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The Economy in its Labyrinth: A Structuralist View of the Mexican Economy in the 21st Century

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The Economy in its Labyrinth: A Structuralist View of the Mexican Economy in the 21st Century[1].

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Abstract:

In this paper, I analyze the performance of the Mexican economy during the two decades of the 21st century. I focus on the aggregate and sectoral dynamics of the economy to understand the underlying dynamics behind the aggregate performance of the economy. With these results in mind, I analyze the changes and continuities in the conduction of macroeconomic and labor market policy with the arrival of a new administration in 2018. The goal of analyzing both elements is to provide an integrated view of the situation in which the Mexican economy will face three structural challenges: the medium and long-run effects of the COVID-19 pandemic, the integration of artificial intelligence into the production process, and climate change.

Keywords: Mexico, Shift-share analysis, COVID-19, automation

JEL codes: O11, O15, O17, 054

[1] I deeply appreciate the comments made by Carlos Ibarra and Raymundo Campos-Vázquez to a previous version of this paper. All errors reman my own.

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1. Introduction

After the tumultuous end of the 20th century, the beginning of the 21st century seemed to bring a more stable and prosperous time for the Mexican economy. After a fifth of the century, inflation has fallen and remained relatively stable compared to the nineties. However, economic growth remains slow, so by the end of 2022, GDP per capita remained below its 2018 level (see Table 1). During the same period (2000-2022), poverty and extreme poverty decreased, albeit both remained at high levels compared to the Latin American average (see Figure 1a.).

Table 1: Economic growth and inflation in the 21st century

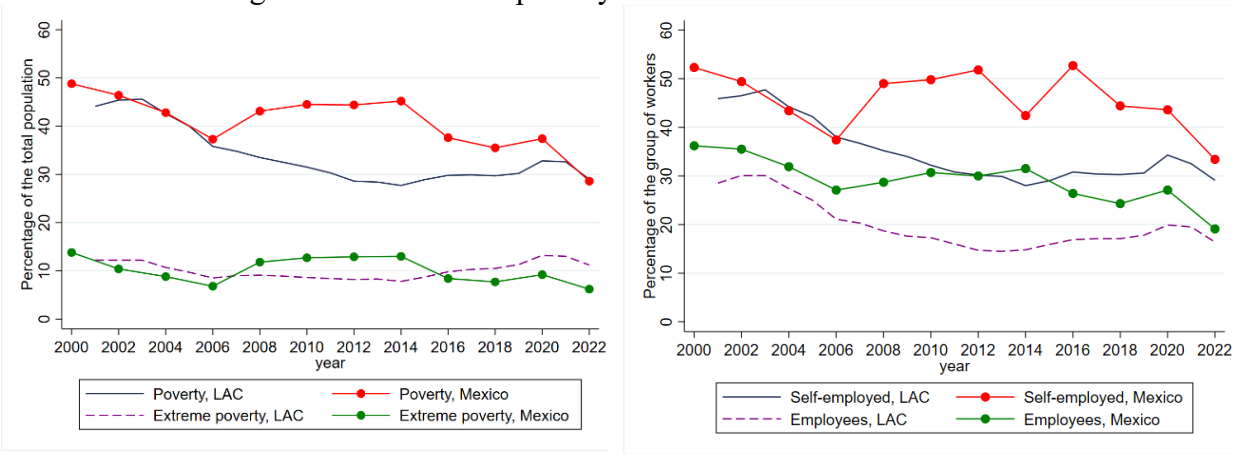
Period	Average annual inflation rate	Average annual growth rate of the GDP per capita	Average value of GDP per capita (1990=100)
1990-2022	9.48	1.14	117.43
1990-1999	20.41	1.47	105.74
2000-2009	5.21	-0.27	117.50
2010-2017	3.89	0.89	125.42
Year	Annual inflation rate	GDP per capita growth rate	Value of GDP per capita (1990=100)
2018	4.90	1.23	133.25
2019	3.64	-1.05	131.84
2020	3.40	-8.65	120.43
2021	5.69	4.14	125.42
2022	7.90	2.42	128.45

Notes: Data from the World Development Indicators of the World Bank. The inflation rate is calculated using the national consumer price index. GDP per capita growth is calculated using the GDP per capita series in constant Mexican pesos.

The labor market is the link between the meager economic growth and the high incidence of poverty. As Figure 1b shows, up until 2020, 50% of the self-employed population had a household per capita income below the poverty line. In contrast, a third of the subordinate workers were in a

similar situation. In both cases, these figures are above the Latin American average. It was not until 2022 that the Mexican share of the workers in poverty converged to this average. This is in line with previous research by Campos-Vázquez and Monroy-Gómez-Franco (2016a, 2016b), who find that an increase in economic growth is associated with a less than proportional decrease in poverty and that a contraction of the economy is associated with a more than proportional increase in the poverty rate in Mexico.

Figure 1: Evolution of poverty in Mexico and Latin America



1a) Headcount of poverty and extreme poverty in Latin America and Mexico.

1b) Percentage of self-employed and subordinate employees that are in poverty

Note: The poverty headcount is the share of the total population with a household income per capita below the poverty line calculated by ECLAC for the country, whereas the extreme poverty headcount is the share of the total population with a household income per capita below the extreme poverty line calculated by ECLAC for the country. The percentage of self-employed in poverty refers to the share of self-employed workers with a household income per capita below the poverty line, while the share of employees in poverty refers to the share of subordinate workers with a household income below the poverty line.
Source: CEPALSTAT.

The abovementioned evidence strongly suggests that a structuralist perspective is a correct lens through which the prospects of the Mexican economy should be analyzed. In other words, it is an analysis that brings to the forefront the sectoral dynamics and the institutional changes that have occurred in the labor market and the conduction of the macroeconomic policy. This type of analysis becomes more relevant in a scenario where the Mexican economy is due to experience three

significant challenges in the near future: the long-run outcomes of the pandemic, climate change, and automation.

