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Productivity, Misallocation, and Special Tax Regimes in the Dominican Republic

Rodrigo Azuero
Mariano Bosch
Marvin Cardoza
Dennis Sanchez

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Contact: Rodrigo Azuero, rodrigo.azuero.melo@emory.edu.

Abstract^{*}

This paper advances understanding of the relationship between tax policy and productivity, taking advantage of unique data from the Dominican Republic to document a significant negative impact of tax regulations on total factor productivity (TFP). It begins by estimating productivity using administrative records provided by the tax authorities. Then, it estimates the extent to which misallocation of resources might be limiting TFP using the Hsieh and Klenow (HK) methodology. Finally, it analyzes the tax regulation and provides suggestive evidence about how some provisions might be contributing to the misallocation of resources observed in the Dominican Republic. The paper finds that if misallocation of resources is eliminated from the economy, TFP will increase by a factor of 3.5. Several regulations generate discontinuities in the average rate of taxation, and tax reductions designed for small businesses are actually used by large and unproductive firms, which may be contributing to the overall misallocation observed in the Dominican Republic.

JEL Classification: H26, H30, J8, L11, L51

Keywords: firm size, general fiscal policies, labor regulation, productivity, tax evasion and avoidance

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1. Introduction

In the last 60 years, the productivity gap between countries in the Latin America and the Caribbean (LAC) region and the advanced economies has increased significantly. Between 1960 and 2010, the productivity gap between the United States and LAC countries increased by approximately 30 percent (Pagés, 2010), much more than the productivity gap between the rest of the world and the United States, which increased by approximately 15 percent (Grazi et al., 2016). Part of the reason why this gap has increased during the last 60 years is that technologies and best practices flow to developing countries very slowly (Cole et al., 2016; Restuccia and Rogerson, 2018). However, recent evidence shows that a large fraction of this is also due to the fact that LAC countries are less likely than advanced economies to allocate resources to their most productive use (Busso, Madrigal, and Pagés, 2013). Although the evidence shows that misallocation of resources is one of the most frequent reasons why TFP differs across countries (Hsieh and Klenow, 2009), the main sources of misallocation in developing economies are still not clear, especially in LAC countries.

This study uses administrative records from the Dominican Tax Authority (Dirección General de Impuestos Internos, or DGII) to determine the extent of misallocation of resources in the Dominican Republic. It estimates the amount of productivity lost due to inefficient allocation of resources and identifies policies in the tax system that might be preventing resources from flowing to their most productive use. This study contributes to the literature because it is believed to be the first time that the relationship of misallocation of resources and firm-level productivity is analyzed in the Dominican context. Access to administrative records provides a reliable source of information that enables these dynamics to be analyzed with respect to both large and small taxpayers in the country. Moreover, by having panel data of individual tax returns of all firms in the economy spanning ten years (2007-2017), the dynamics of the firms and how they change as a consequence of policy changes can be determined. In turn, this illuminates suggestive relationships between policy changes and productivity at the national level.

The costs of misallocation are estimated following the HK methodology. The intuition behind the HK methodology relies on the fact that if there were no frictions or distortions in the economy, the marginal product of labor and capital should be equal for all firms in a given economic sector. Resources, in principle, should flow to the firms where their marginal product is the highest. For this reason, dispersion in marginal productivities indicates misallocation of resources in a specific sector.

According to the HK methodology, TFP in the Dominican Republic could be 3.5 times higher if there were no distortions. Although this counterfactual illustrates the extent of misallocation in the Dominican Republic, it is hard to argue that reaching a point with no distortions is attainable even in the long run. A more realistic counterfactual compares the extent of misallocation in the Dominican Republic with some advanced economies. The United States is frequently used as a benchmark (Busso et al., 2013; Hsieh and Klenow, 2009). This analysis shows that TFP in the Dominican Republic could be twice as high if the extent of misallocation were similar to that of the United States. These two counterfactuals show that analyzing the potential sources of misallocation is highly relevant.

Although the HK methodology illustrates the productivity costs of misallocation, it does not identify which policies or frictions are responsible for this phenomenon. The specific sources of

misallocation in developed and developing economies are still an open question in the literature (Hopenhayn, 2014; Restuccia and Rogerson, 2018). Recently, size-dependent policies (Guner, Ventura, and Xu, 2009), lack of property rights (Adamopoulos et al., 2015), and financial frictions (Xu, 2014) have been found to explain part of the problem of misallocation in both developing and developed economies.

This paper provides evidence suggesting that size-dependent policies, in the form of special tax regimes, might partly explain why resources do not flow to their most efficient use. Special tax regimes are policy tools that lower the effective taxation rate for firms depending on a set of conditions. For example, firms with annual purchases under \$30 million Dominican pesos (DOP) are eligible to benefit from the simplified tax regime. Although this paper does not present enough evidence of a causal effect between the implementation of special tax regimes and misallocation, the use of panel data from administrative records provides strong evidence of firm behavior in response to the use of these instruments, suggesting a future area of research.

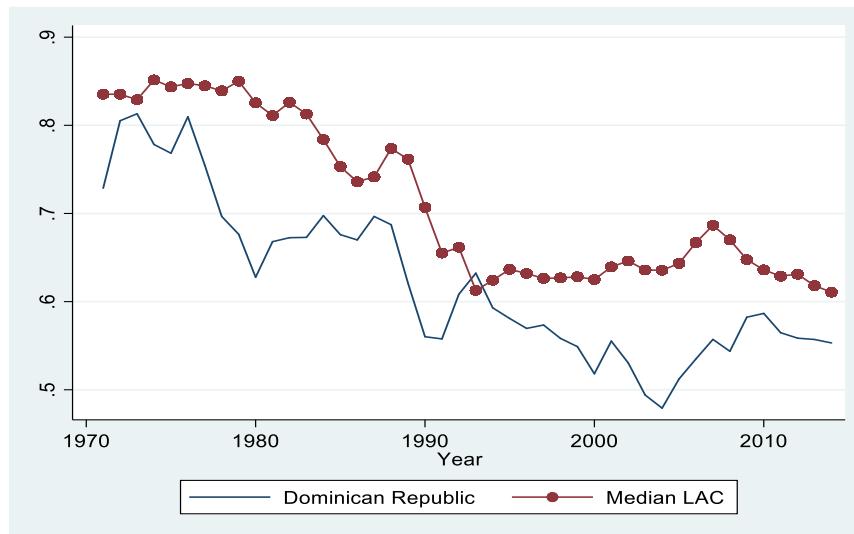
The question of the degree to which the implementation of special tax regimes contributes to the misallocation of resources is a key issue in LAC countries. All countries except Venezuela and Panama have a form of special tax regime. This paper presents suggestive evidence that firms registered in special tax regimes in the Dominican Republic might alter their growth and productivity performance and survive for a longer period in the market compared to firms registered in the general tax regime. Consequently, resources are allocated mostly among low-productivity firms, which account for more than 30 percent of the formal labor force and capital in the Dominican Republic.

The remainder of this paper is structured as follows. Section 1 presents an assessment of the main issues of productivity and misallocation in the Dominican Republic. Section 2 describes the main tax regulations that could lead to an inefficient allocation of resources in Dominican legislation. Section 3 analyzes the administrative records of firms between 2007 and 2017 to identify some issues of firm dynamics and how the introduction of special tax regimes affects this process. Section 4 concludes.

2. Misallocation and Productivity in the Dominican Republic

During the last five decades, the productivity gap between Latin American and Caribbean (LAC) countries and the United States has widened significantly. Figure 1 illustrates the levels of total factor productivity (TFP) for the Dominican Republic and for the median LAC country. The median productivity for LAC countries in 1970 was 80 percent of that of the United States, whereas in 2015 this figure was 60 percent. The Dominican Republic is no exception: currently, productivity in the Dominican Republic is approximately 55 percent of that of the United States.

Figure 1. Total Factor Productivity in the Dominican Republic and Median LAC (PPP, USA=1), 1970–2014



Source: Authors' elaboration based on Feenstra, Inklaar, and Timmer (2015).

What explains the productivity gap between the United States and LAC countries? Aggregate productivity depends on the performance and functioning of three distinct but interrelated components (Cusolito and Maloney, 2018). The first is firm-level performance and intrinsic capability of individual economic units to transform resources into output using their managerial, innovative, and technological capabilities—the *within* component. Second, productivity relies on the allocation of capital and labor to the most efficient uses such that highly productive units absorb a larger fraction of resources than low-productivity firms—the *between* component. Misallocation occurs precisely when the allocation of resources—the *between component*—does not operate properly. Therefore, capital and labor flow toward firms with lower productivity. Third, productivity is sustained by the adequate functioning of entry and exit of firms, which means that highly productive firms are encouraged to enter and grow, whereas low-productivity firms perish—the *selection* component.

This section presents an assessment of the productivity performance in the Dominican Republic by analyzing the latter two components—the *between* and the *selection* dynamics. This methodology proposed by Hsieh and Klenow (2009) enables firm-level productivity to be estimated and dispersion in TFP across firms to be used as a measure of misallocation in the

economy. This analysis of TFP dispersion is accompanied by the productivity profiles of entering and perishing firms.

Previous studies in LAC have employed this methodology and have found significant distortions and potential productivity gains throughout the LAC region. According to Busso, Madrigal, and Pagés (2013), removing all friction and promoting a more efficient allocation of resources could boost TFP in the region by between 41 percent and 122 percent.¹ Recent estimations in Mexico² show that eliminating misallocation could increase aggregate productivity by approximately 148 percent (Levy, 2018).

This methodology has been implemented using economic census, annual manufacturing surveys, and enterprise surveys (Busso, Madrigal, and Pagés, 2013; Camacho and Conover, 2010; Hsieh and Klenow, 2014; Levy, 2018; Seker and Saliola, 2018), as well as administrative records (Avellán and Ferro, 2017; Dias, Robalo Marques, and Richmond, 2016). This paper explores and quantifies the potential distortions in the Dominican Republic using a rich set of microdata in the administrative records provided by the Dominican Tax Authority (Dirección General de Impuestos Internos, or DGII). This dataset contains information of all formal firms that declared their balance sheet and income statements to the tax agency between 2007 and 2017. Moreover, this dataset contains relevant characteristics of the firm, such as age, geographic location, number of workers, tax regime, among others.³

The use of the administrative records as an alternative source of information has both advantages and drawbacks. First, administrative records contain detailed and systematic information on the universe of all formal establishments, which enables firms and the life cycle to be tracked year-to-year and short-term adjustments to be explored. Moreover, the use of these records makes it possible to track the performance of large firms, which are usually excluded from traditional firm surveys. The main disadvantage of using administrative records is that they do not include the informal economy.

According to the National Labor Force Survey, 47 percent of the workers responded that they are hired by a firm that is registered under the DGII. This estimate provides a proxy of the fraction of data that is not covered by the administrative records.⁴ In contrast to census data, which covers both the formal and the informal sectors, this study only observed those firms in the formal sector that submitted their tax returns over the sample period.⁵ Thus, the TFP estimations

¹ The LAC countries covered by this study are: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, El Salvador, Uruguay, and Venezuela.

² TFP analysis have also studied other economies worldwide. Cirera, Fattal Jaef, and Maemir (2017) have studied Côte d'Ivoire, Ethiopia, Ghana, and Kenya; Ryzhenkov (2016) has studied Ukraine; Kim, Jiyoong, and Yongseok (2017) have studied Korea; Thanh Ha, Kiyota, and Yamanouchi (2016) have studied Vietnam; Gong and Hu (2016) have studied China, among others.

³ Regularly, the application of the HK methodology is conducted on economic census data. See, for example, Hsieh and Klenow (2014) and Levy (2018). Alternative sources of information have also been used, as in (Busso, Madrigal, and Pagés, 2013) combining establishment-level data from the World Bank Enterprise Surveys (Guatemala, Honduras, and Nicaragua), annual local economic surveys such as manufacturing surveys (Bolivia, Brazil, Chile, Colombia, Ecuador, Uruguay, and Venezuela) and economic census (El Salvador, Mexico), but fewer works have explored administrative records.

⁴ Using the definition of labor informality, which refers to those workers with no payments to Social Security Systems regardless of the formal/informal status of the firm, informality in Dominican Republic was about 69 percent in 2016.

⁵ Here, a firm is considered formal if it is officially registered under the tax agency. In addition, as administrative records are employed for audit and control purposes, these data could also suffer from misreporting issues because of firms' attempts to avoid taxation or sanctions.

conducted here shed some light on the extent of the distortions in the Dominican Republic but still represent a lower bound of the real distortions. Compared to the census-based data, administrative records will not account for the reallocation gains coming from shifts in productive resources from the informal to the formal sector. Hence, the TFP gains obtained might be biased downward.⁶ Despite this caveat, administrative records are a powerful source of information and offer relevant insights about firm behavior and how economic distortions affect their performance and growth patterns.

Methodology

The Hsieh and Klenow (HK) method is based on the following principle: in the absence of distortions in an economy and as a result of the firm-level optimization process within a framework of monopolistic competition, the marginal product of capital and labor should be equal across sectors. Hsieh and Klenow (2009) argue that observing different marginal products across firms is indicative of distortions. They use the variations in revenue productivity to measure the extent of these distortions in an economy. In addition, they suggest that firms deviate from the optimal scenario, altering input decisions—capital and labor—as well as total output because of two potential wedges. First, Hsieh and Klenow categorize those distortions that simultaneously affect capital and labor decisions and alter the output price perceived by the firm as Type I. Second, they suggest the existence of distortions that modify the marginal product of capital relative to labor, categorized as Type II. Table 1 contains examples of the two types of distortions.

Table 1. Characterization and Examples of Distortions

Output-related distortions Type I (τ_{ysi})	Affect simultaneously and in the same proportion capital and labor, and distort the output price observed by the firm	<ul style="list-style-type: none"> • Government-issued restrictions on size • High transportation costs • Benefits from public output subsidies • Bribes and costs to be paid to operate • Tariffs if commercialized abroad • Taxes on profits and value-added • Specific taxes based on location or size under special tax regimes • Perception of a higher probability of being sanctioned when evading taxes.
Capital-labor related distortions Type II (τ_{ksi})	Affect the marginal product of capital relative to labor	<ul style="list-style-type: none"> • Labor market regulation such as social security payments • Firing costs and rigidities • Tougher capital constraints that limit the access to credit • Tax/Subsidies to credit or capital use

Source: Authors' elaboration based on Busso, Madrigal, and Pagés (2013), Hsieh and Klenow (2009), and Levy (2018).

⁶ Busso, Fazio, and Levy (2012) studied the relationship between productivity and the formal status of the firm and found that informality is highly correlated with the misallocation patterns. They argued that significant TFP gains in Mexico could be derived by shifting more resources from the informal to the formal sector.

To measure the magnitude of these distortions, HK proposes a model of a representative firm that produces a single and homogeneous good by combining a set of intermediate goods Y_s . The total output of the final good is obtained by (1).

$$(1) Y = \prod_{s=1}^S Y_s^{\theta^s}$$

where $\sum_{i=1}^S \theta^s = 1$, denoting the constant returns to scale.

The production of the differentiated intermediate input Y_s follows a constant elasticity of substitution technology such that the aggregation of the individual production of the M establishments within the sector s can be obtained as (2).

$$(2) Y_s = \left[\sum_{i=1}^{M_s} Y_{si}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

where σ denotes the substitution elasticity across varieties and Y_{si} denotes the output of the firm i in the sector s , and follows a Cobb-Douglas technology on inputs capital (K) and labor (L) as described in (3).⁷

$$(3) Y_{si} = A_{si} K_{si}^{\alpha_s} L_{si}^{1-\alpha_s}$$

where α_s refers to the capital share, which is constant among firms within sector s and represents the elasticity of output to capital. The component A_{si} corresponds to the physical TFP at the firm level. The optimization problem for the firm i consists of maximizing its profits π_{si} , with the cost of labor or wages w and the cost of capital R taken as given. The profit function faced by the firm i is described in (4).⁸

$$(4) \pi_{si} = (1 - \tau_{ysi}) P_{si} Y_{si} - w L_{si} - (1 + \tau_{ksi}) R K_{si}$$

where τ_{ysi} and τ_{ksi} refer to the distortions, P_{si} to the price and Y_{si} to the total output of the firm. The element τ_{ysi} refers to distortions that affect the price observed by the firm when the output is put into the market ($P_{si} Y_{si}$). Second, the element τ_{ksi} that operates the value of the capital of the firm ($R K_{si}$) accounts for distortions that change the marginal product of capital K_{si} relative to labor L_{si} . Solving the maximization problem in (4) and from the first-order conditions, the measures of the distortions are presented in (5) and (6).

$$(5) 1 + \tau_{ksi} = \frac{\alpha_s}{1 - \alpha_s} \frac{w L_{si}}{R K_{si}}$$

$$(6) 1 - \tau_{ysi} = \frac{\sigma}{\sigma - 1} \frac{w L_{si}}{(1 - \alpha_s) P_{si} Y_{si}}$$

⁷ The value of σ is defined as a parameter that is usually assumed to be greater than 1.

