types imply that the redistribution of VAT revenues would favor service sectors that dominate spending on goods and services. Additionally, this would indirectly affect the goods used as intermediate inputs in the Public Administration Services sector. On the other hand, in terms of tax revenue, most tax categories exhibit very little variation. As expected, the Municipal Promotion Tax (IPM) rises by 25% one year after the reform and by nearly 100% after ten years, resulting in an accumulated increase of approximately 82% over the ten-year period. This indicates that variations in production and expenditure do not generate significant changes in overall revenue.

The second scenario reveals a different pattern. The New Agrarian Law, by introducing a preferential Income Tax rate and an accelerated VAT refund, generates a visible expansionary effect on agricultural-related activities. In particular, an increase in value added is observed. Notable gains occur in the Agricultural, Forestry, Agro-industrial, and Other Services sectors, confirming that the tax incentives translate into improved performance of agrarian firms and their linkages throughout the value chain. The Agro-industrial sector exhibits extraordinary growth in exports. However, this expansion moderates its overall impact due to contractions in activities less connected to agriculture, such as mining and other industrial sectors including food processing and manufacturing, reflecting a reallocation of resources in favor of the beneficiary sectors.

In terms of real expenditure, the tax measures introduced in the second counterfactual scenario stimulate all spending components within a range of 0.5% to 1%, with the exception of public expenditure. This outcome can be attributed to a cumulative 0.4% decline in total tax revenue over the ten-year implementation period of the reform. The contraction in revenue is primarily driven by cumulative decreases of 0.6% in corporate income tax (CIT) receipts and 0.23% in value-added tax (VAT) collections.

In terms of investment, the differences across scenarios are even more pronounced. Under Law No. 32387 (Counterfactual 1), total investment declines by 1.3% one year after the implementation of the reform, a situation that reverses after nine years, with a significant increase of 1.5%. This initial contraction is primarily attributable to the decline in construction investment and the value added of the construction sector. It is worth noting that the investment subsidy incorporated into the simulations—financed exclusively through the additional funds received from the IPM—appears to mitigate the contractionary effects of the reform. In particular, the results indicate that, after ten years, although investment in construction and machinery falls initially, aggregate investment rises as a consequence of the subsidy.

In contrast, the New Agrarian Law (Counterfactual 2) exhibits sustained growth in investment, attributable to the improved performance in value added of the Construction sector.

Overall, the results indicate that the two scenarios have distinct implications for macroeconomic equilibrium. While Law No. 32387 strengthens fiscal decentralization and the spending capacity of local governments, its productive effects are limited and, in some cases, negative for key sectors such as Construction and Public Administration. In turn, the New Agrarian Law generates a direct and targeted stimulus for agricultural and agro-industrial firms, with notable improvements in exports, albeit at the expense of performance in non-prioritized sectors. Therefore, the selection of strategic sectors to promote growth and productive linkages should be guided by a central strategy focused on productive development in order to maximize its effects.

The use of a Dynamic Computable General Equilibrium (DCGE) model, calibrated with detailed data from Peruvian industries and incorporating various taxes, represents an initial effort toward a systematic and microdata-intensive analysis. This approach enables the evaluation of far-reaching fiscal policies by explicitly capturing the interactions among productive sectors and the economy's adjustment mechanisms. In this way, it contributes to the design of more efficient tax reforms and to the identification of their direct and indirect effects

Table 4: Simulation Results for Counterfactual 1: Production and Real Expenditure (percentage deviations from the balanced growth path)

1. Production	Period	
	After 1 year	After 10 years
Total Value Added	-0.04	0.21
Agriculture	-1.21	-0.83
Forestry	-1.09	-1.01
Fishing	-0.12	0.19
Oil extraction	-0.03	0.30
Mining	-0.10	0.21
Agro-industry	-0.18	0.15
Other food industries	-0.30	-0.03
Construction	-2.37	-2.90
Public Administration	-1.38	-1.09
Other services	0.68	1.00
3. Real Expenditure (2023 price)	After 1 year	After 10 years
GDP	0.14	0.94
Consumption	-0.20	0.10

Investment	-1.27	1.46
Machinery investment	-1.76	-0.51
Construction Investment	-2.34	-2.84
Government spending	3.97	4.28
Exports (FOB)	-0.42	-0.05
Imports (CIF)	-0.48	-0.06
3. Consumption by Sector	Period	
	After 1 year	After 10 years
Food	-0.09	0.21
Colthing	-0.08	0.22
Fuel	0.01	0.34
Basic Services	-0.08	0.26
Transport	-0.09	0.21
Manufactured goods	-0.08	0.22
Personal Services	-0.42	-0.11
Rent	-0.11	0.19
4. Exportations by Sector	Period	
	1 año	10 años
Agriculture	-4.75	-4.27
Fishing	-0.13	0.17
Oil	0.33	0.76
Mining	-0.03	0.29
Agro-industry	-0.55	-0.23
Other food industries	0.34	0.63
Textiles and clothing	-0.52	-0.07
Chemical products	-0.04	0.22
REfined mining	0.03	0.40
Other manufacturing	0.40	0.54

Services	0.28	1.13

Source: Own elaboration

Table 5: Simulation Results for Counterfactual 1 – Tax Revenue (percentage deviations from the balanced growth path)