The essay proceeds as follows: In the next section, I present an analysis of the sectoral dynamics of the Mexican economy, focusing on the changes in key parameters such as the capital-output ratios, the profit rates, average labor productivity, and the evolution of relative prices between the tradable and the non-tradable sector. With these results in mind, in the next section, I describe the institutional changes in the labor market, where most of the population obtains their income. Both types of results serve to analyze the possible responses of the Mexican economic structure to the challenges that lie ahead in the immediate and not-so-immediate future. This is done in the second to last section of the essay. Finally, I provide some comments concerning the policy alternatives.

2. Sectoral dynamics:

A key element to understanding the performance of the Mexican economy is the behavior of the tradable and non-tradable productive sectors. The importance of the tradable goods sector is crucial, as trade openness, measured as the ratio of total exports and imports to total GDP, went from 52% in 2000 to 89% in 2022. During the first decade of the 21st century, productivity growth in the tradable sector was faster than in the non-tradable sector of the economy, such that labor relocations outside of that sector harm total productivity (Padilla-Perez and Villarreal, 2017; Ibarra, 2018b; Ibarra and Ros, 2018). However, as Table 2 shows, this pattern reversed during the second decade of the century, as productivity growth in the tradable sector slowed down while productivity growth in the non-tradable sector grew faster. Table 2 shows the behavior of both sectors throughout the 21st century in terms of capital accumulation, productivity, and capital-output ratio.

Table 2: Sectoral dynamics of the Mexican economy in the 21st century

Period	Average annual growth of gross value added			Average annual rate of capital accumulation			Average annual growth of the output per worker			Average value of the output capital ratio		
	Total	T	NT	Total	T	NT	Total	T	NT	Total	T	NT
2000-2021	1.49	1.26	1.64	2.38	1.99	3.06	0.79	1.11	0.65	0.65	0.36	1.15
2000-2010	1.10	0.27	1.59	3.06	2.70	3.66	0.63	1.65	0.18	0.59	0.33	1.06
2010-2018	3.12	2.96	3.12	2.63	2.18	3.36	1.56	0.71	1.91	0.55	0.30	0.97
2018-2021	-1.59	0.04	-2.11	-0.56	-0.93	0.28	-0.59	0.37	-1.13	0.55	0.32	0.91

Notes: Total corresponds to the total private sector of the economy, T corresponds to the tradable, and NT to the non-tradable sector. The tradable sector comprises agriculture, forestry, fishing, quarrying, mining, and manufacturing. The non-tradable sector comprises construction and services. I exclude sectors in which the State's participation is substantial: oil and gas extraction (211-213-486), oil and coal products (324), electricity, water and gas supply (222), education and health services (611-62), and legislative and government activities (93 and 521). The real state services subsector (531) is excluded as it is dominated by residential investment. Numbers correspond to the NAICS code corresponding to each sector. The profit rate is calculated as the ratio of the gross operating surplus to the net capital stock in nominal terms. As prices of the capital stock, I employed the implicit deflator of gross fixed capital formation. All variables in 2018 prices.
Source: Author's calculation based on the KLEMS database, base year 2018, INEGI

In consonance with the findings of previous literature, the evidence shows that the tradable sector is more intensive in its use of capital goods than the non-tradable sector, as indicated by the smaller output capital ratio in the tradable than in the non-tradable sector. Notably, however, both the tradable and the non-tradable sectors experienced a decline in this variable, being more pronounced in the case of the non-tradable sector than in the former. As Ibarra (2018b) explains, this is the product of increased capital intensity in the production process and the lack of growth in labor productivity. This tendency seems to persist throughout the period after 2018. In the case of the tradable sector, there is a slight increase in the average output capital ratio during this latter period. A possible explanation behind this pattern is that net accumulation was negative, suggesting

that the depreciated capital was not replaced, but it was maintained in use during the recovery after the 2020 economy-wide shutdown linked to the COVID-19 pandemic. More research is needed to identify the source of this behavior.

The higher accumulation rate in the non-tradable sector during the first decade of the 21st century can be explained, at least partially, by a fall in the relative price of tradable goods concerning that of non-tradable goods (figure 2a). However, this pattern reversed in the second decade of the century, leading to an increase in the relative profitability of the tradable goods sector compared to the non-tradable one. As Ibarra and Ros (2018) Ibarra (2018a) and (2019) show, changes in the relative profitability of the tradable sector are closely linked to the real exchange rate behavior, which increased during this period due to the peso's depreciation in the international markets. These findings, however, concern the last decade of the 20th century and the first decade and a half of the 21st century. It is left for future work to analyze whether the relationship remains unchanged after the COVID-19 pandemic.

To analyze the relationship between these capital accumulation patterns and labor productivity evolution, Table 3 presents a shift-share decomposition of productivity's average annual growth rate into three components: intra-sectoral, static, and dynamic intersectoral components. The intra-sectoral component refers to the contribution of labor productivity growth in each sector to the total productivity growth. The intersectoral components refer to the effect of the reallocation of labor across sectors on total productivity, i.e., the reallocation from low-productivity to high-productivity sectors or the reverse process.

Figure 2: Relative profitability of the tradable goods sector.