⁸ This model follows the conventional values for the parameters in the literature such that all firms face the same capital rental costs R equal to 10 percent and same wages (normalized to 1), and a constant elasticity across varieties $\sigma = 3$. Likewise, α_s is computed as 1 minus the labor share in the data, which corresponds to the ratio of the wage bills to the value added within each industry.

In the presence of these distortions, also referred to the literature as idiosyncratic distortions, the decisions associated to the level of inputs and production deviate from the optimal or efficient scenario. According to HK, this deviation is caused by market distortions and not directly by underlying differences in the firm productivity. Consequently, distortions are manifested by distinct marginal revenue product for capital and labor across firms (Hsieh and Klenow, 2009).

In addition, this methodology distinguishes between physical TFP (A_{si}) and total factor revenue productivity ($TFPR_{si}$). It derives two formulas to measure them from observed values of labor, capital, and value-added, as shown in (7) and (8).⁹

Physical Total Factor Productivity:

$$(7) TFPQ_{si} = A_{si} = \frac{(P_{si}Y_{si})^{\frac{\sigma}{\sigma-1}}}{K_{si}^{\alpha_s} L_{si}^{1-\alpha_s}} \kappa_s$$

where $\kappa_s = \frac{w^{1-\alpha_s}}{P_s} (P_s Y_s)^{-\frac{1}{\sigma-1}}$. Since the distortions are analyzed and estimated among firms within sectors, the component κ_s is normalized to 1 and the physical TFP can be obtained from the nominal output ($P_{si}Y_{si}$) and the capital and labor values even without observing the firm-level price data.¹⁰

Revenue Total Factor Productivity:

$$(8) TFPR_{si} = P_{si}A_{si} = \frac{\sigma}{1-\sigma} \left(\frac{R}{\alpha_s} \right)^{\alpha_s} \left(\frac{w}{1-\alpha_s} \right)^{1-\alpha_s} \frac{(1+\tau_{ksi})^{\alpha_s}}{1-\tau_{ysi}}$$

Distinguishing between physical TFP and revenue TFP is a powerful tool for identifying the distortions. In the optimal scenario, productive resources flow toward firms with the largest physical productivity right up to the point at which total factor revenue productivity is equal across firms, implying that no dispersion would be observed in the $TFPR_{si}$ within a sector (Busso, Fazio, and Levy, 2012).¹¹ Therefore, all noticeable deviations of the $TFPR_{si}$ within a sector s account for these distortions, and dispersion statistics could be used to measure their magnitude. The sectoral benchmark value used to determine the magnitude of the distortions is defined as the average \overline{TFPR}_s , shown in (9).

$$(9) \overline{TFPR}_s = \frac{\sigma}{\sigma-1} \left[\frac{R}{\alpha_s \sum_{i=1}^{M_s} \left(\frac{1-\tau_{ysi}}{1+\tau_{ksi}} \right) \left(\frac{P_{si}Y_{si}}{P_s Y_s} \right)} \right]^{\alpha_s} \left[\frac{w}{1-\alpha_s \sum_{i=1}^{M_s} (1-\tau_{ysi}) \left(\frac{P_{si}Y_{si}}{P_s Y_s} \right)} \right]^{1-\alpha_s} \\ = \frac{\sigma}{\sigma-1} \left(\frac{\overline{MRPK}_s}{\alpha_s} \right)^{\alpha_s} \left(\frac{\overline{MRPK}_s}{1-\alpha_s} \right)^{1-\alpha_s}$$

⁹ For these establishment-level estimations and because of the lack of records of firm-level prices, the model recovers the prices from the demand function $P_{si} = Y_{si}^{-\frac{1}{\sigma}}$.

¹⁰ Following Busso, Madrigal, and Pagés (2013), because human capital is not observable, the firm-level wage bill is employed rather than labor input.

¹¹ As the demand function is decreasing on the quantity produced, highly productive firms gain a larger share of the market by lowering prices such that the two forces—price and quantity—offset each other to the point where the TFPR is exactly equalized across firms within the same sector.

In the absence of distortions, the $TFPR_{si}$ should be equalized to \overline{TFPR}_s across all firms i within sector s . Therefore, any deviation observed between the actual total factor productivity distribution and its sectoral benchmark is indicative of the presence of distortions and consequent productivity losses. Narrowing the gap between the current distribution and the optimal case, that is, re-allocating more resources from less productive toward more productive uses would result in economy-wide productivity gains. These productivity gains are estimated as the gap (ratio) between actual TFP and the optimal scenario, denoted as TFP^* . Aggregated TFP corresponds to the geometric average of the physical TFP among firms aggregated across s industries.

$$(10) \quad TFPQ = \prod_{s=1}^S [TFPQ_s]^{\theta_s} = \prod_{s=1}^S \left[\sum_{i=1}^{M_s} \left(A_{si} \frac{\overline{TFPR}_s}{TFPR_{si}} \right)^{\sigma-1} \right]^{\frac{\theta_s}{\sigma-1}}$$

From equation (10), it is possible to derive the $TFPQ$ in the optimal scenario. In the absence of distortions, there is no productivity dispersion across firms. Therefore, in the optimal case, equation (10) can be expressed as $TFP^* = \prod_{s=1}^S (\overline{A}_s)^{\frac{\theta_s}{\sigma-1}}$. However, in the presence of distortions, the lower the TFP compared to the sectoral average \overline{TFPR}_s , the larger the weights $\frac{\overline{TFPR}_s}{TFPR_{si}}$, penalizing those firms that employ more resources compared to the optimal scenario for producing similar or even lower output (Busso, Fazio, and Levy, 2012).

As a result, the combination of these forces would cause aggregate TFP to deviate from the true potential in an economy. Thus, the distance between the efficient counterfactual and the actual allocation can be conceived as productivity gains if distortions were removed. For this purpose, Hsieh and Klenow (2009) define the productivity gains as $100 \left(\frac{TFP^*}{TFP} - 1 \right)$, where $\frac{TFP}{TFP^*}$ is as described in (11).

$$(11) \quad \frac{TFP}{TFP^*} = \prod_{s=1}^S \left[\sum_{i=1}^{M_s} \left(\frac{A_{si}}{\overline{A}_s} \frac{\overline{TFPR}_s}{TFPR_{si}} \right)^{\sigma-1} \right]^{\frac{\theta_s}{\sigma-1}}.$$

Thus, the estimation of (11) refers to the productivity gains—in percentage terms—that an economy could experience as a result of removing frictions and distortions and allocating resources toward more efficient units.

Description of the Data

This study uses firm-level data from the administrative records provided by the DGII. This rich dataset contains financial information reported by formal firms in their balance sheet and income statements for declaring income and value-added taxes. Firms report their annual data, including information about the economic sector, total sales, capital, labor costs, gross revenues, number of employees, and sales costs, among other variables. Since the declaration forms and methodology changed substantially in 2007, this study looks at the period 2007–2017, which enables comparable and consistent analyses to be performed.¹²

¹² The specific sources of information are Appendices A-1 and B-1 attached to the form IR-2 used by registered firms to report to the DGII. Registered firms with purchases below 40 million pesos (DOP 40,759,725) are subject to the

Labor is defined as the total number of employees declared by the firm; the wage bill is the sum of the salaries, insurance contributions, and social protection payments; capital corresponds to total fixed asset, including buildings, machinery, equipment, and vehicles; and value-added is the difference between the production value and sales costs. In total, the study makes 46,264 observations for 18,128 firms in 2007 and 28,136 firms during 2017 in the agriculture, manufacturing, and services sectors.¹³

The estimations are conducted at the 2-digit sector level, which corresponds to the most detailed classification provided by the DGII and 37 industries in the database—1 aggregated classification for the agriculture sector, 22 industries for manufacturing, and 14 for services.¹⁴ More than 80 percent of the firms in the administrative records data correspond to firms operating in the services sector, which account for 73 percent of the labor force and 80 percent of total capital in 2017.

Table 2 shows the relative importance of the agriculture and manufacturing sectors in the economy in terms of number of firms, labor, capital, and value-added. The composition shares resemble the structure of the economy in the Dominican Republic. The services sector contributes 67 percent of gross domestic product (GDP) in 2017, followed by manufacturing industries, with 26.8 percent, and agriculture, with 6.1 percent.¹⁵

Table 2. Relative Participation by Sector, 2007–2017

Sector	2007				2017			
	Firms	Labor	Capital*	VA*	Firms	Labor	Capital*	VA*
Levels								
Agriculture	390	12,177	10,910	6,007	652	23,847	32,063	19,629
Manufacturing	3,143	125,978	80,903	84,880	4,608	191,550	211,344	233,959
Services	14,595	316,407	283,269	311,043	22,876	597,067	972,812	956,118
Participation (%)								
Agriculture	2.2	2.7	2.9	1.5	2.3	2.9	2.6	1.6
Manufacturing	17.3	27.7	21.5	21.1	16.3	23.6	17.3	19.3
Services	80.5	69.6	75.5	77.4	81.4	73.4	80.0	79.0

Source: Authors' calculations based on DGII information.

Note: * Capital and value-added are reported in millions of current DOP pesos.

simplified tax regime (STR) are not required to fill out this information and therefore are not considered for the estimations of this section. In 2017, the total number of firms subject to the STR was 2,618. They reported 0.28 percent of the total income tax for 2017, according to the DGII (2017).

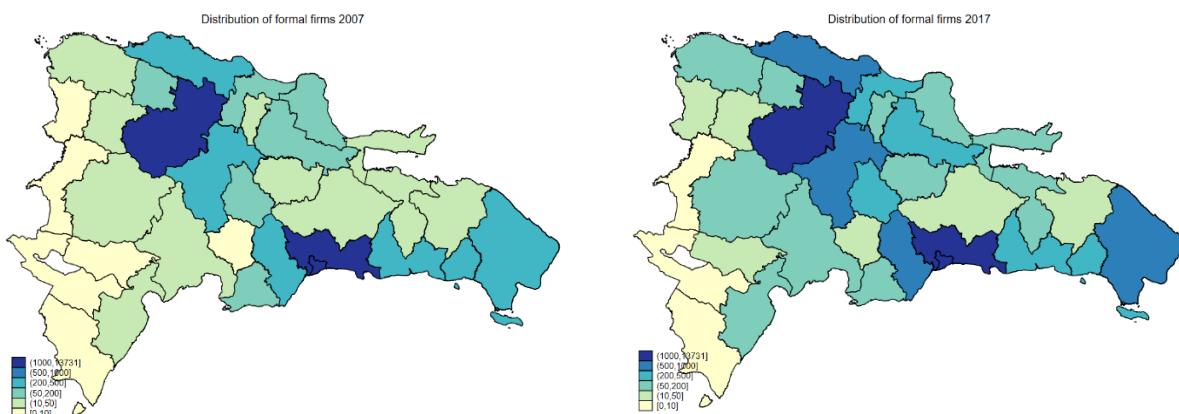
¹³ Originally, the database reports information for 108,353 firms. However, many firms report either zero or missing values for relevant variables required for the estimation such as labor, capital, and value-added. Consequently, these firms are omitted from the analysis.

¹⁴ This classification closely although imperfectly follows the structure of the ISIC rev. 3 classification. The database contains 37 sectors, after excluding those sectors in which the number of firms is below 10, to maintain consistency with the key assumption of a market with monopolistic competition. The sectors excluded are sugar manufacturing, sugar confectionery manufacturing, exchange and remittance agents, cocoa and chocolate manufacturing, cement manufacturing, and production of ceramic and refining products. In addition, by the nature of the businesses sectors of banks, insurance, pension funds administrators, and public administration are not considered in this analysis.

¹⁵ These shares are obtained from the National Statistical Office.

Map 1 illustrates the distribution of formal firms by provinces across the Dominican Republic. In 2007, 82 percent of the total formal firms in the database were located in three provinces: National District (53.9 percent), Santo Domingo (17.3 percent) and Santiago de los Caballeros (10.8 percent). In 2017, the concentration of formal firms was slightly lower, but 77 percent of the formal firms were still distributed among the three provinces mentioned.

Map 1. Distribution of Formal Firms in the Dominican Republic, 2007–2017



Source: Authors' calculations based on DGII information.

To analyze the size distribution, the study uses the firm-size definitions for micro, small, and medium-sized enterprises in the Dominican Republic set forth in Law 488 of 2008, which establishes the criteria based on total number of workers, value of assets, and gross income, as shown in Table 3. For example, a firm is defined as a microenterprise if it reports fewer than 15 workers and either declares assets below DOP\$3 million or gross income below DOP\$6 million. One of the latter two conditions is required in addition to the number of workers to be classified in one of the four size categories.

Table 3. Firm-size Definition

	Number of workers	Assets/Capital (millions DOP)	Gross Income or sales (millions DOP\$)
Micro	1 – 15	<=3	<=6
Small	16–60	3–12	6–40
Medium	61–200	12–40	40–150
Large	+200	+40	+150

Source: Authors' elaboration based on Law 488.

Note: Values are reported in 2008 Dominican pesos (DOP). Law 488 establishes that these values are to be indexed annually to inflation.

According to this definition, in 2017, three out of four firms in the sample were either micro or small firms. Despite the large share of micro and small firms, most of the capital and labor is concentrated among the larger firms. These account for over 91 percent of the capital and 62.9 percent of the labor declared, as presented in Table 4.

Table 4. Firm Size Distribution in the Sample, 2017

Firm size	Number firms	Sales*	Capital*	Labor
Levels				
Micro	12,850	46,446	26,989	57,947
Small	8,707	217,749	35,287	128,197
Medium	3,345	373,525	42,903	115,233
Large	3,234	1,573,118	1,111,043	511,087
Total	28,136	2,210,838	1,216,221	812,464
Participation				
Micro	45.7%	2.1%	2.2%	7.1%
Small	30.9%	9.8%	2.9%	15.8%
Medium	11.9%	16.9%	3.5%	14.2%
Large	11.5%	71.2%	91.4%	62.9%

Source: Authors' calculations based on DGII information.

Note: * Capital and sales are reported in millions of current DOP pesos.

Next, the study estimates productivity at the firm level. As firm' output prices are not available in the data, the estimations of physical TFP are obtained following (7), assuming the demand function holds. The dispersion measurements are computed as deviations of firm-level productivity with respect to the sectoral mean in logarithmic terms such that the dispersion of revenue productivity is defined as $\log(TFPR_{Si}/\overline{TFPR}_S)$ from equations (8) and (9), respectively. Following Busso, Madrigal, and Pagés (2013), the top and bottom 1 percent observations are trimmed to exclude potential outliers.

Estimation Results¹⁶

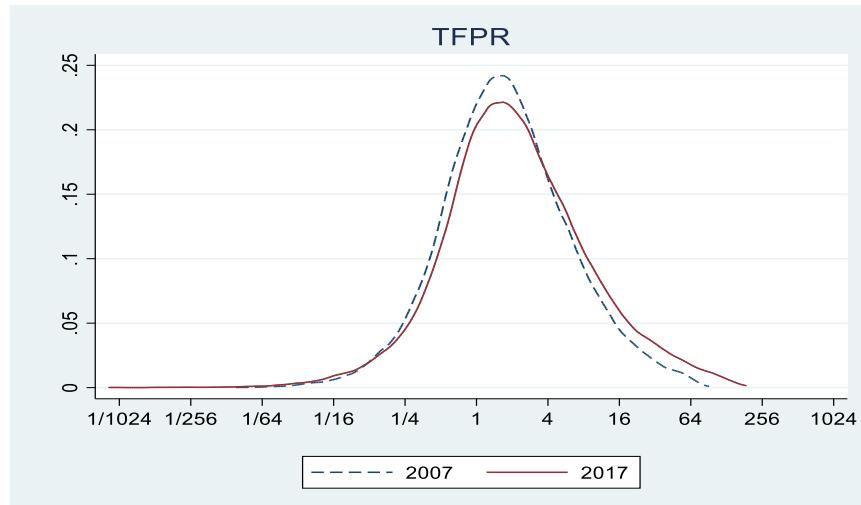
Figure 2 illustrates the distribution of TFPR in the Dominican Republic, comparing the results between 2007 and 2017. The sector mean is normalized to 1. Thus, it can be expressed as the distance from this reference point. **Error! Reference source not found.** not only evidences the distortions, as there are observations that deviate from the sectoral mean in both directions, but also suggests that these distortions have increased over time. Comparing the distribution for 2017 with respect to 2007, some interesting findings appear at first glance. First, the distribution for 2017 is slightly shifted to the left, which suggests that overall, Dominican firms are relatively less productive. Second, the breadth of the distribution is larger in both tails, but particularly in the left tail, which in the spirit of HK represents larger distortions in the Dominican Republic, as more firms deviate from the sectoral mean.

Figure 2 reveals both sides of the distortion coin in the Dominican Republic. On the one side, more firms are highly productive. In 2007, the most productive firms were about 64 times larger than the sectoral mean, whereas in 2017 the right tail is thicker and longer, suggesting that a larger mass of firms are highly productive and are surpassing the sector mean by a factor of 64, and even by 256 times.