	Period		Cumulative
Type of Tax	After 1 year	After 10 years	
Total revenue	0.10	0.05	0.06
Subsides	-0.71	-0.60	-0.64
Tariffs	-0.21	-0.12	-0.14
Production taxes	-0.04	-0.06	-0.06
VAT	-0.03	-0.07	-0.07
VAT on domestic products	0.04	-0.06	-0.04
VAT on imports	-0.31	-0.14	-0.19
Selective Consumption Tax (ISC)	-0.19	-0.14	-0.15
ISC on domestic products	-0.08	-0.09	-0.09
ISC on imports	-0.45	-0.25	-0.31
Income Tax (IR)	0.08	0.02	0.03
IR on corporations	0.04	-0.01	0.00
IR on individuals	0.21	0.11	0.13
Social security contributions	0.56	0.48	0.50
Municipal Promotion Tax (IPM)	24.96	99.85	81.72

Source: Own elaboration

Table 6: Simulation Results for Counterfactual 2: Production and Real Expenditure (Deviations % from the Balanced Growth Path)

1. Production	Period	
	After 1 year	After 10 years
Total Value Added	0.54	0.77
Agropecuario	4.77	4.99
Forestry	0.47	0.74
Fishing	-0.09	0.13
Oil	-0.17	0.06
Mining	-0.20	0.03
Agro-industry	10.62	10.87
Other industries	-0.62	-0.39
Construction	0.55	0.82
Public Administration	-0.30	-0.07
Other services	0.28	0.51
2. Real Expenditure (2023 price)	Period	
	After 1 year	After 10 years
GDP	0.52	0.75
Consumption	0.74	0.97
Investment	0.52	0.78
Machinery Investment	0.52	0.78
Construction Investment	0.52	0.78
Government spending	-0.38	-0.15
Exports (FOB)	0.50	0.70
Imports (CIF)	0.58	0.81
3. Consumo por sector	Period	
	After 1 year	After 10 years

Food	0.84	1.07
Clothing	0.85	1.08
Fuel	0.89	1.13
Basic Services	0.34	0.56
Transport	0.84	1.07
Manufactured goods	0.81	1.04
Personal services	0.70	0.93
Rent	0.18	0.40
4. Exports by sector	Period	
	After 1 year	After 10 years
Agriculture	9.32	9.52
Fishing	-1.26	-1.05
Oil	-0.64	-0.41
Mining	-0.21	0.00
Agro-industry	47.32	47.57
Other food industries	-11.53	-11.39
Textile and clothing	-6.63	-6.48
Chemical products	-2.49	-2.41
Refined minerals	-0.13	0.10
Other manufacturing	-8.07	-7.92
Services	-15.08	-14.94

Source: Own elaboration

Table 7: Simulation Results of Counterfactual 1: Revenue (percentage deviations from the balanced growth path)

	Period		Cumulative
Type of Tax	After 1 year	After 10 years	
Total Revenue	-0.49	-0.48	-0.42
Subsidies	2.24	2.22	2.07

Tariffs	-0.64	-0.64	-0.62
Production Taxes	-0.69	-0.68	-0.66
VAT	-0.23	-0.22	-0.23
VAT on domestic products	-0.22	-0.22	-0.22
VAT on imports	-0.24	-0.23	-0.24
Selective Consumption Tax (ISC)	-0.56	-0.56	-0.54
ISC on domestic products	-0.48	-0.48	-0.46
ISC on imports	-0.75	-0.74	-0.72
Income Tax (IR)	-0.76	-0.75	-0.55
IR on corporations	-1.08	-1.07	-0.80
IR on individuals	0.31	0.31	0.27
Social security contributions	-0.34	-0.33	-0.36
Municipal Promotion Tax **(IPM)**	-1.95	-1.94	-1.94

Source: Own elaboration

6. **Conclusions and Final Considerations**

The Dynamic Computable General Equilibrium (DCGE) model proves to be a robust tool for examining the effects of broad tax reforms, as it leverages national accounts data in a comprehensive manner. Its holistic nature allows for a more accurate representation of the structure of the Peruvian economy and enables the analysis of how fiscal changes impact production, exports, spending, and revenue collection.

The results show clear contrasts between the analyzed scenarios. In Counterfactual 1 (Law No. 32387), despite its primarily redistributive nature, it generates significant productive effects on key sectors for growth, such as Construction and Public Administration. This indicates that the reform, by favoring local governments through increased transfers to the FONCOMUN, introduces a pattern of public spending with mostly small contractionary effects on the majority of spending and production variables, but with a negligible aggregate effect. These results, with some exceptions, are consistent with those obtained in sophisticated studies on the distribution of revenue among government levels, such as those conducted for the Australian economy (Dixon et al., 2005; Groenewold et al., 2002).

Conversely, Counterfactual 2 (the New Agrarian Law) highlights that the tax incentives directed toward the agricultural sector generate notable productive synergies. Both the agricultural and agro-industrial sectors experience increases in value added and exports, with observable effects on related activities such as Forestry and, to a lesser extent, sectors like Construction. This expansion is accompanied by a rise in investment, while non-prioritized sectors experience setbacks, reflecting a reallocation of resources toward the activities benefiting from the policy. Consequently, competition for shared resources favors the agrarian sectors and those closely linked to them. The present study, along with the analyses by Seldon and Boyd (1995) and Mardones (2012), underscores the value of the CGE approach in capturing such redistributive effects.

Finally, it is important to note that the model does not account for differences in the efficiency of public and private investment, nor the quality of subsidies financed through the IPM. This limitation may lead to an underestimation of the contractionary effects of the investment decline observed in Counterfactual 1. Future extensions could incorporate an interregional framework as well as the explicit inclusion of international trade and capital flows, allowing for a more comprehensive capture of the sectoral and dynamic implications of tax reforms on the Peruvian economy.

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