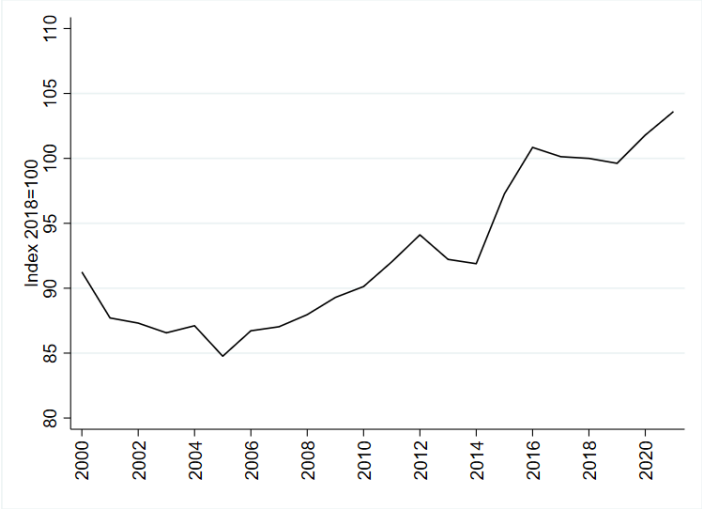


Figure 2a) Evolution of the internal real exchange rate

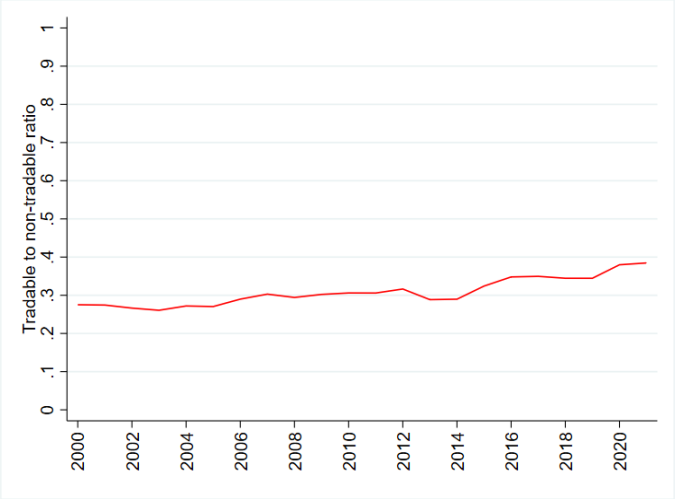


Figure 2b) Relative profitability of the tradable sector vs the non-tradable sector

Note: The internal real exchange rate is the ratio between the tradable sector's price index and the non-tradable sector's price index. An increase implies a depreciation. The relative profitability of the tradable sector is calculated as the ratio between the profit rate of the tradable sector with respect to the profit rate of the non-tradable sector. The tradable sector comprises agriculture, forestry, fishing, quarrying, mining, and manufacturing. The non-tradable sector comprises construction and services. I exclude sectors in which the State's participation is substantial: oil and gas extraction (211-213-486), oil and coal products (324), electricity, water and gas supply (222), education and health services (611-62), and legislative and government activities (93 and 521). The real state services subsector (531) is excluded as it is dominated by residential investment. Numbers correspond to the NAICS code corresponding to each sector. The profit rate is calculated as the ratio of the gross operating surplus to the net capital stock in nominal terms. As prices of the capital stock, I employed the implicit deflator of gross fixed capital formation. For details, see Ibarra and Ros (2018)
Source: Author's calculations based on KLEMS database 2018 base year, INEGI

Following Maudos, Pastor, and Serrano (2008) and Padilla-Pérez and Villarreal (2017), the shift-share decomposition can be formally defined as indicated by equation 1. Defining Y_t and L_T as the total output and number of workers at time T, and Y_0 and L_0 as total output and workers at time 0,

and Y_{iT} and L_{iT} as the output and workers of sector *i* at time T, and Y_{i0} and L_{i0} are the total output and workers of sector *i* at time 0, and θ_{iT} and θ_{i0} as the share of total workers that workers of sector *i* represent, we can define the shift-share decomposition as follows

$$\frac{Y_T}{L_T} - \frac{Y_0}{L_0} = \sum_{i=1}^{I} \theta_0 \left(\frac{Y_{iT}}{L_{iT}} - \frac{Y_{i0}}{L_{i0}}\right) + \sum_{i=1}^{I} \frac{Y_{i0}}{L_{i0}} (\theta_T - \theta_0) + \sum_{i=1}^{I} \left(\frac{Y_{iT}}{L_{iT}} - \frac{Y_{i0}}{L_{i0}}\right) (\theta_T - \theta_0) \quad (1)$$

Table 3 below presents the results from Equation 1 for the Mexican case, dividing the economy into two sectors: tradable and non-tradable.

Table 3: Shift-share analysis for the decomposition of output per worker growth rate (contribution in percentage points to the annual annual growth rate)

Period	Sector	Intra-sectoral effect	Static sectoral effect	Dynamic sectoral effect	Sector's total contribution
2000-2021	Tradable	0.43	-0.18	-0.05	0.20
	Non-tradable	0.41	0.16	0.02	0.59
	Total	0.84	-0.02	-0.03	0.79
2000-2010	Tradable	0.65	-0.62	-0.11	-0.08
	Non-tradable	0.11	0.59	0.01	0.71
	Total	0.76	-0.03	-0.10	0.63
2010-2018	Tradable	0.23	0.23	0.02	0.48
	Non-tradable	1.29	-0.20	0.00	1.09
	Total	1.52	0.02	0.02	1.56
2018-2021	Tradable	0.13	0.21	0.00	0.34
	Non-tradable	-0.74	-0.20	0.01	-0.93
	Total	-0.61	0.01	0.01	-0.59

Note: The tradable sector comprises agriculture, forestry, fishing, quarrying, mining, and manufacturing. The non-tradable sector comprises construction and services. I exclude sectors in which the State's participation is substantial: oil and gas extraction (211-213-486), oil and coal products (324), electricity, water and gas supply (222), education and health services (611-62), and legislative and government activities (93 and 521). The real state services subsector (531) is excluded as it is dominated by residential investment. Numbers correspond to the NAICS code corresponding to each sector. The profit rate is calculated as the ratio of the gross operating surplus to the net capital stock in nominal terms. As prices of the capital stock, I employed the implicit deflator of gross fixed capital formation. For details, see Ros and Ibarra (2018)

Source: Author's calculations based on the KLEMS database 2018 base year, INEGI

For the period from 2000 to 2021 as a whole, the productivity growth within the tradable sector has contributed more to aggregate labor productivity growth than that of the non-tradable sector. However, this pattern was not constant throughout the period. Although it is a good description of the sectoral dynamics during the first decade of the century, from 2010 to 2018, productivity growth within the non-tradable sector was faster than in the tradable sector. This pattern shifted back to a process led by the tradable sector from 2018 to 2021. A surprising result is that the structural change component of the decomposition is small and negative. This implies low levels of labor reallocation between sectors, and the one that occurs is from industries with higher productivity levels to industries with lower productivity levels. Thus, productivity in the Mexican case is mostly led by what happens inside each sector instead of being driven by structural change.