¹⁶ The authors thank Matias Busso for sharing the code that produced the estimations for the Dominican Republic case.

On the other side, this finding is counterbalanced by the fact that more firms are below the sectoral mean, steering the distribution to the left. For instance, some firms are about 1/1024 and 1/256 times below the sector average, levels that were not formerly observed in 2007. Overall, more firms are going much further from the average sectoral productivity in 2017 in both directions, which in the spirit of HK represents larger distortions in the Dominican Republic.

Figure 2. Revenue Total Factor Productivity Distribution in the Dominican Republic, 2007 vs. 2017



Source: Authors' calculations based on DGII information.

The distribution of revenue total factor productivity (TFPR) in Figure 2 is only part of the misallocation story. Clearly finding more disperse and separate firms in terms of productivity triggers the alarm of latent distortions, but it is also concerning because of the amount of resources diverging from highly productive to less productive firms. Another way of reading the results shown in Figure 2 is that firms observed on the right-hand tail receive fewer resources (are relatively smaller) than in an efficient scenario, in which firms on the left-hand side would correspond to those that garner a larger share of productive resources and are larger than in the efficient scenario. In both cases, the presence of firms in both directions is indicative of the misallocation phenomenon and the disruption of productivity in the Dominican Republic.

Following Levy (2018), the firms are segmented into low-, medium-, and high-productivity firms, and the fraction of resources being devoted to each productivity type is computed. For this purpose, percentiles 25 and 75 of the TFPR distribution by year are used. The results are presented in Table 5.¹⁷

¹⁷ Low-productivity firms are considered those below of P25; medium-productivity firms located between P25 and P75, and high-productivity firms are those in the top 25 percent of the distribution. Consequently, a fraction of 25 percent of the firms are defined as low-productivity, 50 percent as medium-productivity, and the top 25 percent as high-productivity establishments.

Table 5. Resources Allocated in the Dominican Republic by Productivity Segment, 2007–2017

Productivity segment	Firms	% Capital	% Labor
2007			
Low	4,532	57.2	28.8
Medium	9,064	40.9	57.0
High	4,532	1.9	14.2
Total*	18,128	375,083	454,424
2017			
Low	7,034	59.7	31.1
Medium	14,068	39.2	54.3
High	7,034	1.1	14.6
Total*	28,136	1,216,221	812,151

Source: Authors' calculations based on DGII information.

Note: Total capital is in current values for each year in millions of DOP.

This exercise suggests that an important fraction of resources is allocated to less productive units. In 2007, the low-productivity firms concentrated about 57.2 percent of the capital and 28.8 percent of the labor declared by the formal firms in the sample. In 2017, both capital and labor allocated to low-productivity firms grew to 59.7 percent and 31.1 percent, respectively. More than half of the total capital within the formal sector in the Dominican Republic is being allocated among firms that are substantially less productive, while simultaneously highly productive firms receive only a small and decreasing fraction of the capital: 1.9 percent and 1.1 percent in 2007 and 2017, respectively. Regarding the assignment of labor across firms, 31 out of 100 workers in the formal economy in the Dominican Republic are employed in low-productivity firms, and fewer than 15 of every 100 are employed by highly productive firms.

Similarly, Table 5 reveals that as the fraction of firms in the low-productivity segment increased, so did the share of capital and labor in that direction. More capital and labor flowed from high- productivity firms toward low-productivity firms in 2017 compared to 2007. This indicates that a significant and growing fraction of resources is not being efficiently assigned across firms, that is, that the misallocation is intensifying progressively in the Dominican Republic. This finding is equivalent to saying that with the exact same amount of capital and labor, assigned efficiently, productivity in the Dominican Republic could be larger, and economic growth could rise.

Figure 2 is complemented with some dispersion measurements, as in Hsieh and Klenow (2009) and Busso, Fazio, and Levy (2012), in Table 6, which confirms the presence of distortions economy-wide. The standard deviation increased across all sectors for either physical or revenue productivity between 2007 and 2017. Furthermore, the gap between a firm located at the top of the distribution—percentile 90 or 75—and a firm at the bottom of the distribution—percentile 10 or 25—suggests that differences broaden over time across all sectors.

For example, the interquartile range for the TFPR, which is the difference between percentile 75 and 25, indicates that a highly productive firm was about 54 percent more productive

than a less productive firm in 2007. The same comparison provides evidence that this gap widened over time. A highly productive firm in 2017 with the same amount of labor and capital could produce 72 percent more than the low-productivity firm.

Table 6. Dispersion Measurements TFPR and TFPQ in the Dominican Republic

Log TFPR								
	2007	2017	2007	2017	2007	2017	2007	2017
S.D.	1.21	1.39	1.41	1.68	1.24	1.45	1.20	1.37
P75 – P25	1.54	1.72	1.78	2.01	1.54	1.79	1.53	1.69
P90 – P10	3.05	3.42	3.65	4.13	3.11	3.67	3.02	3.36
Sector	All		Agricultural		Manufacturing		Services	
Log TFPQ								
	2007	2017	2007	2017	2007	2017	2007	2017
S.D.	1.83	2.15	2.33	2.70	2.98	3.35	2.40	2.66
P75 - P25	2.41	2.81	3.02	3.30	4.36	4.89	3.14	3.48
P90 - P10	4.70	5.47	6.09	6.63	7.92	8.68	6.10	6.72
Sector	All		Agricultural		Manufacturing		Services	

Source: Authors' calculations based on DGII information.

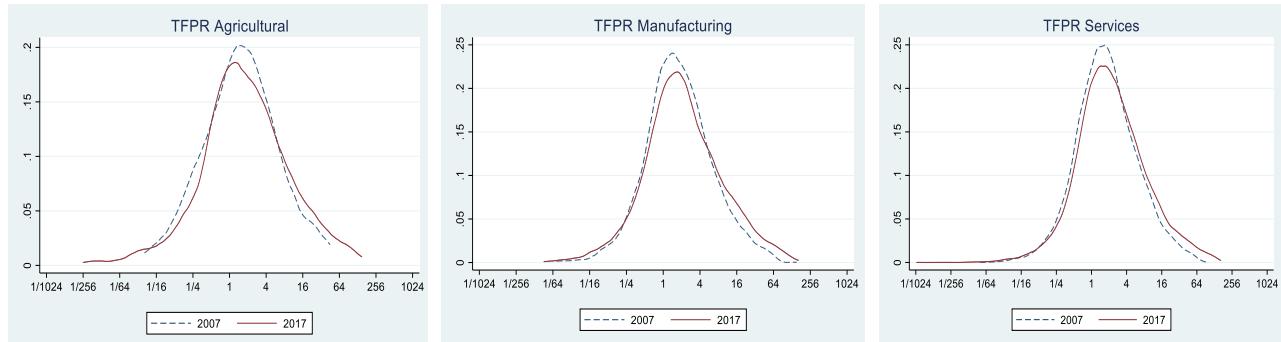
Notes: The results correspond to the dispersion measurements at the firm level with the respective sectoral mean.

S.D. refers to standard deviation, P75–P25 to the inter-quantile range and P90–P10 to the difference between the top 10 percent and the bottom 10 percent of the distribution.

This pattern also occurs at the sectoral level. The gap in TFPR between a company in the low-productivity segment (p25) compared to the highly productive segment (p75) increased to 101 percent in the agricultural sector, 79 percent in manufacturing, and 69 percent in services in 2017. These differences in the outcomes obtained by firms suggest that re-allocating resources toward more productive firms within the same sector would significantly increase both productivity and growth potential.

Following the reasoning of the HK methodology, more dispersion, which is reflected in more firms in both extremes of the distribution, confirms the presence of economic distortions. A larger dispersion indicates that firms in the Dominican Republic are indeed severely heterogeneous in terms of productivity, but also that they are becoming farther apart from each other. Contrary to the game of tug-of-war, in which each side pulls away against the force of the other team, the productivity game in the HK framework requires that firms approach each other and push in the same direction. Following this analogy, the width of the curves in Figure 3 illustrates that all sectors are mostly close to the tug-of-war structure, while being defeated in the productivity game in 2007 and 2017.

Figure 3. Dispersion Plots in Revenue Total Factor Productivity by Sector, 2007–2017



Source: Authors' calculations based on DGII information.

Distortions are evident in all sectors in the Dominican Republic, but to what extent are they larger than in other jurisdictions? Although not directly comparable because of the differences in the sources of information, timeframe, sectors, and firms studied as well as representative matters, the results for the Dominican Republic can be contrasted—although cautiously—with former findings for the United States obtained by Hsieh and Klenow (2009), which may be considered a benchmark of a relative less distorted economy. For Latin American countries, the results from Busso, Madrigal, and Pagés (2013) are employed.

Table 7. Comparative Dispersion of Revenue Total Factor Productivity, Percentile 90 and Percentile 10, across the Latin America and the Caribbean Region

Country	Last year available	Source	P90 - P10
Honduras	2006	WB Enterprise Surveys	3.33
Venezuela	2001	Industrial Survey	3.28
Dominican Republic	2017	Administrative records	2.93
Colombia	1998	Manufacturing survey	2.90
Guatemala	2006	WB Enterprise Surveys	2.84
Uruguay	2005	Economic activity survey	2.47
Mexico	2004	Economic Census	2.08
Bolivia	2001	Manufacturing survey	2.06
Chile	2006	Industrial Survey	1.77
Argentina	2002	Industrial Survey	1.56
Ecuador	2005	Manufacturing/ Mining survey	1.48
El Salvador	2005	Economic Census	1.29
US	1997	Census of Manufactures	1.19

Sources: Busso, Madrigal and Pagés (2013) and Hsieh and Klenow (2009).

Note: The value reported corresponds to the difference between percentile 90 and percentile 10 and represents the latest data available for each country. For comparison purposes, values refer only to the manufacturing sector and exclude plants with 10 or fewer workers.

Since estimations for the Dominican Republic only cover the formal sector and those firms that met their tax obligations during the period 2007–2007, these results are expected to act as a lower bound of the real distortions in the economy. A comparison exercise between the highly productive firms (percentile 90) vis-à-vis the firms at the bottom of the distribution (percentile 10) ranks the Dominican Republic in third place of the list with the largest deviations, only behind Honduras and Venezuela. On average, a representative firm in the highly productivity segment obtains almost three times more product using the same amount of resources than a less productive firm. This difference in other countries of the region ranges from 1.29 to 2.9. Interestingly, the Dominican Republic surpasses almost all the countries in the list. In fact, the productivity gap between high- and low-productivity firms in the Dominican Republic is about 2.5 times larger than in the United States.

These results suggest that distortions are particularly relevant for the Dominican Republic economy and reveal a problem of resource misallocation. In the HK framework, the larger the distortion measures, the greater the misallocation and productivity leaks, as there might be significant room for reallocating the same amount of resources among the most productive firms and obtaining significant productivity gains. Although the HK methodology is relatively silent about the specific source of these distortions the distortions or wedges can be decomposed into two types to explore their potential origins: (i) distortions related to the output of the firm (type I) and (ii) those related to the capital costs with respect to labor (type II). These two types are shown in Table 8.

Table 8. Distortion Types I and II in the Dominican Republic

Type I: Output-related distortions $1 - \tau_{Ysi}$								
	2007	2017	2007	2017	2007	2017	2007	2017
S.D.	0.94	1.03	0.99	1.17	1.00	1.08	0.93	1.01
P75 – P25	1.08	1.17	1.24	1.42	1.18	1.28	1.04	1.13
P90 – P10	2.21	2.42	2.32	2.65	2.32	2.59	2.18	2.37
Sector	All		Agricultural		Manufacturing		Services	
Type II: Capital and labor-related distortions $1 + \tau_{Ksi}$								
	2007	2017	2007	2017	2007	2017	2007	2017
S.D.	1.60	1.80	1.81	2.02	1.61	1.80	1.59	1.80
P75 – P25	2.05	2.32	2.43	2.59	2.04	2.26	2.04	2.32
P90 – P10	3.96	4.49	4.72	4.97	3.95	4.52	3.95	4.48
Sector	All		Agricultural		Manufacturing		Services	

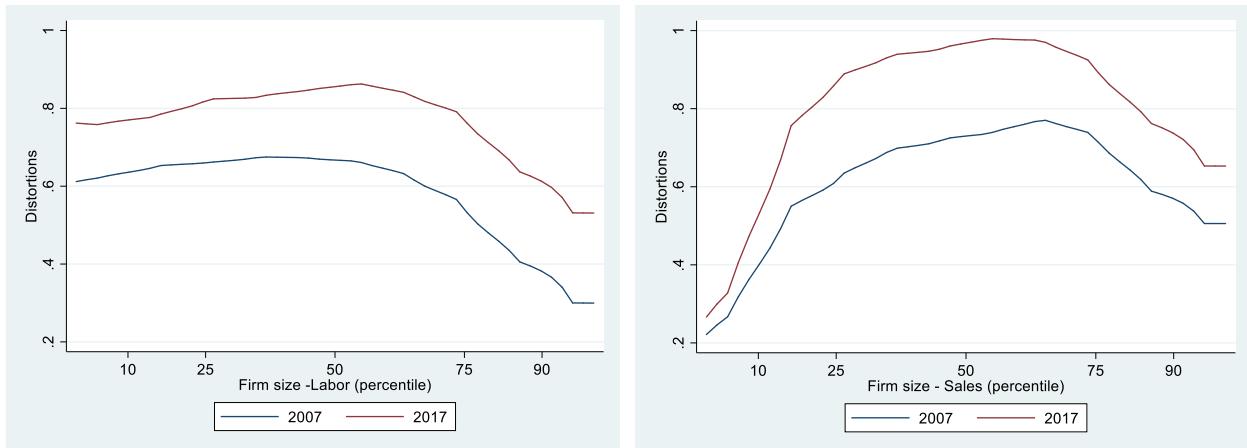
Source: Authors' calculations following Busso, Madrigal and Pagés (2013) and Hsieh and Klenow (2009).

As before, wider dispersion in both capital and output distortions is found, confirming that Dominican Republic faces a higher degree of misallocation in 2017 compared to 2007. The decomposition exercise reveals a higher dispersion in capital and labor-related distortions vis-à-vis output-related distortions, although both are particularly large. Dispersion indicators at the bottom of Table 8 are considerably larger, shedding light on the potential sources of misallocation in the Dominican Republic and suggesting that capital constraints faced by the firms are relatively more significant than the output restrictions.

Firm Size in Relation to Distortion

Are distortions uniformly evidenced across firms in the Dominican Republic or are there size-dependent constraints such that some frictions are more stringent for smaller or larger firms? To answer this question, the relationship between distortions and firm size is analyzed. For this exercise, firm size is defined as a function of labor and sales by percentiles and the relationship between these frictions and firm size is evaluated. Figure 4 reveals two interesting findings. First, all firms across the Dominican Republic, regardless of size, were subject to enlarged distortions, as higher values are estimated for these wedges in 2017 compared to 2007. Second, distortions decrease as the firm expands. That is, larger values on the y-axis represents larger distortions. This result holds whether firm size is measured in terms of sales or workers.

Figure 4. Dispersion of Revenue Total Factor Productivity by Size, 2007–2017



Source: Authors' calculations based on DGII information following Thanh Ha, Kiyota, and Yamanouchi (2016).

Note: This figure represents the local polynomial smooth of the log of TFPR demeaned with respect to the sectorial mean with kernel=epanechnikov, degree=0, bandwidth=6.99. The percentiles correspond to the following ranges of labor: < 2 workers in percentile 10, 2–3 are in percentile 25, 3–7 are in percentile 50, 7–17 are in percentile 75, and 17–45 in percentile 90. For sales, the percentiles are as follows: < 0.9 million DOP percentile 10, 0.9–2.6 million in percentile 25, 2–9 million, percentile 50, 9–33 million percentile 75, 33–118 million percentile 90.

This exercise suggests that smaller firms might face some disadvantageous distortions compared to the larger firms and that these distortions decrease as firm size increases. As argued by Busso, Madrigal, and Pagés (2013), firm size should be positively correlated with firm productivity in the absence of distortions, as more productive firms should expand over time. Nonetheless, this relationship could rupture in the presence of government or market failures, enabling less productive firms to thrive while more productive firms restrain their growth.

Table 9 describes the connection between physical and revenue productivity and firm size in columns (1) and (2), respectively, as a result of regressing each measure of productivity on dummies for each firm size. The excluded category corresponds to micro firms. A positive and increasing relationship is observed between physical productivity, measured as $\text{Log}(\frac{A_{Si}}{A_S})$, and firm size, as all coefficients are statistically significant and exhibit a monotonic and positive relationship with firm size.