As the data for the period between 2018 and 2021 indicates, the tradable sector has been more resilient to the economic downturn caused by the COVID-19 pandemic than the non-tradable sector. This can be pinned on two reasons: one structural and one circumstantial. Regarding the structural reason, as Ros (2015b) indicates, productivity growth in the non-tradable sector heavily depends on the behavior of the total aggregate demand in the economy. Because of this, it is particularly vulnerable to experiencing abrupt drops in output with sluggish adjustments in employment in the face of sizeable aggregate demand shocks, such as the one represented by the COVID-19 pandemic. The tradable sector, in contrast, depends on the aggregate demand conditions of the local economy and those of the trading partners. This is the circumstantial reason: as the US economy exited the pandemic crisis experiencing high rates of economic growth for a mature economy (Milesi-Ferretti, 2022), this catalyzed the dynamism of the Mexican tradable sector, given that the US is Mexico's principal trading partner. The capacity of the tradable sector

to recover part of the ground lost during the first decade of the 21st century in the near future is heavily dependent on how it responds to the changes in the global trade conditions, particularly to the process of friend-shoring[3] that has started to take place in the US-centered global value chains.

In the next section, I analyze the changes and continuities in labor market regulation and macroeconomic policy with these structural dynamics in mind[4].

3. Steady as she goes or changing course?

The victory of the electoral coalition headed by Andres Manuel López Obrador supposed the arrival to power of a coalition that, at least discursively, deliberately sought to distance itself from the economic policy followed by the previous governments[5]. In this section, I will analyze the changes in two key areas to the economy's capacity to respond to future challenges: labor and fiscal policy.

3.1 Labor market policy

As Bensusan (2020) explains, the series of labor reforms implemented from 2017 onwards, particularly those implemented in 2019 and 2021, represent a clear breakaway from the previous consensus regarding the regulation of the labor market in several key aspects. The reforms

[3] By friend-shoring, I refer to the process of geographical relocalization of several segments of the global value chains following a geopolitical criterion. In other words, it refers to the reconstitution of the global distribution of labor based on the goals of China's and the US's international policy instead of following purely economic criteria. This process is also named "near-shoring," but this overemphasizes the role of geography over the role of political alignment with the different global powers, with the latter the driver of the process. See Attinasi, Boeckelmann and Meunier, (2023).

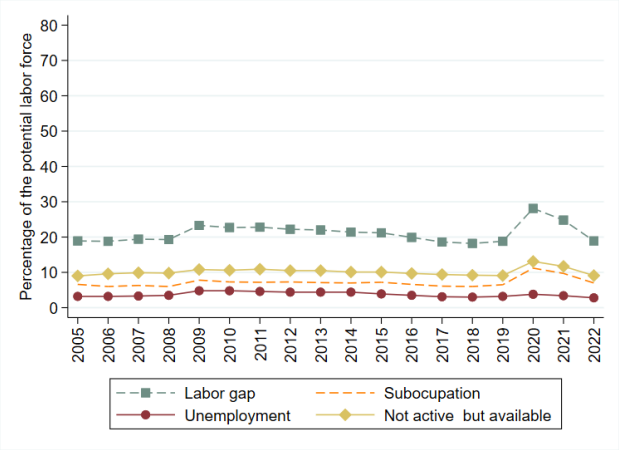
[4] The analysis of the social policy changes is beyond this paper's scope. See Esquivel, (2023); Jaramillo-Molina (2022); Martínez-Espinoza (2023) and Yaschine (2023) for competing views on the subject.

[5] For an assessment of the results of the last round of "structural reforms" undertaken by the immediately previous government, see Moreno Brid, Sánchez Gómez and Monroy-Gómez-Franco (2020).

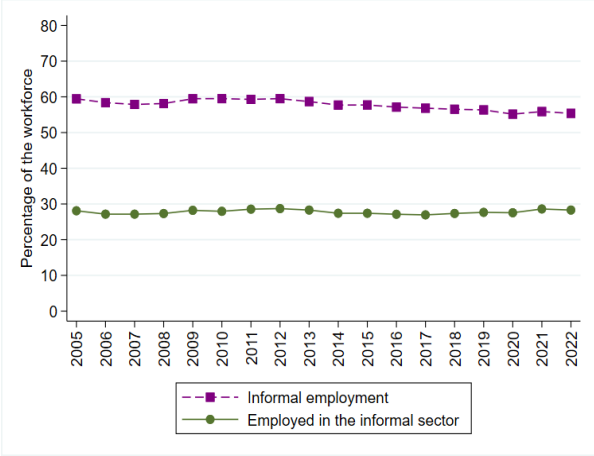
undertaken during 2017 and 2019 aimed to improve the internal democracy and transparency of unions and strengthen their independence from the State. Among the changes established by the reforms was the regulation of union elections, which now have to take place during general assemblies and use a secret ballot to cast the votes. They also established the obligation of unions to present evidence of the right to represent the workers (with at least 30% of those employed in the unit supporting the representation by the union), and they also established a new set of labor tribunals to replace the labor boards that previously settle conflicts between employers and employees. Bensusán and Middlebrook (2020) explain that a significant driving force behind these changes in labor regulation was the UMSCA negotiation process, in which American labor unions pressured the change in the Mexican labor regulation, which was perceived to be too favorable to employers.

The reforms undertaken in 2021 aimed to transform how outsourcing and subcontracting were regulated in the country. The new regulation restricted the use of outsourcing and subcontracting only to the performance of specialized activities outside the main objective of the firm, as well as forcing all the firms that provide such services to register with the labor ministry. Finally, the lack of compliance with these new regulations is subject to substantial penalizations to the infractors by the federal government (Brito et al., 2022).

Figure 3. Evolution of the labor gap and its components, 2005 to 2022.
(Share of the potential labor force)



3a) Labor gap and its components
(% of the potential labor force)



3b) Informality in the Mexican labor market
(% of the employed population)

Note: The potential labor force is defined as the sum of the economically active population plus the economically inactive population available for work. The labor gap is the ratio of unemployed, the not economically active but available for work, and the suboccupied workers to the potential labor force. The figure shows the labor gap and each of its components. Annual average values presented. The employed in the informal sector corresponds to the population that works in an economic unit that operates using household resources without constituting itself as a business, such that the economic unit cannot be distinguished from the household. Informal employment corresponds to the sum of those employed in the informal sector and those who work in the formal sector without full coverage of the rights granted by the labor regulation,
Source: Encuesta Nacional de Ocupación y Empleo, INEGI.

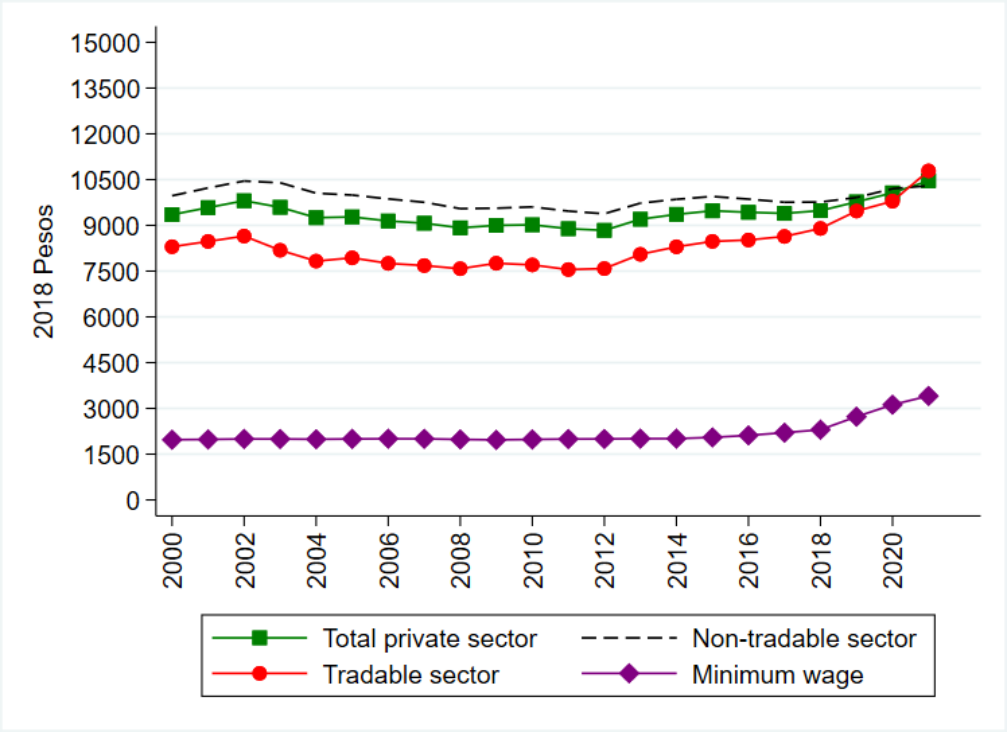
Figure 3 describes the context in which these reforms occurred through the evolution of the labor gap (Figure 3a) and the incidence of informality (Figure 3b). The labor gap, proposed by Blanchflower and Levin (2015), measures the degree of occupation of the potential labor force, composed of the unemployed, the available for employment, and the suboccupied. As can be seen, Mexican labor operates with persistently high levels of underutilization of the potential labor force and a high degree of informality. Although the recovery from the pandemic seems to be pushing the magnitude of the labor gap down to its historical minimum, it still represents a fifth of the potential labor force. Similarly, informal employment has decreased from 2018 onwards but remains well above half of the employed population. Thus, although the reforms have improved the conditions of those already in the labor market, they have not reduced the share of workers who remain excluded from jobs in compliance with the rights recognized by the labor regulation. It is worth noting, however, that according to Brito et al. (2022), the outsourcing reform triggered

a process of re-hiring the formerly outsourced workers by the main employer, leading to their formalization.

The magnitude of the labor gap and the informal sector in the Mexican economy can be partly attributed to the meager economic growth and capital accumulation that occurred during the period. Given the characteristics of the informal sector, it can be conceived as a modern version of the "pre-modern" or subsistence sector conceptualized by Lewis (1954) and Pinto (1970). Under this characterization, the expansion of the other sectors of the economy is a precondition for the absorption of the labor force employed in it into activities with higher productivity and income. Due to the characteristics of this sector, it is part of the non-tradable sector of the economy, which explains why the transfer of workers from the tradable to the non-tradable sector, described in the previous section, led to a productivity slowdown[6]. Thus, the resilience of the tradable sector to the COVID-19 shock can partially explain why the pandemic did not lead to a substantial increase in the informal sector's employment share[7]. Another factor is the institutions that constitute the Mexican stratification regime, which hinder the participation of specific groups of society, defined by their adscriptive characteristics, such as women or persons of darker skin tones, into the labor market as a whole and formal employment[8].

Figure 4. Evolution of the real average monthly wages in the 21st century by sector.
(Mexican pesos in 2018 prices)

[6] For an interpretation of the Mexican economy's performance under this approach, see Ros, (2015a).
[7] Another factor is the institutions that constitute the Mexican stratification regime, which hinder the participation of specific groups of society, defined by their adscriptive characteristics, such as women or persons of darker skin tones, into the labor market as a whole and formal employment. For a more detailed discussion on the Mexican stratification regime, see Vélez-Grajales and Monroy-Gómez-Franco (2023)
[8] For a description of the characteristics of the Mexican stratification regime see Monroy-Gómez-Franco and Villagómez-Ornelas (2024).