Interestingly, when analyzing the distortions, measured as $\text{Log}(\frac{\text{TFPR}_{si}}{\text{TFPR}_S})$, they decline in firm size. Coefficients are statistically significant but decreasing suggesting that marginal revenue product is higher for smaller and medium firms, but then the relationship reverts for the largest firms. It indicates that higher returns are obtained by providing more capital and labor to small and medium firms, while marginal revenue product decline when allocating extra resources on the largest firms. This exercise complements the findings in Figure 4 suggesting that the largest firms face some advantageous distortions in the Dominican Republic and that they could be receiving some differentiated treatment given their productivity.¹⁸

Table 9. Correlates of Physical Total Factor Productivity and Revenue Total Factor Productivity and Firm Size, 2017

Firm size	(1) TFPQ	(2) TFPR
Micro		
Small	2.20*** (0.22)	0.47*** (0.07)
Medium	3.24*** (0.20)	0.22*** (0.08)
Large	3.41*** (0.27)	-0.84*** (0.10)
Observations	28,134	28,134
R-squared	0.24	0.08

Clustered-Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations based on DGII information.

Relationship between Firm Age and Size of Distortions

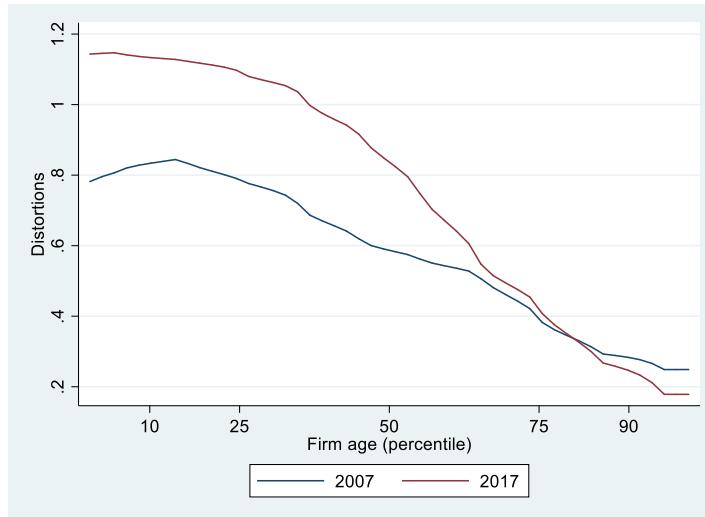
This study explores whether capital and/or output constraints vary by the firm age, following Hsieh and Klenow (2009), Than Ha, Kiyota, and Yamanouchi (2016), and Ziebarth (2013). First, the relationship between the revenue productivity and the age of the firm by percentiles is observed in Figure 5. It indicates that as the firm matures, TFPR dispersion decreases. This negative relationship indicates that younger firms face tougher distortions than established firms in the Dominican Republic. In addition, comparing 2017 to 2007 in Figure 5, distortions are found to be particularly steep for firms less than 15 years old.

Firms less than 1 year old—in percentile 10—are exposed to the largest distortions. In fact, Figure 5 shows that there is a significant reduction in the distortions after a firm reaches 4 years old (percentile 25) and decreases progressively. In 2017, as indicated in Table 10, almost 72 percent of formal firms in the dataset were under 15 years old, which indicates that younger

¹⁸ Estimations presented correspond to 2017, and the results hold for the other years studied.

firms not only face tougher distortions but also represent a significant fraction of firms in the Dominican Republic. In addition, from observing these large distortions in 2017 for firms under 4 years old, it is clear that newer firms are having even more difficulties absorbing resources in the market and expanding compared to 2007.

Figure 5. Revenue Total Factor Productivity and Firm Age, 2007–2017



Source: Authors' calculations based on DGII information.

Note: This figure represents the local polynomial smooth with kernel=epanechnikov, degree=0, bandwidth=6.99

The distortions (y-axis) refers to the TFPR measured as the log of TFPR demeaned with respect to the sectorial mean. The percentiles correspond to the following ranges of age: < 1 year in percentile 10, 1–4 years percentile 25, 4–8 years percentile 50, 8–15 years percentile 75, 15–24 years percentile 90.

Table 10. Firm Age Distribution in the Dominican Republic, 2017

Age	Firms	Share (%)
<5	8,386	30.2
5–9	7,041	25.3
10–15	4,646	16.7
16–20	3,354	12.1
21–25	2,005	7.2
+25	2,368	8.5
Total	27,800	100

Source: Authors' calculations based on DGII dataset.

Table 11 presents the correlations between firm age and physical and revenue productivity measures. The results are obtained from regressing $\text{Log}(\frac{A_{si}}{A_s})$, and $\text{Log}(\frac{\text{TFPR}_{si}}{\text{TFPR}_s})$ on dummies denoting age groups of firms, including controls by firm size and location. The excluded category in this exercise are those firms under 5 years old, so the coefficients are interpreted as the percentage difference in physical and revenue productivity of each age group of firms compared to the youngest cohort of firms in 2017.

This exercise shows that younger firms in the Dominican Republic are relatively more productive than established economic units. Both physical and revenue measures of productivity report negative and significant coefficients for firms over 15 years old compared to the reference category of firms under 5 years old. These results imply that in the Dominican Republic, allocating some extra units of capital and labor to the youngest firms would yield higher revenue productivity compared to firms that are on average over 15 years old in the market. It also provides suggestive evidence that distortions in the Dominican Republic obstruct younger firms from absorbing more resources and consequently might be smaller than in the efficient scenario. In contrast, mature firms seem to be benefiting from the presence of these distortions such that as firm age increases, neither physical nor revenue productivity expands, but they continue to concentrate a large share of productive resources. In other words, younger and relatively more productive firms are smaller than in the efficient case, while older firms are larger than the efficient scale, diverting some resources from more productive uses.

Table 11. Correlates of Physical Total Factor Productivity and Revenue Total Factor Productivity and Firm Age, 2017

Age group	(1) TFPQ	(2) TFPR
5–9 years	0.09 (0.06)	-0.17*** (0.03)
10–15 years	-0.03 (0.12)	-0.44*** (0.05)
16–20 years	-0.22** (0.10)	-0.63*** (0.04)
21–25 years	-0.23* (0.12)	-0.71*** (0.04)
+25 years	-0.16 (0.13)	-0.77*** (0.03)
Observations	27,798	27,798
R-squared	0.24	0.12

Source: Authors' calculations.

Clustered-standard errors in parentheses

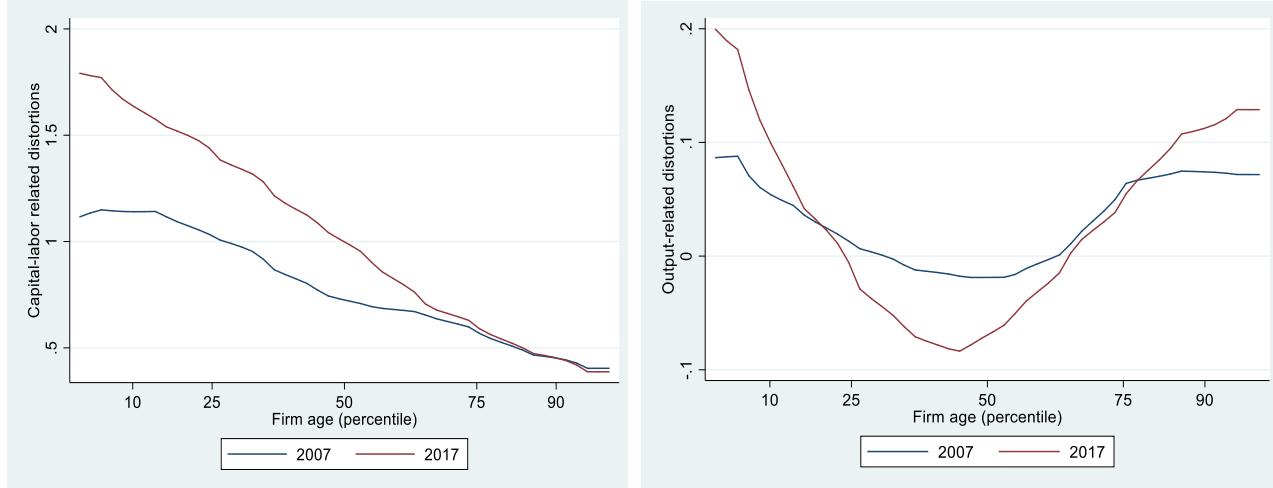
*** p<0.01, ** p<0.05, * p<0.1

Next, the types of distortions are explored to identify whether capital constraints or factors associated with output placement in the market explain the sources of those distortions for younger firms. Figure 6 shows that firms face important capital constraints in the early stages, particularly before the first year, evidenced in larger capital distortions. However, these limitations decrease over time as the firm ages.

On the other hand, output-related constraints appear to be particularly relevant for both firms less than four years old (percentile 25) and mature firms over 15 years old (percentile 75). This could be because younger and relatively newer firms in the market face important restrictions to expand and gain some market share, while middle-aged firms are larger than the efficient scale absorbing resources. Here, evidence suggests that distortions in the Dominican Republic channel

potentially too much capital and labor toward firms that have remained in the market longer, and they limit the availability of productive resources for entering firms.

Figure 6. Capital and Output Distortions by Firm Age, 2007–2017

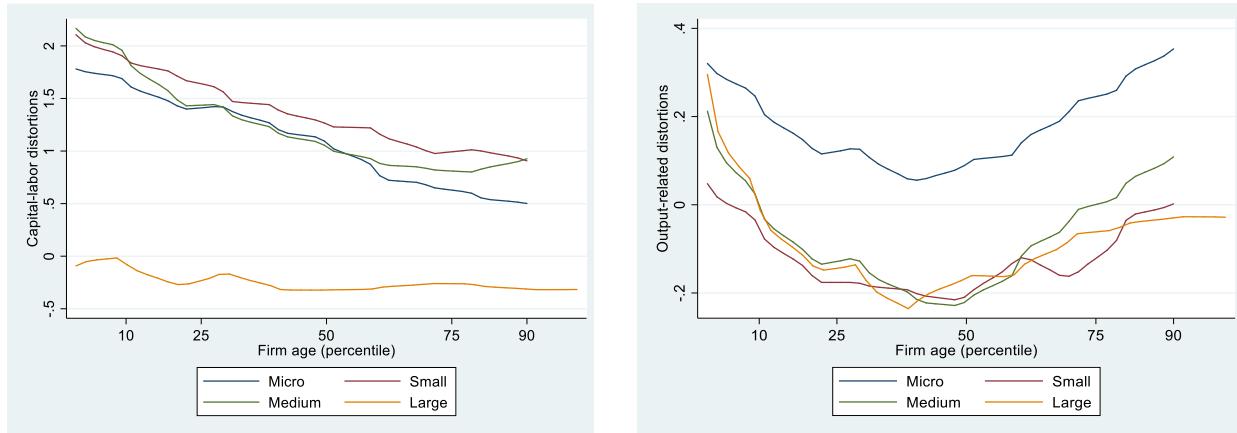


Source: Authors' calculations based on DGII information.

Note: This figure represents the local polynomial smooth with kernel=epanechnikov, degree=0, bandwidth=6.99. Left panel illustrated the capital and labor-related distortions as the representation of scaled $1 + \tau_k$ relative to a given industry and firm age, and the right panel presents the relationship between scaled $1 - \tau_y$ relative to a given industry and the firm age.

This study also explores how capital and labor and output-related distortions vary as a function of firm size and age to identify which distortions are more relevant for micro and small firms, since they account for more than 75 percent of the observations in the data. The exercise, presented in Figure 7, illustrates interesting findings. The left panel in Figure 7 shows that large firms might face some advantages. Because negative values are obtained for these firms, this implies that large firms are rather too large relative to the efficient allocation of resources. It may be diverting too much capital and labor toward the largest firms, which restrains the productivity gains that could be obtained from allocating more resources to micro, small, and medium-sized firms.

Figure 7. Dispersion of Revenue Total Factor Productivity by Firm Size and Age, 2007–2017



Source: Authors' calculations based on DGII information.

Note: This figure represents the local polynomial smooth with kernel=epanechnikov, degree=0, bandwidth=6.99. Left panel illustrated the capital and labor-related distortions as the representation of scaled $1 + \tau_k$ relative to a given industry and firm age, and the right panel presents the relationship between scaled $1 - \tau_y$ relative to a given industry and the firm age. The percentiles correspond to the following ranges of age: < 1 year in percentile 10, 1–4 years percentile 25, 4–8 years percentile 50, 8–15 percentile 75, 15–24 percentile 90.

The right panel in Figure 7 shows that output-related distortions particularly affect micro firms and that these constraints do not disappear as the firms age. With respect to output-related distortions, micro firms cope with larger frictions, indicating that transportation and transaction costs and taxes do not allow them to unleash their productivity and growth potential.

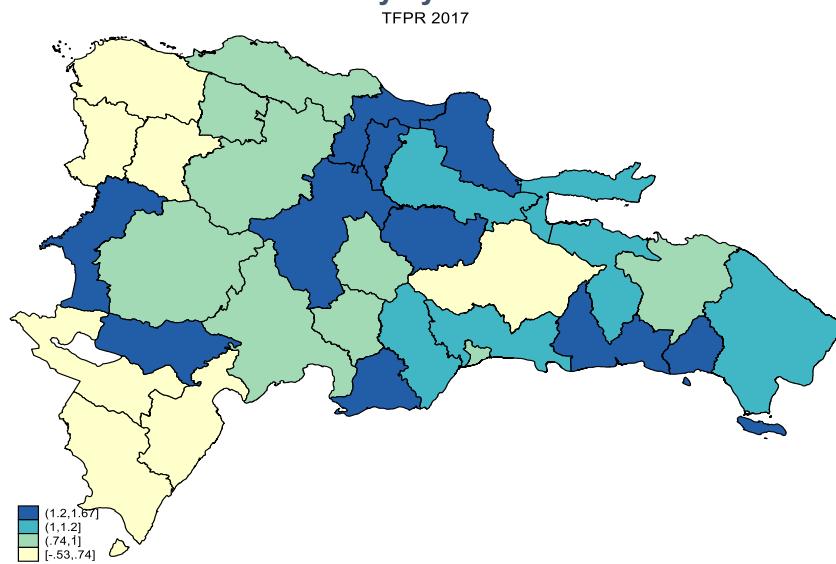
Ability of Provinces to Address Distortions

As multiple policy interventions, access to strategic inputs, transportation and transaction costs, and even tax regimes vary from one province to another in the Dominican Republic, this study looked at whether there are spatial patterns related to the location of more (less) productive firms.

Map 2 shows the high degree of heterogeneity across provinces, as measured by revenue productivity. It shows the median value of the distortions, measured by $\text{Log} \left(\frac{\text{TFPR}_{si}}{\text{TFPR}_S} \right)$, which is the relevant indicator for investigating misallocation issues.

As can be seen in Map 2, in provinces whose revenue productivity values are below 1, firms are absorbing relatively more resources (being relatively less productive) than in the efficient scenario. Consequently, smaller TFPR values suggest that firms in that province are larger than the ideal size. In contrast, values above 1 indicate that firms receive fewer resources than they need to realize their true productivity potential.

Map 2. Distortions in Revenue Productivity by Province in the Dominican Republic, 2017



Source: Authors' calculations based on DGII information.

Interestingly, Map 2 shows significant heterogeneity, which supports the existence of resource misallocation in the Dominican Republic. Some policy interventions, transactions costs, or market failures seem to be distorting the way that capital and labor flow to the most productive firms. For example, TFPR values along the border with Haiti reveal that firms located in Pedernales, Independencia, Barahona, Dajabón, Monte Cristi, and Santiago Rodríguez are absorbing more capital and labor than in the ideal scenario. A similar result is found for Monte Plata. On the other side, firms in the provinces of Baoruco, Peravia, La Vega, Espaillat, Sanchez Ramírez, María Trinidad, San Pedro de Macorís, and La Romana (shaded dark blue on Map 2) are relatively smaller than in the efficient counterfactual. Firms in those provinces exhibit some constraints that limit their access to capital and labor, which consequently restrains their size despite their productivity potential. Finally, lower distortions are evident in Santo Domingo, Distrito Nacional, and Santiago de los Caballeros—provinces where more than 77 percent of the formal firms in the Dominican Republic are concentrated.

Productivity Gains in the Dominican Republic

Following HK, the potential productivity gains can be now be quantified so that, if all distortions were hypothetically removed, resources could flow to the most productive firms, regardless of the sector, size, location, or age. Using the HK framework, the optimal counterfactual is computed, in which the marginal product of capital and labor—TFPR—is equalized within each narrowly defined sector. Subsequently, the gains are aggregated across industries, employing the value-added shares as described in (11).

The results in Table 12 suggest that productivity gains in the Dominican Republic reached 202 percent in 2007 and 355 percent in 2017. As larger distortions were revealed in 2017 compared to 2007, consistently higher potential gains in productivity were found for 2017. The magnitude of the TFP gains was particularly large considering that only those gains that could occur within the formal sector were quantified. Furthermore, comparing these productivity gains with some results from Busso, Madrigal, and Pagés (2013) for comparator countries such as Colombia (50.5 percent), Ecuador (57.6 percent), El Salvador (48.2 percent), Guatemala (60.3

percent), and Honduras (53.4 percent), and total factor productivity gains in the Dominican Republic are particularly significant.

Table 12. Total Factor Productivity Gains in the Dominican Republic, 2007 vs. 2017

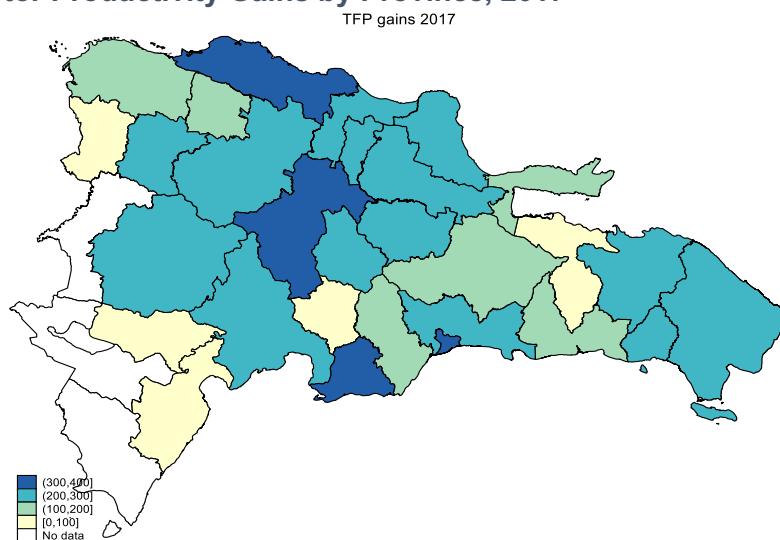
	2007	2017	2017 with respect to USA
All	202	355	218
Agricultural	195	292	175
Manufacturing	185	279	165
Services	211	407	255

Source: Authors' calculations based on DGII information.

TFP gains are also computed at the sectoral level. Removing all distortions could enhance productivity mainly in the service sector, where the potential gains surpass 407 percent. These high values are also symptoms of misallocation issues that are undermining the productivity in the Dominican Republic. However, eliminating the distortions might represent an unrealistic scenario. For that reason, this study obtains the potential TFP gains in the event that the Dominican Republic approached the level of distortions of a less distorted economy using the United States as a benchmark. This exercise suggests that productivity gains would more than double in the aggregate, and that substantial gains are achievable also at the sectoral level the gap is narrowed compared to the distortions observed in the United States.

Furthermore, TFP gains were quantified within each province as a diagnostic instrument to illustrate how they would be distributed across the Dominican Republic if distortions were removed and resources would flow to the most productive units within each province. In 2017, the productivity gains range from 7.8 percent in Bahoruco in the southwest to 365 percent in La Vega, located in the center of the country. Bringing down all distortions would improve productivity for firms across the Dominican Republic, particularly in the eastern provinces such as Altagracia, La Romana, and El Seibo, and the northern provinces, such as Cibao.

Map 3. Total Factor Productivity Gains by Province, 2017



Source: Authors' calculations based on DGII information.

Thus far, this paper has compared productivity distortions in 2007 to those of 2017. Nonetheless, the presence of these distortions might also influence the dynamic of entry, exit, and profile of survival firms in the Dominican Republic and how resources are being allocated among them—the *selection* component.

Productivity Types of Firms that Remain in the Market in the Presence of Distortions

Distortions and misallocation constitute a vicious circle since they promote the emergence and proliferation of dysfunctional firms, which in turn reproduce the misallocation patterns (Levy, 2018). Instead of being allocated to the most fruitful uses, capital and labor flow inefficiently to productivity-anemic firms, promoting their permanence in the market and reducing economic growth. As argued by Levy (2018), when less productive firms perish and exit the market and productive firms thrive and remain, this dynamic itself would release and mobilize resources to the most productive uses, pulling up productivity in an economy. However, market failures, and sometimes policy interventions, may disrupt this process of “destructive creation” (Levy, 2018). This shows that the process is flawed in Mexico, as many low-productivity firms survive while many high-productivity firms exit the market. This process has also impacted resource allocation, as less productive firms are absorbing significant shares of labor and investment.

In the Dominican Republic, low-productivity firms draw about 60 percent of the capital and 31 percent of the labor force within the formal sector. Thus, less productive firms represent a productivity leak. It is therefore important to explore the process of entry, survival, and exit of firms and how this dynamic could be either enhancing or deteriorating the foundations of productivity in the Dominican Republic. Following Levy (2018), firms are segmented into those entering, surviving and exiting the market using the data available for 2007 and 2017. Firms reporting information in 2007 but that do not appear in 2017 are considered as exiting, while firms that only appear in the data in 2017 are defined as entering firms. Firms that appear in both periods are defined as surviving. Table 13 shows that 49.5 percent of the firms observed in 2007 survived until 2017. These surviving units accounted for 32 percent of the total firms observed in 2017, which means that two out of three firms observed in 2017 are new.

Table 13. Entry, Survival, and Exit of Firms, 2007–2017

	Firms	Labor force	Capital ^a	K/L ^b (median)	Labor ^c (median)
2007					
Exiting	9,143	162,665	133,178	0.14	5
Surviving	8,985	291,897	258,882	0.23	8
Total	18,128	454,562	392,060	0.86	25
2017					
Surviving	8,985	435,492	457,507	0.34	11
Entering	19,151	376,972	387,208	0.11	6
Total	28,136	812,464	844,715	1.04	29

Source: Authors' calculations based on DGII information following Levy (2018).

Notes: ^a Values in constant prices of 2008, in millions of DOP.

^b It is the size of a representative firm (median) in terms of number of workers.

^c It is the capital/labor ratio of a representative firm (median) in millions of DOP.

As Table 13 shows, 35.8 percent of the labor force and 34 percent of the capital in 2007 were employed in firms in 2017 that did not exist in 2007.¹⁹ It also suggests that exiting firms were relatively smaller in terms of the number of workers and less capital-intensive, measured as the median of the number of workers and the capital-labor ratio, than surviving firms. In 2017, a representative entering firm employed six workers and was three times less capital-intensive compared to the established firms.

Despite the high rotation evidenced in Table 13, it is necessary to explore whether these forces are wiping out the low-productivity firms or attracting more productive ones. For this purpose, the analysis is conducted by first exploring the dynamic and profile of the surviving firms and then breaking down the “destructive creation” process to characterize the process of entry and exit of firms in the Dominican Republic.

Surviving Firms

The data show that 8,985 firms survived over the period 2007–2017. These firms grew 49.2 percent in terms of the labor force employed and were more capital-intense compared with 2007 as the capital-labor ratio enlarged from 0.23 to 0.34.²⁰

Although surviving firms used more capital and labor in 2017 compared to 2007, it is important to determine whether this allocation of resources was productivity-driven, that is, due to improved capacity to transform them into real output. For this purpose, the surviving firms are broken down into three categories—low-, medium-, and high-productivity—to explore whether there are productivity-enhancing forces that triggered the reallocation of resources. As the share

¹⁹ As this dataset corresponds to the tax-agency records, a firm is considered to have exited if it is not observed in 2017, although this could be attributed to other events. Some reasons why a firm is longer observed in the data are the following: (i) missing tax return in 2017, (ii) operations moved to the informal sector, (iii) shrinking size and income, which enables it to enter a special tax regime such as the STR and removes the requirement to declare, or iv) it exited the market, among others.

²⁰ Capital values are deflated with CPI to 2008 prices such that the increase in the capital ratio refers to the units of real capital (in millions of DOP) per worker.

of resources employed by surviving firms exceeds 54.2 percent and 53.6 percent of the capital and labor, respectively, in 2017, the patterns evidenced here are indicative of what occurs in the Dominican Republic.

Table 14 illustrates the movements of firms between the productivity segments.²¹ The diagonal elements show the number of firms that report neither improvements nor downturns in productivity. These firms account for over 56 percent of the sample, suggesting that more than half the firms report no structural change in productivity over the period 2007–2017.

Table 14. Productivity Breakdown of Surviving Firms, 2007–2017

		2017		
		Low	Medium	Large
2007	Low	1,392	784	85
	Medium	1,286	2,975	479
	High	259	1,033	692
	Total	2,937	4,792	1,256
		8,985		

Source: Authors' calculations based on DGII information.

Some productivity-enhancing forces are evidenced in the elements above of the diagonal, 1,348 firms thrust forward from lower segments to the upper level between 2007 and 2017. However, these firms represent only 15 percent of the formal firms studied. By contrast, 2,578 firms (28.6 percent) lost productivity. This suggests that six out of seven firms that were observed in both 2007 and 2017 declared either stagnant or lower productivity. Consequently, the share of low-productivity firms increased from 25.2 percent to 32.7 percent. In contrast, the fraction of highly productive firms declined from 22.1 percent to 14 percent over the period 2007–2017 within the surviving segment.

The productivity decomposition is useful in exploring how labor and capital are allocated among firms according to their productivity movements. Tables 15 and 16 describe the share of resources assigned to each type of firm. In 2017, only 12.3 percent of labor was assigned to productivity-enhanced firms and 24.6 percent of the labor is allocated among firms with lowered productivity. A similar pattern is found for the allocation of capital. Less than 10 percent of the capital is assigned to firms that increased productivity, while 28 percent was employed by firms with lowered productivity.

Table 15. Labor Distribution within Surviving Firms by Productivity Segment (%)

		2017		
		Low	Medium	Large
2007	Low	19.5	9.1	0.3
	Medium	14.9	40.2	2.9
	High	1.1	8.6	3.4
	Total	35.5	57.7	6.6

Source: Authors' calculations based on DGII information.

²¹ Low-productivity firms are those with TFPR below the 25th percentile; medium-productivity are those located between the 25th and 75th percentile, and high-productivity are those above the 75th percentile for the respective year.

Table 16. Capital Distribution within Surviving Firms by Productivity Segment (%)

		2017		
		Low	Medium	Large
2007	Low	37.0	9.4	0.1
	Medium	23.9	24.9	0.3
	High	1.2	2.9	0.3

Source: Authors' calculations based on DGII information.

These results suggest that productivity is declining among surviving firms and misallocation issues are undoubtedly present in Dominican economy. A large fraction of strategic inputs is devoted to low-productivity firms, while only a small part goes to the most productive units. This means that the country could be producing more with the same amount of resources. In terms of workers, 12 of every 100 workers in the Dominican Republic are employed by high-productivity firms, 24 by low-productivity firms, and 64 continue in plants that did not report significant changes in productivity over the 10-year period. Similarly, less than 1 unit of capital is invested in productivity-enhancing plants for every 10 units of capital invested in surviving firms.

Entering and Exiting Firms

Next, the study explores the dynamic of firms following the concepts of productivity-enhancing and productivity-reducing, proposed by Levy (2018). The first occurs as low-productivity firms exit the market, while the second case, particularly undesirable for productivity, emerges when highly productive firms exit the market.

As before, the TFPR estimates are employed following the HK methodology and the distribution is split into three segments. Firms below the 25th percentile are defined as low-productivity plants, those between the 25th and 75th percentiles are considered as average-productivity plants, and those above the 75th percentile are considered highly productive plants. The purpose of this exercise is to identify the productivity segment in which the firm was located before it exited the market. It found that 2,271 exiting firms were in the low-productivity segment, 4,324 were in the average range, and 2,548 were in the high-productivity segment.

This finding has both positive and negative repercussions for productivity in the Dominican Republic. The positive aspect is that the exit process eliminated about 50 percent of the firms that fell within the low-productivity segment observed in 2007 (2,271 over 4,532 identified in 2007), which should be the natural result of a market operating efficiently. However, the exit also extinguished 2,948 highly productive firms, accounting for 56 percent of highly productive firms observed in 2007. Thus, market forces erased both low-productivity and high-productivity firms, but more of the latter than the former.

Are entering firms counterbalancing this process? To answer this question, the exercise is replicated by splitting the distribution of firm-level TFPR into three segments and examining whether these new plants are steering productivity toward a more productive field. The 19,151 entering firms are divided as follows: 5,778 (21 percent) in the low-productivity segment, 4,097 (30 percent) are in the high-productivity segment, and the remaining 9,276 (49 percent) are in the medium-productivity segment. Eighty-two percent of the plants in the highest segment in 2017 were new firms.

Three main forces are impacting productivity in the Dominican Republic. First, surviving firms are mostly stagnant or decreasing in productivity, suggesting that the small improvements in productivity, observed in the right tail of Figure 2, are mainly derived from the process of entry and exit of firms. Second, although market forces are wiping out less productive firms, they are also sweeping away highly productive firms in the Dominican Republic. Finally, entering firms play a significant role in elevating overall productivity, 82 percent of the plants are in the highest segment in 2017.

The entry of highly productive plants is counterbalanced by the exit of highly productive firms along with the permanence of many firms with null productivity improvements. This means that the process of destructive creation is not working properly in the Dominican Republic. Moreover, economic distortions are contributing to the exit of productive firms while they may be aiding unproductive units to enter and remain in the market. This has harmful consequences for the allocation of resources, as a high fraction of labor and capital is concentrated among firms that are not growing over time, hampering the country's potential.

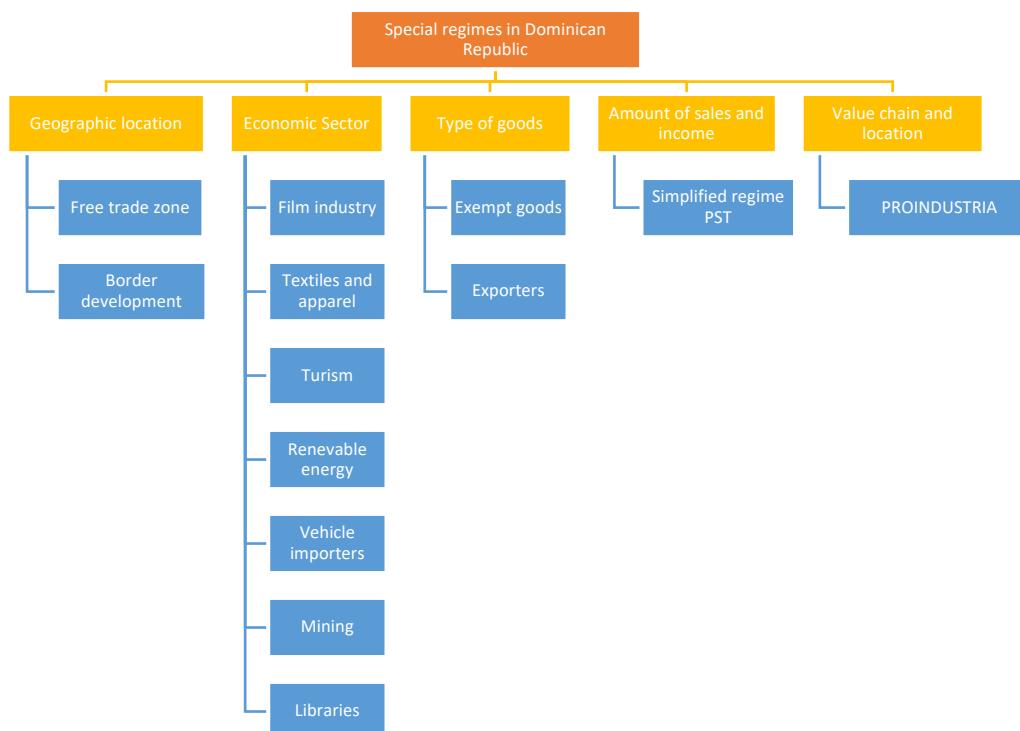
There are several possible reasons for these distortions and poor productivity performance, including labor market regulation, tariffs, transportation costs, capital constraints, and tax schemes. Special tax regimes offer segmented and differentiated tax rates across firms depending on size, economic sector, location, and other factors. As a result, the application of special tax regimes could provide uneven incentives for different subsets of firms, which result in types of distortions mentioned above. In the past two decades, 13 different special tax regimes and incentives were issued, which vary depending on the economic sector, geographic location, sources of inputs, and firm size, among others.

3. Special Tax Regimes in the Dominican Republic

Since the 1990s, a wide variety of special tax regimes have been implemented. They emerged as an instrument to support specific agents in the economy, boost the growth of incipient and local industries, and promote exports and economic growth in remote regions. However, the use of these instruments has come at a cost for the country's economy.

The plurality of special tax regimes has increased the complexity of the tax system. As shown in Figure 8, a taxpayer in the Dominican Republic could register in a different regime depending on (i) the geographic location where the company is operating, (ii) the type of economic activity, (iii) the amount of sales/income declared, (iv) the type of goods produced or sold, (v) the origin of the inputs and raw materials used, or (vi) the destination of the local production, among others.

Figure 8. Main Special Tax Regimes in the Dominican Republic



Source: Authors' elaboration.