Note: The tradable sector comprises agriculture, forestry, fishing, quarrying, mining, and manufacturing. The non-tradable sector comprises construction and services. I exclude sectors in which the State's participation is substantial: oil and gas extraction (211-213-486), oil and coal products (324), electricity, water and gas supply (222), education and health services (611-62), and legislative and government activities (93 and 521). The real state services subsector (531) is excluded as it is dominated by residential investment. Numbers correspond to the NAICS code corresponding to each sector. For details, see Ibarra and Ros (2018). The monthly minimum wage is obtained by multiplying the daily minimum wage by 26.1, the average number of monthly workdays.
Source: Author's elaboration with data from the KLEMS database, 2018 base year INEGI and National Commission for Minimum Wages (CONASAMI)

The national minimum wage policy change is another major change in the Mexican labor market[9]. Starting in 2015 but more aggressively since 2018, the national nominal minimum wage has increased substantially above the inflation rate, leading to an average annual gain of 15%. The new policy establishes two geographical zones with a differentiated minimum wage: for the municipalities on the border with the US, the minimum wage is higher than for the rest of the country. Similarly, the VAT in the border municipalities is lower than in the rest of the country. This policy starkly contrasts with the one followed in the previous years, during which the real

[9] For a description of the minimum wage policy followed in the previous year see Moreno-Brid, Garry and Monroy-Gómez-Franco (2014).

value of the minimum wage was held constant to anchor the growth of the wage distribution. Although the average wage in the tradable sector started to grow before the start of the new policy, it accelerated from 2018 onwards. As a result, the sector's average wage has reached its maximum value observed in the 21st century, and the private sector minimum wage has had the same behavior.

Several studies have analyzed the effects of the new policy across several labor market outcomes using the differential rate of increase by region as a source of exogenous variation. A robust finding of the literature is that the effect of an increase in the nominal value of the minimum wage in the northern border of 100% in 2019 on employment was small to no significant, while the effect on labor earnings was between 4% and 10 % on the average real wage, with a substantial higher effect at the lower rungs of the earnings distribution (Alvarado et al., 2023; Campos-Vázquez and Esquivel, 2021; Campos-Vázquez et al., 2020; Valverde-Rodríguez, 2023). With respect to the lighthouse effect, Alvarado et al. (2023) find that the increase in the minimum wage has a positive effect on the earnings of workers up to the median of the distribution of labor income. When disaggregating by informality status, the authors find an effect for all workers in the first quartile of the distribution but only among formal workers in the second quartile. This is consistent with the evidence presented by Campos-Vázquez and Rodas Milian (2020) on previous increases in the minimum wage.

Concerning the probability of having formal or informal employment, Alvarado et al. (2023) find that the increase in the minimum wage increased the probability of being employed in the formal sector by 1.4 percentage points. An analysis of previous, less ambitious increases in the minimum wage also found a positive effect on the probability of being a formal worker (Campos-Vázquez

et al., 2018). Concerning prices, the net effect of the increase in the minimum wage and the reduction in the VAT rate is nill (Campos-Vázquez and Esquivel, 2021; Calderon et al., 2023), although Calderón et al. (2023) find evidence suggestive of a positive effect albeit small of the increase in the minimum wage on prices

3.2 Fiscal Policy

Figure 5 depicts the fiscal position of the Mexican federal government, both in terms of its primary balance and the composition and size of tax revenues. For reference, the annual rate of growth of the GDP is plotted in Figure 5a. It is clear that, in contrast with what has happened with regard to labor market policy, the fiscal policy has retained its procyclical character even after the change in administration that occurred in 2018. It is particularly stark how, in 2020, in the face of the most significant contraction of GDP during the 21st century, the fiscal stance was more restrictive than during the Global Financial Crisis of 2008-2009. A similar fiscal stance was adopted during the recession that the Mexican economy experienced at the beginning of the century due to the dot com crash in the US economy. In contrast, the budget for 2024, a year in which the economy is expected to grow but coincides with the presidential elections, implies a primary deficit larger than the one employed in the pandemic.

Figure 5: Fiscal position of the government

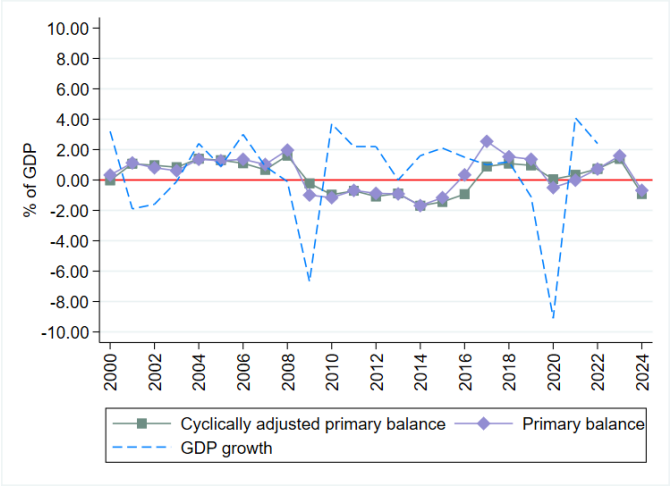


Figure 5a) Primary balance and GDP growth (% of GDP)

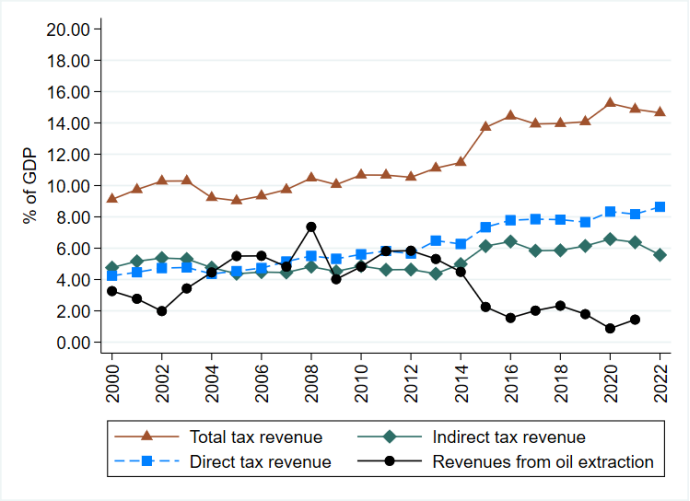


Figure 5b) Composition of tax revenues (% of GDP)

Note: The fiscal primary balance information comes from the IMF's Fiscal Monitor Database. Data for 2023 and 2024 are based on projections by the IMF. Data on the composition of fiscal revenues comes from CEPALSTAT.
Source: Fiscal Monitor Database, IMF and ECLAC CEPALSTAT

The continuity from the past is not only present in the fiscal policies followed during phases of the economic cycle but also in terms of the tax structure and capacity of the State to collect taxes. As Figure 5b) shows, total tax collection remains between 14% and 16% of the GDP, below other countries in Latin America such as Colombia and Peru (17%), Chile (23%), Argentina (24%), and Brazil (25%)[10]. The last important tax reform that increased the resources of the State was in 2015, which decoupled the State resources from the revenues obtained from oil extraction. Although touted as sufficient to close the financing gap, the gains in collection efficiency have not substantially impacted the resources available.

The procyclicality of fiscal policy and the lack of substantial tax reform have progressively reduced the available fiscal space for the State to invest in improving infrastructure or conduct sector-

[10] All numbers come from CEPALSTAT and correspond to total tax collection without including social security contributions.

specific or region-specific policies to incentivize their growth. The results from Sánchez-Vargas (2023) suggest that unless interest rates decrease or growth accelerates substantially, the fiscal space for 2024 and 2025 is nill if the debt coefficient is to be stabilized.

The challenges that lie ahead for the Mexican economy will find it with a labor market with better conditions in terms of wages and labor bargaining power than in the past, but with still a large proportion of the labor force in subsistence activities or lacking benefit coverage, the result of the lack of growth in the past couple of decades. Moreover, they will find it with a State with scarce resources to face them directly or help the private sector adapt to the new conditions that these challenges will bring. In the next section, I describe in more detail what challenges I refer to.

4. **A rocky road ahead**.

As previous sections describe, the Mexican economy has suffered from slow capital accumulation and economic growth. On top of both processes, the economy will face several challenges in the future that threaten its future performance. In particular, the medium and long-run effects of the COVID-19 pandemic on learning acquisition, climate change, the process of automation, and the introduction of AI to the workplace are challenges for which the Mexican economy is severely underprepared. Mexico's vulnerability is a consequence of the lackluster growth of the past 40 years, and it also constitutes shocks that can negatively affect the economy's future performance in terms of growth and capital accumulation.

4.1 *The effects of the pandemic*

The Programme for International Student Assessment (PISA) results show that the COVID-19 pandemic severely impacted students' learning acquisition process worldwide (OCDE, 2023). In the Mexican case, the results indicate a drop in the average scores across all the areas evaluated by the test, albeit smaller than the one observed in the case of developed economies. However, this does not indicate an educational system resilient to the shock but rather a system with persistently poor performance over the years (Andere, 2023).

The adverse effects of the pandemic on learning accumulation identified by the PISA test can be considered as the short-run effects of the pandemic. As learning is a cumulative process, the gaps that occur at a particular moment in the educational trajectory of a person can have ripple effects at further stages, impeding the acquisition of new knowledge or skills that build upon the contents not acquired at previous stages of the educational trajectory. Based on this characterization of the learning process, Monroy-Gomez-Franco (2022) and Monroy-Gómez-Franco, Vélez-Grajales, and López-Calva (2022) calibrate a model of learning progression for the Mexican and estimate that on average, the pandemic is expected to generate a persistent gap in learning equivalent to half of a school year by the end of the ninth school grade of those who experience the pandemic during their sixth grade. There is substantial heterogeneity around this potential outcome. Both papers estimate that for those students in households with sufficient economic resources to engage in compensating activities, the long-run effect of the pandemic will be close to nil in learning acquisition. In contrast, households that lack those resources could experience a learning gap equivalent to missing one year and a quarter of schooling.

So far, there has not been any policy intervention aimed at closing the gap in learning acquisition by the socioeconomic status of origin that appeared as a consequence of the pandemic. This is partially a consequence of the limited fiscal space faced by the Mexican government described in the previous section. Similarly, the lack of growth in the previous years has limited the resources available for the educational system. The persistent negative effect of the gap in learning acquisition can affect the capacity of the labor force to adapt to the technological changes associated with introducing artificial intelligence to the workplace, constraining the expansion of the sectors closer to the technological frontier. This pattern could increase the share of workers in the lower productivity sectors, constraining productivity growth across the economy. It is worth noting that, as Table 3 indicates, this allocation of the labor force towards the lower productivity sectors is already happening, albeit slowly, as the net contribution of structural change to productivity growth from 2000 to 2021 is negative. The long-run effects of the pandemic can strengthen this negative dynamic.

In distributional terms, the heterogeneity in the gaps in learning acquisition by socioeconomic origin can lead to an increase in inequality by reinforcing the occupational polarization associated with the new technologies introduced in the labor market. Furthermore, there is evidence that at least part of the fall in the returns to tertiary education in the Mexican labor market is due to the obsolescence of older workers' skills (Campos-Vázquez, López-Calva, and Lustig, 2016). Although this has only affected older workers so far, the COVID-19 pandemic learning gaps can generalize this phenomenon among the younger cohorts in the labor market, except for the workers who received compensating investments throughout their educational careers. If so, this would increase the association between the conditions of origin of the person and their economic

outcomes, increasing the magnitude of inequality of opportunity in the country, which already represents at least 50% of total inequality in the country (Monroy-Gómez-Franco, Forthcoming).

4.2 *Climate Change*

The decade-old vulnerability to climate change assessment by Ibarrarán et al. (2009) and the more recent one by Byers (2021) highlight Mexico's extreme vulnerability to the effects of the increase in global temperatures caused by climate change. The vulnerability arises from the existing water scarcity in the north and central regions of the country, the exposure of the coasts to extreme temperatures and climatic events, and the lack of infrastructure to deal with the new climate conditions. Although the effects of extreme climatic events are already visible in the effects of Hurricane Otis on the Pacific coast, it is worth highlighting that the effects of climate change expand beyond that dimension and include substantial distortions in everyday activities.