Special tax regimes have a variety of repercussions for the Dominican economy. First, they increase the complexity of the tax system for taxpayers and the tax authority alike. According to the World Bank, the Dominican Republic ranked in 149th out of 190 economies on the indicator that records the procedures and complexity of paying taxes in 2017 (World Bank, 2018).²²

²² This indicator analyzes a case study of a medium-sized company, which makes the results comparable across economies evaluated. It includes all the taxes and contributions that must be paid by the employer, such as corporate

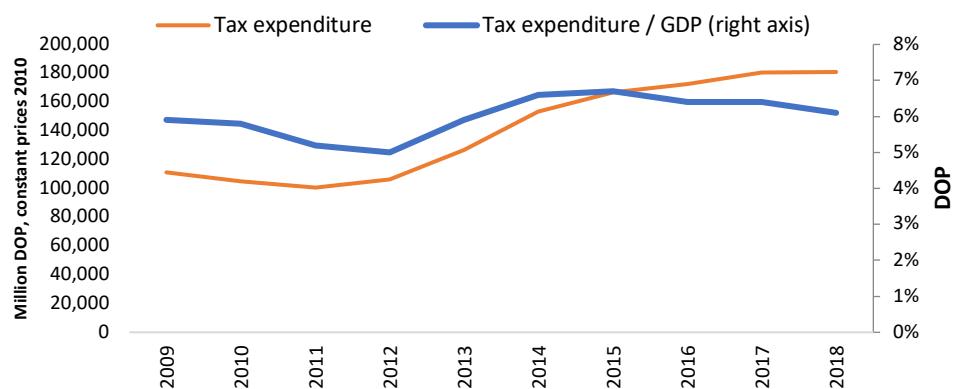
Although a company must make only 7 payments per year in the Dominican Republic—compared to 28 payments for LAC region—complying with the procedures takes an average of 317 hours per year.²³ Just examining the number of payments, the Dominican Republic would be in the top 10 percent economies, with one of the lowest number of payments required. However, because of the length and complexity of the procedures, a Dominican firm spends more time than a similar company in 75 percent of the economies analyzed worldwide.

Special tax regimes are also costly for the tax authority to administer and monitor. The tax authority must manage a more complex set of procedures, which requires more physical, technological, and human resources. They also create more opportunities for tax evasion. In fact, the Dominican Republic reports one of the highest tax evasion rates in the region, with 38 percent and 65.2 percent in VAT and income tax evaded, respectively, according to ECLAC (2017).²⁴

The use of special tax regimes emerged initially as a strategy to broaden the tax base and encourage smaller contributors to enroll in reduced tax and simplified procedures (Azuara et al., 2018). These incentives would not only benefit the newly enrolled contributors, but also the incumbents. Thus, larger and formal firms would have incentives to under-report their true size (as measured by total sales, workers, profit, and capital) to reduce the amount of tax owed (Azuara et al., 2018). Therefore, while at first glance the use of these incentives appears to be beneficial, it can also increase tax evasion and create significant distortions. These distortions affect tax revenues because the exemptions and discounted tax rates related to special regimes results in lost revenues.

The Ministry of Finance reports that tax expenditures have increased significantly over the last decade. As shown in Figure 9 the decade between 2009 and 2018 saw an upward trend in tax expenditure in nominal and relative terms. Total tax expenditures increased by 62 percent, from DOP 111.3 million to DOP 180.8 million over the decade.

Figure 9. Tax Expenditures in the Dominican Republic 2009–2018



Source: Authors' elaboration based on DGII's matrix of tax expenditures 2009–2018.

tax, social contributions, labor taxes, property taxes, dividend tax, capital gains, and financial transactions taxes, among others.

²³ The average number of payments is 24, and the time required across 190 economies studied to pay taxes is 240 hours.

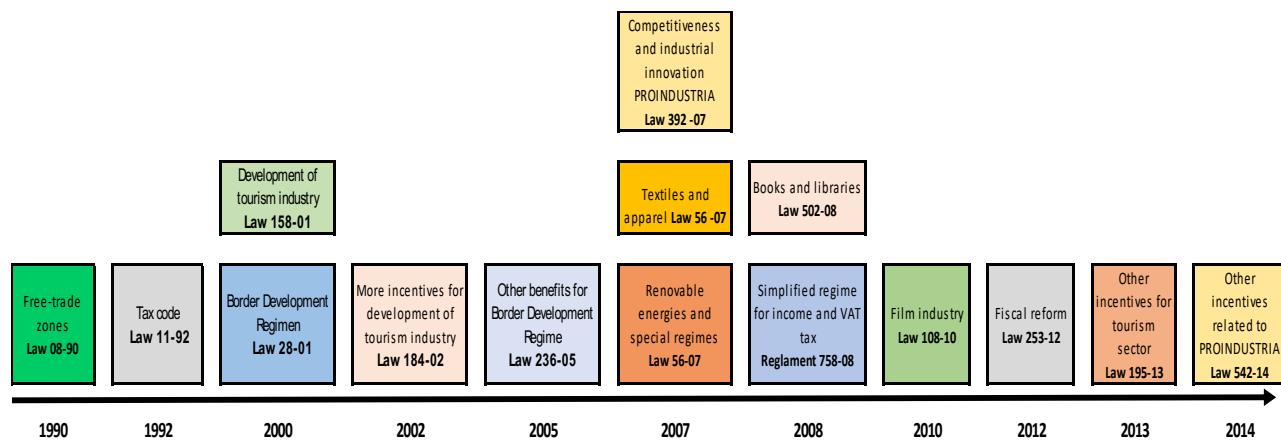
²⁴ The average evasion rate for LAC is 27.8 percent on the value-added tax and 47.5 percent on income tax.

Tax expenditures amounted to 6.1 percent of GDP in 2018 (Figure 9). For the most part, tax expenditures are explained by incentives granted to the private sector (2.06 percent of GDP), exemptions to natural persons (1.93 percent GDP), public sector (1.42 percent of GDP), and others (0.65 percent).²⁵ The cost of special tax regimes also poses significant fiscal risks. Estimations and projections from the International Monetary Fund (IMF, 2017) suggest that the tax revenues in the Dominican Republic have been stagnant at 13 percent of GDP since 2005. Thus, almost half of current government revenues are foregone as result of the incentives associated with STRs.

In addition to these costs, the implementation of special tax regimes can create unnoticed and undesirable changes in firm behavior. As firms navigate among different regulations and incentives, they may find it profitable to stay under the umbrella of a specific tax regime even at the expense of expansion plans, which translates into a larger mass of size-reduced and productivity-constrained firms.

The Dominican tax system is particularly complex, since its regulatory framework includes three general acts, 11 laws that create special tax regimes, and 19 dispositions with specific tax incentives (Cardoza, 2018). As shown in Figure 10, firms in the Dominican Republic navigate in a dense regulatory framework to pay their taxes. Since 2000, 13 regulations have been enacted that have introduced tax incentives and exemptions. In some cases, a 100 percent exemption on domestic taxes, reductions in licenses fees, and reimbursement has been created. Some incentives have also changed over short periods.

Figure 10. Timeline of Special Tax Regimes in the Dominican Republic



Source: Authors' elaboration based on a regulatory framework review.

General Tax Regime - Law 11 of 1992

Law 11 of 1992 established the Tax Code in the Dominican Republic. It defined the general dispositions related to the income tax, the value-added tax (VAT), selective consumption taxes, procedures, and some provisions for specific agents in the economy. This code set the rate of 28 percent for income tax and 18 percent for the VAT.²⁶ Law 253 of 2012 proposed the reduction of

²⁵ The greatest number of private sector incentives consist of benefits granted to firms located in free-trade zones, which accounted for 1.09 percent of GDP in 2018.

²⁶ In 2012, Law 253 proposed to decrease the VAT progressively, but fiscal pressures prevented this reduction.

the income tax to 27 percent and the VAT to 16 percent starting in 2015. However, the reduction in the VAT was conditional on reaching specific fiscal goals that were not achieved as proposed. Since 2015, the income tax rate has been 27 percent, and the VAT stayed at 18 percent.

Free-trade Zone - Law 08 of 1990

In 1990, Law 08 established a set of customs and fiscal instruments to foster the installation of firms either domestic or foreign whose production and/or services were destined for the export market. The Law created three types of free-trade zones: (i) industrial and services zones, (ii) border zones, and (iii) special zones. The first type can be installed in any location of the Dominican Republic to produce manufacturing goods and services. The second category refers to those zones that are located between 3 and 25 kilometers of the border with the Republic of Haiti.²⁷ Finally, the special trade zones require a specific location for sourcing of strategic resources whose transformation would be difficult if companies were not located close together. Table 17 describes the exemptions and tax incentives defined by Law 08-90.

Table 17. Exemptions and Tax incentives, Free-trade Zone Law 08-90

Exemption	<ul style="list-style-type: none"> - 100% income tax and VAT - 100% construction taxes - 100% taxes related to the registration and transfer of immovable assets - 100% tax for the registration of commercial companies or increases in the equity. - 100% municipal taxes. - 100% tariffs, fees and related taxes that apply on the inputs, equipment, construction materials used to build or operate in the free-trade zone. - 100% all export-related taxes - 100% patent fees - 100% import tariffs in equipment and transportation vehicles used in workers facilities
Other incentives	<ul style="list-style-type: none"> - Subsidized prices for the installation of firms in the border provinces.

Source: Authors' elaboration.

The tax benefits and exemptions can be granted for a period of 20 years for the border free-trade zones and for a period of 15 years in any other locations. The National Council of Free-Trade Zones is the regulatory body in charge of enforcement and monitoring of Law 08-90.

Firms operating in free-trade zones are also required to comply with the labor provisions in the Labor Code for the Dominican Republic, the social security contributions established in Law 87-01. However, there are some specific provisions related to the minimum wage and profit-sharing procedures for firms within this regime. The National Committee of Salaries determines the minimum wage in free-trade zones. It differs from wages applicable to any other private firm in the Dominican Republic. The latest adjustment of wages within free-trade zones was defined in Regulation 10 of 2011, which set the minimum wage at DOP 6,320. This is 7.8 percent lower

²⁷ It involves the following provinces: Pedernales, Independencia, Elías Piña, Dajabón, Montecristi, Santiago Rodríguez and Bahoruco.

than the minimum wage for a medium-sized firm operating in any other location in the Dominican Republic.²⁸

Regarding the annual profit distribution, firms operating in the free-trade zones are exempt from the 10 percent profit sharing defined by the Labor Code in Law 16 of 1992. Workers' participation in company profits is mandatory in the Dominican Republic regardless of the size of the firm, but only applies to permanent workers.²⁹

Border Development Regime – Law 28 of 2001 and Law 236 of 2005

Law 28 of 2001 created a special zone for the development of seven provinces located on the border of the Dominican Republic and Haiti: Bahoruco, Dajabón, Elias Piña, Independencia, Montecristi, Pedernales, and Santiago Rodriguez. It was enacted to address several issues related to depopulation, under-exploitation of strategic inputs located in isolated areas, and poverty intensification. The main purpose of this law is to attract new projects and investment in different sectors and bring economic and social development to these provinces.

All companies in the agriculture, energy, industrial, metallurgy, and tourism sectors, as well as those operating within a free-trade zone that existed at the time this law went into force, and those that install operations within any of the seven provinces are subject to the benefits and exemptions described in Table 18 for a period of 20 years.³⁰

Table 18. Exemptions and Tax Incentives, Border Development Law 28-01

Exemption	100% on all internal taxes, including income and VAT. 100% on tariffs on inputs, raw materials, equipment, and machinery
50% reduction	Payment of transit and license taxes to use ports and airports Any other tax, fee, current or future contributions, while the 20-year exemption period is in force.

Source: Authors' elaboration based on Law 28-01.

Law 236 of 2005 established some guidelines related to the transference of goods and services produced by firms operating in these provinces. It stipulates that goods and services produced within the seven provinces that are transferred to the local market are subject to the VAT as well as selective consumption taxes in the case of goods derived from alcohol, tobacco, among others. Thus, the clarification made by Law 236-05 indicates that sales and transference to local market are subject to the VAT rate of 18 percent as well as the respective selective consumption tax.³¹

²⁸ The minimum wage for the private sector outside a free-trade zone in Dominican Republic is defined as a function of the capital declared by the firm. In 2011, the minimum wage defined by Regulation 5 of the National Committee for Salaries was DOP 6,035 for firms with less than DOP 2 million pesos in capital, DOP 6,810 for firms with capital between DOP 2 and 4 million, and DOP 9,905 for those companies with capital exceeding DOP 4 million.

²⁹ The Labor Code establishes that only indefinite-term contract workers can participate in profit sharing. Among other exemptions, Act 16 of 1992 excludes agricultural, industrial, and mining firms within their first three years of operation and agricultural firms with capital less than DOP 1 million.

³⁰ The period for benefiting from the tax incentives begins at the start of operations of the firm.

³¹ Selective consumption taxes are levied on the transference of some goods, such as alcoholic beverages and tobacco, and for some services (regardless of origin), and they vary by product. For instance, the tax on alcoholic beverages is

In addition, this law contains a clause indicating that there might be a substantial transformation on raw materials to make use of the 100 percent exemption from tariffs on inputs. "Substantial transformation" is defined as the change in the tariff code of the final good compared to the originally imported good to demonstrate the amount of value added in the process. It also specifies that packaging, mixing, grinding, and/or refining products are not considered eligible procedures to benefit from the tariff exemption provided in the Law.³²

Article 15 of the General Budget Law, Act 243 of 2017, stipulates that firms that import inputs under this regime, such as materials, machinery, and capital goods, are required to pay 50 percent of the VAT rate.

Development of Tourism Industry – Law 158 of 2001 and Law 184 of 2002

Law 158 or 2001 proposed a set of incentives for developing the tourism sector in isolated districts and provinces with great potential and natural conditions for tourism exploitation.³³ All natural and legal persons that promote or invest in activities in tourism areas, districts, or municipalities listed in Article 1 of the Law can benefit from the incentives described in Table 19.

Table 19. Exemptions and Tax Incentives, Tourism Development Law 158-01 and Law 184-02

Exemption	<ul style="list-style-type: none"> - 100% from income tax - 100% from taxes for constituting societies or increase capital - 100% from national and municipal taxes for transferring properties - 100% from import taxes and all fees, including VAT on equipment, machinery, and all materials required for the installation and operation of the facility.
Deductions	<ul style="list-style-type: none"> - Natural persons can deduct any investments in tourism projects up to 20% of the annual taxable income for a maximum period of five years.

Source: Authors' elaboration based on Law 158-01 and Law 184-02.

The following economic activities are eligible for these tax incentives: (i) construction and operation of hotels; (ii) construction of facilities for conventions, fairs, and international events; (iii) promotion of cruise-ship activities; iv) construction and operation of ecological and recreational parks; (v) construction and operation of ports and maritime infrastructure; (vi) small and medium-sized businesses that are supported mainly by tourism, such as crafts, ornamental plants, and

defined as a function of the quantity; telecommunication and insurances services are taxed at 10 and 16 percent, respectively.

³² In 2014, the Association of Industries of Dominican Republic filed a lawsuit to declare Law 28-01 unconstitutional based on the distortions introduced to the market. The suit claimed that this regime (i) creates incentives to import tariff-free merchandise and to sell it in local markets at artificially low prices; (ii) weakens the productive process, since the firms limit their activity to simple re-packing processes without generating employment or adding value; (iii) creates an unjustified inequality, generating an environment of unfair competition. (Tribunal Constitucional: Sentencia TC/253/14, p. 8).

³³ These tourism poles are defined in Article 1 of Law 158-2001.

breeding farms; and (vii) facilities for the tourism industry. The tax exemption period for each project or tourism company is 10 years starting from the date of completion of construction.

Textile Sector - Law 56 of 2007

Law 56 of 2007 declares the textile, apparel, leather and footwear manufacturing industries to be national priority sectors and creates a specific regulatory regime for these industries, operating either in free-trade zones or any other part of the national territory (Table 20).

Table 20. Exemptions and Tax Incentives, Tourism Development Law 56 of 2007

Exemption	<ul style="list-style-type: none">- The purchases and imports of inputs, materials, machinery, equipment defined in the Article 3 are exempt of 100% VAT and other taxes.- The import tariff is set at 0% for the goods defined in Article 3.
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Source: Authors' elaboration based on Law 56 of 2007.

According to Article 4, all firms operating in the industries listed above that are not registered in other customs regimes or special provisions are also exempt from the income tax. For that purpose, the firm must receive an authorization provided by the National Council of Export Zones. The Law does not establish a specific period for using the tax incentives proposed in this regime. In 2017, Article 15 of the General Budget Law, Act 243 of 2017, stipulates that firms that import capital goods, inputs, machinery, and materials under this regime are required to pay 50 percent of the VAT rate.

Renewable Energies - Law 57 of 2007

Law 57 of 2007 establishes several tax incentives designed to promote the creation of new technologies and the use of alternative, clean, and renewable sources of energy (Table 21).