Consider, for example, the case of agriculture. As Estrada et al (2022) indicate. Mexican agriculture is particularly vulnerable to changes in global temperatures, with substantial drops between 30% and 40% of current production in maize, sorghum, rice, and soybean yields by the end of the century. The effects of this drop in yields would affect not only the populations that obtain an income from them but also will likely be reflected in a substantial increase in prices as they represent a cornerstone of the current diet of the population. Without any compensating policy, the direct effect will be increased poverty. Furthermore, considering that Mexico is already importing a large proportion of the food supply, the ramifications of a decrease in local production

can affect other dimensions of the economy, such as the external balance and the availability of foreign currency to finance food imports.

Although the impacts on agriculture might seem intuitive, other areas will be affected by the increase in temperature. For example, increasing evidence shows that extreme heat conditions negatively affect learning acquisition and performance in school environments (Alberto et al., 2021; Graff Zivin et al., 2020; Groppo & Kraehnert, 2017). In order to attenuate this type of effect, substantial investment in attenuation capacities would be required, as the most recent data indicate that less than half of schools in the country have sufficient ventilation or air conditioners (Miranda, 2018). As expected, the deficit is larger in communities in the poorest regions of the country, which are also those more likely to experience more days of higher temperatures per year (Bryers, 2021). As discussed in the previous subsection, the effects of gaps in learning are cumulative and can suppose a restriction on the adoption of newer technologies that are intensive in their use, particularly in an era of rapid technological change. This means climate change can affect potential future growth through its direct effects and costs on human capital accumulation.

Similarly, it is necessary to consider the effects of extreme temperatures on the population's health, particularly in the presence of infectious diseases and the abovementioned high levels of hydric stress. Agüero (2014) finds that more frequent exposure to heat waves negatively impacts the height of Mexican children, akin to the effect observed due to insufficient nutritional intake. The evidence provided by Cohen and Dechezleprêtre (2022) and Helo Sarmiento (2023) shows that the presence of public medical services can counter the negative health impacts of extreme temperatures. In the Mexican case, that implies an expansion of the capacities of the public health

system, implying another source of pressure over the fiscal balance. Furthermore, it is worth mentioning that although Mexico used to have a funding scheme that minimized economic and life losses due to natural disasters (del Valle, Forthcoming; del Valle et al., 2020), this scheme was dismantled by the current administration.

4.3 *Automation*

The existing analyses of the exposure of the Mexican labor force to the threat of automation indicate that it is already technically feasible to replace roughly two-thirds of jobs with robots or artificial intelligence (Minian and Martinez Monroy, 2018; Cebreros et al., 2020). The manufacturing sector is particularly exposed to this process, as according to Minian and Martínez Monroy (2018), 80% of the occupations in that sector are already substitutable by robots. The technical feasibility, however, does not imply that it is economically reasonable to proceed with the substitutability. According to the estimations by Ramos et al. (2022), less than 10% of total occupations are at an economic risk of being replaced by robots. That is, it is both technically feasible and economically reasonable regarding the associated costs to replace 8% of the jobs currently in Mexico by robots.

These results show both the extreme vulnerability of the Mexican occupational structure to the type of technical change that is taking place in the world and the relatively low level of Mexican wages such that it still is not profitable to introduce those technical advancements into the production process. Based on the results from the previous two sections of this essay, it is clear that the combination of low labor productivity growth and rising average wages will increase the

economic profitability of replacing labor with robots and AI. Similarly, it is also clear that the tradable sector is more heavily exposed to this process and that there is a risk that the non-tradable sector cannot absorb the displaced workers into activities with a high productivity and wage level.

Thus, the Mexican economy is likely to experience a process of technological upgrading in specific sectors that, although it might increase labor productivity within them, can also lead to a process of structural change with adverse effects on the total productivity level. In order to attenuate this potential negative effect, it is necessary to develop industries where the substitutability of labor by machines is lower, but a high productivity level is also present so that the wage gains can be sustained. As Autor (2013) and Autor et al. (2003) explain, the type of industries that likely fulfill these characteristics are those in which the production process employs non-repetitive manual and cognitive tasks and those in which socioemotional skills play a prominent role. These characteristics are present in industries such as the care sector, for example. The existence of public policy programs that facilitate the growth of this type of industry and the insertion of workers into them is crucial to attenuate the possible adverse effects of automation on employment, productivity, and, ultimately, earnings.

5. Final Remarks

The analysis in the previous sections makes it clear that the first step necessary to exit the labyrinth of low-growth, high-poverty, and inequality in which the Mexican economy is trapped is a fiscal reform that, through a progressive tax scheme, provides the State with sufficient resources as to face the incoming challenges for the Mexican economy. That said, it is also clear that the

interrelatedness of the different challenges also poses an opportunity for public policy to tackle several of them simultaneously.

Considering the abovementioned goal, the type of investments necessary to adapt schools, housing, and infrastructure in general to the challenges posed by climate change can help to dynamize the high-productivity industries in the non-tradable sector of the economy. This would reduce the labor gap and the share of workers in the informal sector. Dynamizing the non-tradable sector through a "greening process" and adopting adaptation measures would not only result in faster growth but also allow Mexican society to navigate better the effects of climate change.

Paired with this type of investment, investment in the care sector would allow to diminish the structural factors that deter mothers and, to a lower extent, fathers from entering the labor market or that lead to their permanence in informal but flexible jobs. Similarly, due to the type of labor these activities demand, the jobs generated in that sector are less exposed to replacement by artificial intelligence or robots. An expansion and upscaling of the care sector in Mexico would also imply the expansion and/or upscaling of the health and education sectors, with the simultaneous effect of making those sectors more adapted to the conditions imposed by climate change and thus diminish the exposition of the population to their adverse effects.

This, however, makes it evident that to undertake both types of projects, it is necessary to tackle the effects of the pandemic on learning acquisitions and rethink the educational profile to diminish the share of workers exposed to the threat of automation. This, again, requires resources,

particularly considering that more than 80% of all children of schooling age are in the public sector.

However, without making that step, the labyrinth's exit will keep eluding the Mexican economy.

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