Table 21. Exemptions and Tax Incentives, Renewable Energies Law 57 of 2007

Exemption	<ul style="list-style-type: none"> - 100% of all import taxes on equipment and machinery imported by individuals or firms required to produce energy from renewable sources. The specific list of goods, parts and equipment is described in Article 9. - 100% of VAT and sales taxes. - 100% of income tax for a period of 10 years since the start of operations
Reduction	<ul style="list-style-type: none"> - 5% reduction in the tax on interest for external financing established in Article 306 of the Tax Code.
Tax credit	<ul style="list-style-type: none"> - Up to 75% of the costs and investment in equipment can be applied as a tax credit on the income tax to be declared by owners or tenants of family dwellings, commercial or industrial houses that change to or expand for renewable sources systems in the provision of their private energy consumption and whose projects have been approved by the competent agencies.³⁴

Source: Authors' elaboration based on Law 56 of 2007.

Competitiveness and Industrial Innovation – PROINDUSTRIA, Law 392 of 2007

Law 392 of 2007 creates a normative and institutional framework for the purpose of developing the manufacturing industry, stimulating the diversification of the Dominican economy, and strengthening value-chain channels and the competitiveness of Dominican products in international markets.

For these purposes, the law proposes the creation of industrial parks and districts to foster collaboration among firms within the manufacturing sector related to the following:

- Installation of logistics nodes
- Import of inputs and raw materials
- Transit of inputs, raw materials, and intermediate goods from and to local markets to be processed and transferred once finished to the special zone or export markets³⁵
- Promotion of specialization and clusters to group small and medium-size companies involved in similar manufacturing activities

It also establishes several tax incentives and special customs regime provisions, described in Table 22.

³⁴ The tax credit is discounted in the 3 years subsequent at a rate of 33.3 percent.

³⁵ Article 27 of Law 392-07 establishes that inputs, intermediate goods, and raw materials must be transferred from any industrial region subject to a special regime toward the local territory to be processed and must return to the special zone in a period no longer than six months.

Table 22. Exemptions and Tax Incentives for Legal Person, Special Regime PROINDUSTRIA, 2007

Exemptions³⁶	<p>100% VAT related to imports of:</p> <ul style="list-style-type: none"> - Raw materials, inputs and intermediate goods - Industrial machinery and capital goods for industries defined in Art 24 of Law 557-05. - Other capital goods and inputs that have tariff rate 0. <p>100% Import tax, tariffs, custom fees and related taxes of:</p> <ul style="list-style-type: none"> - Inputs and raw materials used to the effect of "partially processed" goods.
Reimbursement	<p>National and foreign firms classified by PROINDUSTRIA, who export to third markets have the right to request the reimbursement of the taxes listed below in the same proportion as the share of exports over total income in a year:</p> <ul style="list-style-type: none"> - VAT - Selective tax on consumption of telecommunications - Selective tax on consumption of insurance - Selective tax on consumption of fuels (Law 495-06) - Tax on checks <p>Exporters have two months to request reimbursement of those taxes. Administrative silence from the Customs Authority will be considered an authorization of the reimbursement, and the taxpayer can apply it toward any other tax as a compensation or credit.</p>
Accelerated depreciation	<p>For a period of five years after the enactment of the Law, the industries that classify can:</p> <ul style="list-style-type: none"> - Apply expedited depreciation, which reduces by half the time established by DGII to report the value of machinery, equipment, and technology acquired. - Deduct all the investments in machinery, equipment and technology up to 50% of taxable income of the previous year. - Deduct the assets defined in Article 19 of Law 557-05 and the fixed assets purchased for the renovation of the industry from taxable income.
Deductions	<p>All Dominican firms that donate to support PROINDUSTRIA can deduct the amount of the donation (cash or in-kind) for from their income tax.</p>

Source: Authors' elaboration based on Law 392-07.

³⁶ Article 24 of Equivalent Treatment of Local Manufactured Goods establishes that the incentives given to purchases of foreign goods, including exemptions from tariffs and taxes, must be applied identically on fungible locally produced goods. For this purpose, sales of local firms to the beneficiaries of these tax incentives must be documented with the authorized payment vouchers defined by DGII.

Law 392 also offers a set of tax incentives for natural persons who are explicitly authorized by PROINDUSTRIA and are interested in developing an industrial park. The incentives applicable in this case are described in Table 23.³⁷

Table 23. Exemptions and Tax Incentives for Natural Person in Industrial Parks, Special Regime PROINDUSTRIA, 2007

Exemptions	<p>100% of national and municipal taxes related to the issuance and use of construction licenses.</p> <p>100% of import taxes, contributions and fees, including the VAT applied on:</p> <ul style="list-style-type: none"> - Equipment, materials, furniture imported for the first installation and for the first restauration of the industrial park. - Goods obtained in the local market.
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Source: Authors' elaboration based on Law 392-07.

To be part of this regime and receive the incentives described above, firms must request an official authorization from PROINDUSTRIA. The firms need to be classified according to the requirements defined by PROINDUSTRIA and receive an industrial identification, which is renewable every two years.³⁸ The authorization is provided by the board of directors of PROINDUSTRIA, which consists of the secretary of the Ministry of Industry and Trade, Planning and Development, the National Council for Competitiveness, and the director of the customs agency, among others, and five representatives from private sector. In 2014, Law 542 modified Law 392-07, broadening the scope of the transition period. It also proposed some changes in the tax incentives for the firms that are subject to this special regime, as shown in Table 24.

³⁷ If the authorization for installation and equipment of the industrial park is issued but the project does not start or operates with interruption within a period of two years, the authorization is nullified, and all the tax incentives must be repaid.

³⁸ The criteria for obtaining the classification are based on procedural steps such as presenting the updated mercantile register, sanitary permit, and official forms. There are no specific minimum requirements with respect to size of the firm, number of employees, or sales.

Table 24. Changes Introduced to Tax Incentives under PROINDUSTRIA, Law 542 of 2014

Exemptions	<p>99% of VAT related to imports of:</p> <ul style="list-style-type: none"> - Inputs, and raw materials defined in Article 24 of Law 557-05. <p>100%:</p> <ul style="list-style-type: none"> - Industrial machinery and capital goods used in the production, and other capital goods and inputs that are not subject to tariffs.
Accelerated depreciation	<p>The five-year transition period is extended for three additional years, such that the firms classified can³⁹:</p> <ul style="list-style-type: none"> - Apply expedited depreciation and double the percentage of depreciation for each category of goods, according to the Tax Code, including machinery, equipment and technology acquired. - Deduct all the investments in machinery, equipment, and technology, up to 50% of taxable income for the previous year. (The assets defined in Article 19 of Law 557-05 and the fixed assets purchased for renovation of the industry are not considered taxable income.)

Source: Authors' elaboration based on Law 542-14.

Books and Libraries – Law 502 of 2008

Law 502 of 2008 created a special regime for the publishing industry for the purpose of promoting the development and growth of publishing and the literary creation. Editing and the graphic and technical processes related to it, as well as distribution and sale of books, are considered part of the publishing industry (Table 25).

³⁹ Law 392 of 2007 entered in force in January 2008. Thus, the initial transition period proposed was 2008–2012, and Law 542 of 2014 extended it to 2015.

Table 25. Tax Incentives for Publishing Industry, Law 502 of 2008

Exemptions	<ul style="list-style-type: none"> - 100% VAT on the importation of books and related editorial products as well as the sale in the Dominican Republic of books and related editorial products. - 100% of VAT on the production of books and related editorial products, their graphic components, and printing. - 100% of income tax for 10 years to all firms related to printing, graphics, and technical companies provided they are legally established in the Dominican Republic and are dedicated exclusively to printing or publication of books and related editorial products. - 100% of income tax for all bookstores established as legal entities. - 100% of import tariffs on paper and inputs, photographs, films, prints, cardboard, plates, lithographic ink, raw materials and supplies, machinery and equipment for printing or publishing books and publishing products. - 100% of import tariffs on books and related editorial products. - 100% of all taxes on exports of books, magazines, and brochures edited and printed in the Dominican Republic.
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Source: Authors' elaboration based on Law 542-14.

Article 26 establishes that these incentives are compatible with any other incentives. Other exemptions are also applicable for the personal income tax of the authors and translators of works edited and published in the Dominican Republic.

Simplified Tax Regimes for Small Taxpayers – Regulation 758 of 2008

In 1992, Article 290 of the Tax Code created a simplified regime applicable to natural persons and single-owner businesses whose income does not exceed DOP 100,000 per year. These taxpayers could deduct for any item up to 30 percent of gross income to determine taxable net income.

In 2000, Regulation 1199 proposed a modified regime for small taxpayers called the Simple Estimation Regime, covering single-owner companies and corporations with annual income below DOP 6,000,000.⁴⁰ In 2004, the secretary of state for finance modified these procedures with Regulation 1521 to define the tax declaration for those natural persons and single-owner businesses whose annual gross income does not exceed DOP 2,000,000. This regulation established that the net taxable income would be computed as 70 percent of gross income and will be taxed accordingly at the rates shown in Table 26.

⁴⁰ Article 1 of Regulation 1199 also covers natural persons and self-employed professionals whose incomes fall below the threshold indicated. Among the requirements to be eligible for this regime, Article 3 requires that the firm has only one establishment and registers as a formal firm.

Table 26. Determination of Net Taxable Income, Simple Estimation Regime

Range	Tax rate (%)
<= DOP 360,000	15
DOP 360,001 - 500,000	20
>= DOP 500,001	25

Source: Regulation 1521 of 2004.

In 2007, Law 172 modified Article 290 of Law 11 of 1992, establishing that all natural persons and single-owner businesses with revenues of more than 50 percent of sales of goods exempt from VAT and whose gross income does not exceed DOP 6,000,000 are eligible to deduct up to 40 percent of their taxable income to determine their net income subject to the income tax.

In 2008, this mechanism was replaced by Regulation 758, which proposed a new set of rules for determining the income tax and VAT for both small and medium-sized firms. The system proposes two procedures based on either income or purchases for a set of specific economic activities. Since 2008, this tax regime has been applicable for small and medium-sized firms.

Simplified Tax Regime Based on Purchases

Single-owner businesses, legal or natural persons that satisfy a specific set of criteria, must use the simplified regime to declare their income taxes and VAT. The eligibility requirements are based on the level of purchases and the economic activity performed. According to Regulation 758-08, those agents whose purchases does not exceed DOP 30,000,000 and who are involved in the following economic activities are eligible to use the simplified regime based on purchases⁴¹:

- Commercial activities of retail sales to final consumers such as grocery stores and *colmadones*⁴² that do not issue receipts valid for tax credit for the VAT or for expense purposes in the income tax.
- Commercial activities of wholesale and retail providers whose inventory of industrial products in obtained primarily and directly from domestic industrial companies or from wholesalers.
- Production of manufactured goods and sales to companies that are not under the Simple Estimation Regime and that obtain their inputs from the local market.

The firms and natural person that benefit from this regime are not required to do the following⁴³:

- Submit the information on tax receipts established in the General Regime 01-07
- Make advanced payments of income tax⁴⁴
- Pay the assets tax

⁴¹ The sales limit is indexed and varies yearly. In 2018, the limit set by the DGII was DOP40.7 million.

⁴² *Colmadones* are locales in the Dominican Republic that sell liquor as well as groceries and other items.

⁴³ Among the requirements for the simplified regime, the taxpayers should be registered in the National Register of Taxpayers in the case of a legal entity, reporting capital, shareholders, and economic activity. In addition, the taxpayer should file the respective forms and be up to date in the payment of tax obligations.

⁴⁴ Instead of the advances, the taxpayer can pay the income tax in three segments.

In addition, Regulation 758-08 establishes a set of rules for determining taxable income as well as the income tax to be applied according to the volume of purchases reported and the economic activity.

Determination of the Income Tax

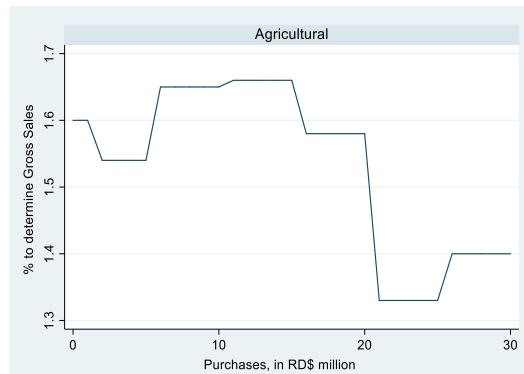
Instead of reporting taxable income and applying a tax rate as in the general regime, the simplified regime designs a scheme that varies the tax rate as a function of (i) the volume of purchases and (ii) the economic activity of the taxpayer. Hence, the taxpayer should report the economic activity and the level of purchases, presumably below the threshold of DOP30 million, and the tax will be determined based on 2 computations.

First, the mechanism requires to recover the hypothetical level of gross sales associated with the level of purchases declared by the taxpayer. Article 11 of Regulation 758-08 establishes different rates to be applied. For instance, within the manufacturing sector, taxpayers that declared the same amount of purchases might be subject to different rates depending on the economic activity such that companies with even the same value of purchases would pay a different tax rate if they are reporting activities in textiles, furniture, or footwear. The computations to obtain the gross sales is defined in (1).

$$(12) GS = P * (1 + \delta_{ls})$$

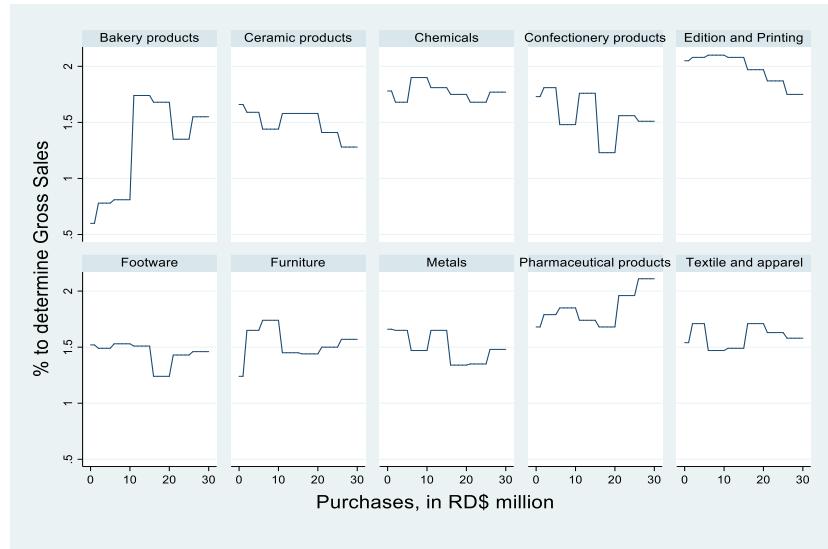
Where GS represents gross sales, P the level of purchases declared, and δ_{ls} a percentage rate that varies over the level of sales l , and the industry s . Figures 11, 12, and 13 illustrate the variation in the percentage rate to be applied to the agriculture, manufacturing, and service sectors, respectively, to determine gross sales value.

Figure 11. Percentage Rate Applicable to Determine Gross Sales Value, Agriculture Sector



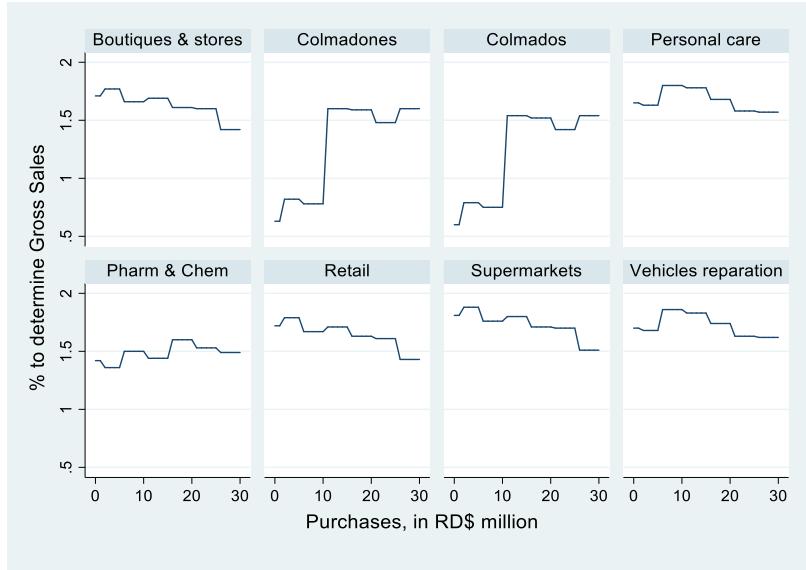
Source: Authors' elaboration based on Article 11 of Regulation 758-08.

Figure 12. Percentage Rate Applicable to Determine Gross Sales Value, Manufacturing Sector



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

Figure 13. Percentage Applicable to Determine Gross Sales Value, Service Sector



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

Figures 11, 12, and 13 clearly show a large variation of the percentage applicable across purchase levels and across economic sectors. For instance, as the value of purchases increases, the rate applicable rises for *colmadores*, grocery shops, and pharmaceutical industries, but it decreases for retail stores, boutiques, and supermarkets.⁴⁵

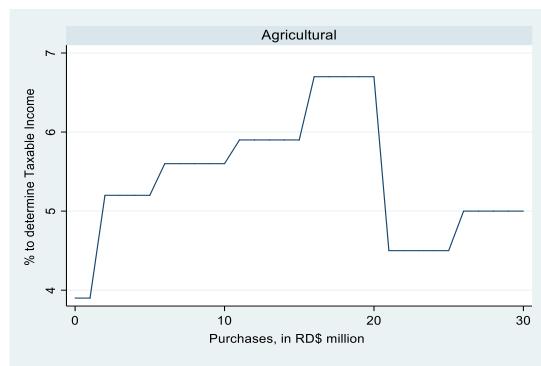
⁴⁵ The variation of purchases reported within the same industry might also imply significant variations even for relatively small change in sales. For instance, a small change from 10 to 11 million purchases of an agent in *colmadores* represents a twofold increase in the percentage rate, from 0.78 to 1.60

Once the gross sales value is determined, the second step consists of determining taxable income. For this purpose, Article 11 defines another subset of percentages to be applied as a function of the purchases and economic activity, according to:

$$(13) \quad TI = GS * (r_{ls})$$

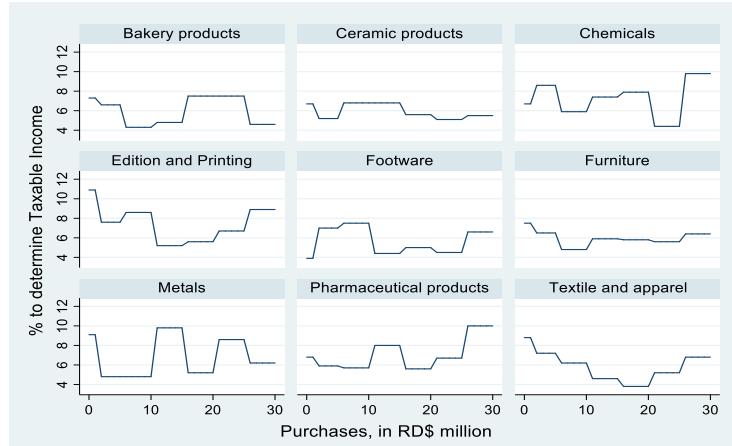
where TI refers to taxable income, GS to the gross sales computed in (12), and r_{ls} to the percentage applicable to determine the income tax depending on the specific value of purchases declared and the economic activity of the taxpayer. The percentage rates are shown in Figures 14, 15, and 16 for the agriculture, manufacturing, and service sectors, respectively.

Figure 14. Percentage Applicable to Determine Taxable Income, Agriculture Sector



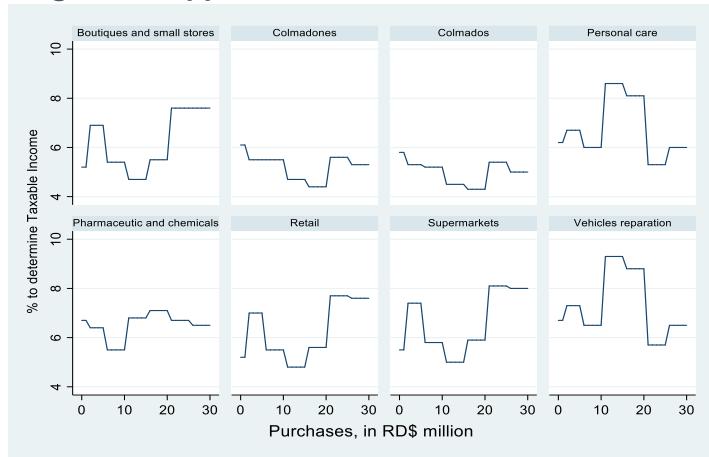
Source: Authors' elaboration based on Article 11 of Regulation 758-08.

Figure 15. Percentage Applicable to Determine Taxable Income, Manufacturing Sector



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

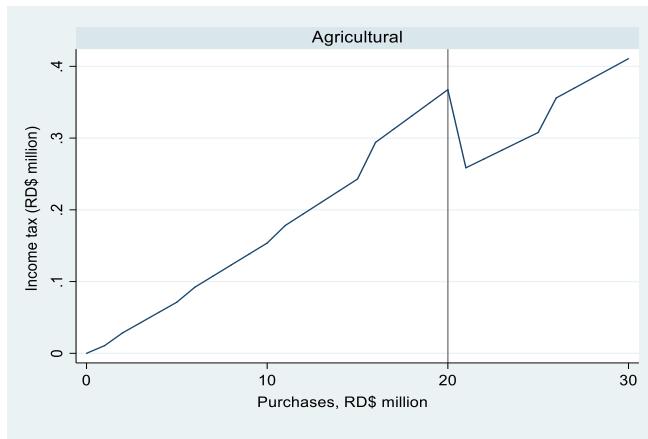
Figure 16. Percentage Rate Applicable to Determine Taxable Income, Service Sector



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

Finally, to obtain the income tax corresponding to each taxpayer, the taxable income defined in (2) is multiplied by the tax rate of 27 percent.⁴⁶ Figures 17, 18, and 19 show the estimations of the income tax corresponding to each purchase level after applying the procedure defined in Regulation 758.

Figure 17. Income Tax (in millions of DOP) for Each Purchase Level – Simplified Regime, Agriculture Sector, 2017



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

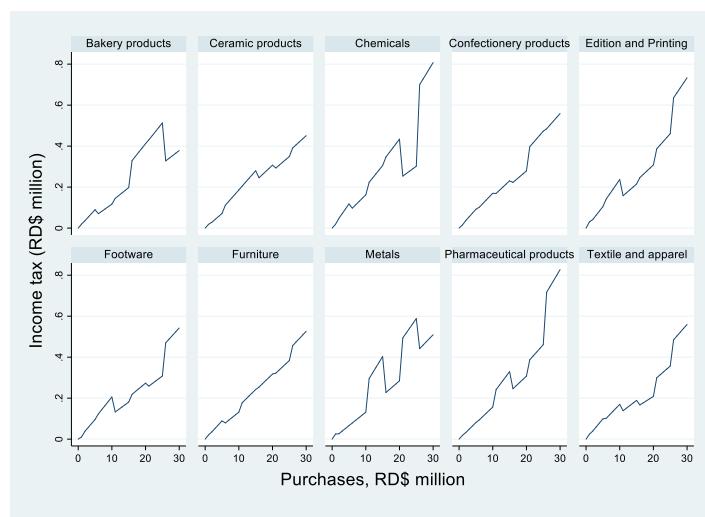
Some surprising results are immediately evident. Figure 17 shows that the income tax increases as the purchases rise, but just below 20 million. Once the firm declare purchases marginally above 20 million, the income tax declines. For instance, a firm that declares 20 million in purchases would find incentives to over-report the true amount, since increasing this amount even marginally to 21 million would reduce the applicable tax rate by 25 percent. Figure 17 shows that as result of applying asymmetric percentages to different amounts of sales as proposed in Regulation 758, the effective income tax rate is partially regressive. That is, firms with purchases declared above

⁴⁶ In the simplified and general regime, the tax rate is the same. The example takes the 27 percent tax rate that was applied officially in 2017.

20 million pay lower tax rates. The mechanism itself that discriminates the tax treatment by size (measured by purchases) is creating some room for arbitrage and potential tax evasion.⁴⁷

A similar pattern is found in the manufacturing sector, as shown in Figure 18. Large variations are observed in the income tax and effective tax rate applicable across economic activities and sales volume declared by the firm. For instance, a chemical firm that declares exactly DOP 20 million could reduce its taxable income by 44 percent by declaring purchases between DOP 21 and 26 million. Similarly, firms declaring sales over 26 million have incentives to under-report their true size. For example, moving from DOP 26 to 25 million reduces the income tax payable by 133 percent, making it highly profitable and attractive to misreport their total purchases. Comparable abrupt discontinuities are observed across industries in the manufacturing and service sectors, in Figures 18 and 19, respectively.

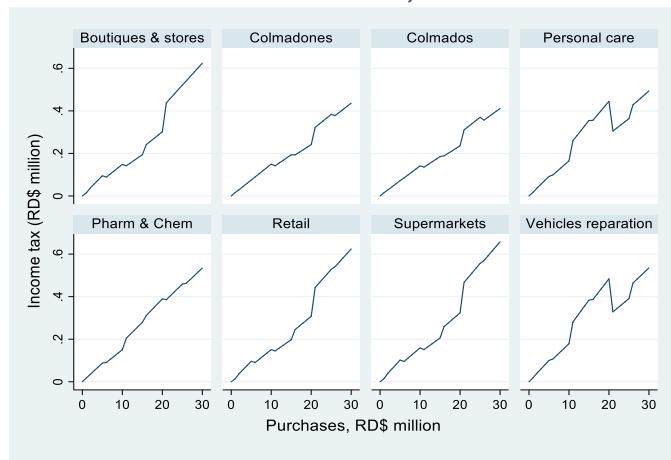
Figure 18. Income Tax (in millions of DOP) for each Purchase Level - Simplified Regime, Manufacturing Sector, 2017



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

⁴⁷ A firm declaring purchases between DOP 21 and 26 million would pay on average 19 percent less in income tax with respect to a firm declaring exactly DOP 20 million.

Figure 19. Income Tax (in millions of DOP) for each Purchase Level - Simplified Regime Service Sector, 2017



Source: Authors' elaboration based on Article 11 of Regulation 758-08.

Determination of the Value-added Tax

The procedure described before corresponds exclusively to the determination of the income tax. In addition, Article 12 of Regulation 758-08 specifies a procedure for calculating the VAT, computed on the difference between the gross income and the purchases declared.⁴⁸

The procedure for determining the VAT is the following:

- i. Define the value added as the difference between gross income (obtained with the application of the percentage rates mentioned in the Article 11) and the purchases declared by the taxpayer.

$$(14) VA = \delta_{ls} * P$$

where VA refers to the value added, δ_{ls} to the percentage rate applicable according to Article 11 of Regulation 758-08 that varies by purchase level (l) and sector (s), and P corresponds to the purchases declared by the firm.

- ii. Apply a percentage of exempted sales and obtain the taxable base for computing the value-added tax. Article 12 also establishes that the taxpayers for pharmaceutical and bakery sector are subject to a tax rate of 25 percent, while taxpayers in the food sector would pay 60 percent on the gross value added.

$$(15) \text{Tax base} = VA * (1 - \mu_s)$$

where μ_s is the percentage of exemption for the corresponding sector s .

⁴⁸ According to paragraph IV, Article 12, the legal entities that are applying the simplified procedure to declare their income tax and reporting industrial activities may not apply for the simplified procedure for the VAT.

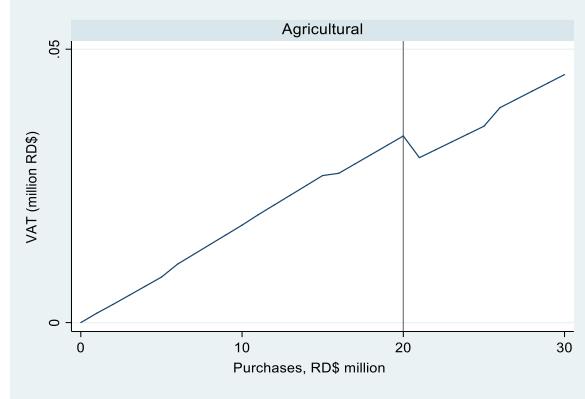
iii. Apply the VAT rate of 18 percent on the transfers of goods and services.⁴⁹

$$(16) ITBIS = (\text{tax base}) * 0.18$$

where *ITBIS* refers to the VAT tax that may be paid in a 12-month period.

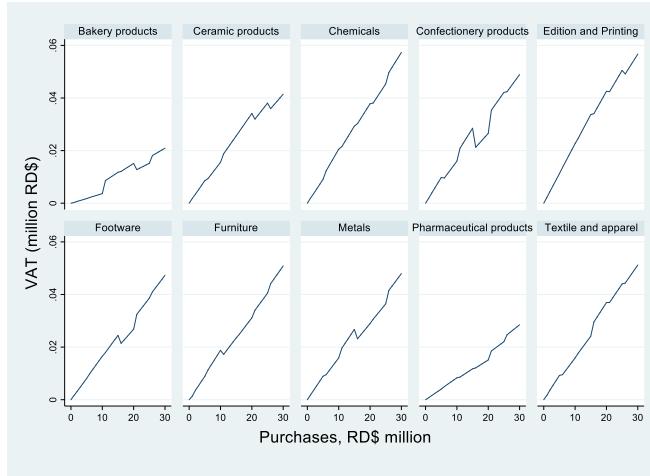
Figures 20, 21, and 22 illustrate the hypothetical VAT for each level of purchases declared by the taxpayer whose firm is in the agriculture, manufacturing, or service sector. Comparable to the income tax, the resulting VAT scheme seems to be regressive for some industries. As the value declared by the firm increases, the effective rate decreases. Surprisingly, this outcome is spread across sectors and industries, although not uniformly.

Figure 20. Value-added Tax, Agriculture Sector, 2017



Source: Authors' calculations based on Article 12 of Regulation 758-08.

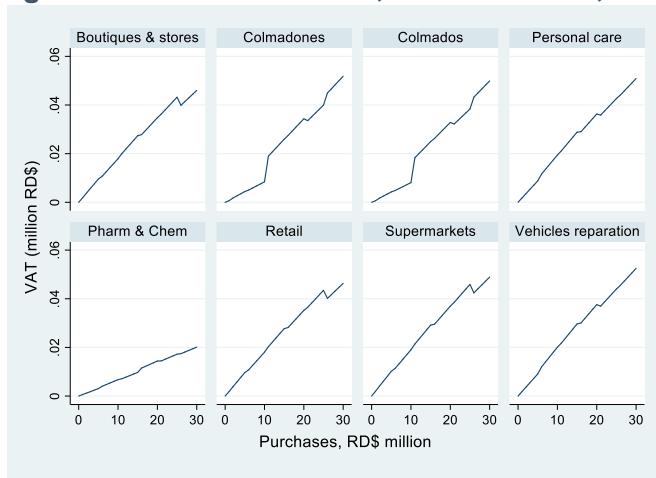
Figure 21. Value-added Tax, Manufacturing Sector, 2017



Source: Authors' calculations based on Article 12 of Regulation 758-08.

⁴⁹ In 2012, Article 23 of Law 253-2012, which proposed a tax reform, suggested a progressive reduction of the VAT rate from 18 to 16 percent after 2015. However, this progressive reduction was subject to the performance of the tax revenues and fiscal soundness. Because of mounting fiscal pressures in 2015, it was not possible to reduce the VAT rate.

Figure 22. Value-added Tax, Service Sector, 2017



Source: Authors' calculations based on Article 12 of Regulation 758-08.

These figures reveal some discontinuities and potential distortions related to the segmented rates applicable by industry and purchase level. Some firms would find incentives to misreport their true size (measured by the amount of purchases) as a mechanism to reduce significantly the income tax and VAT owed. In some industries, over-reporting purchases might be the best strategy to alleviate tax costs, while in other cases under-reporting them would represent a significant increase in the profitability of the firm. In both cases, misreporting and evasion are likely.

Apart from the evasion risks, one of the main guiding principles or canons of tax policy is equity, both vertical and horizontal (AICPA, 2007). This principle does not imply that all taxpayers are taxed the same, but that taxpayers are levied according to their income and ability to pay. This principle of proportionality is not clearly evidenced in the simplified regime. Assuming a monotonic relationship between purchases and gross income, in some segments, higher tax rates are levied against lower-income taxpayers, which is evidenced by the pronounced steps across sectors as declared taxable incomes increase.

Simplified Tax Regime Based on Income

In addition to the simplified regime based on purchases, Article 15 of regulation 758-08 proposes a simplified procedure for natural persons and owners of single-owner businesses residing in the Dominican Republic and who are not subject to organized accounting procedures, whose income (i) is totally exempt from VAT, or (ii) comes from more than 50 percent of sales of goods and services that are exempt from VAT, or (iii) comes from services with 100 percent VAT withheld, and (iv) whose annual gross terms do not exceed DOP 6,532,800.⁵⁰

The procedure for determining the income tax in this regime is the following:

1. Apply the exemption rate on the income declared by the taxpayer. The reduction proposed in Article 20 of Regulation 758-08 is 40 percent based on the income declared.

⁵⁰ This value corresponds to the threshold defined in 2008, which is indexed and updated annually by the DGII. In the case that the declaration of the taxpayer exceeds the limit by 5 percent or more, the tax authority will exclude the taxpayer from the regime and the taxpayer will be monitored and levied the tax rates applicable to the general regime.

$$(17) TI = Y * (1 - \varepsilon)$$

where Y refers to the income declared by the taxpayer and ε corresponds to the percentage exempt.

2. Deduct the tax exemption that corresponds to the income level that is exempt from tax obligations. In 2017, the minimum income to declare and pay income tax was DOP 416,220.
3. Apply the income tax rate according to the segment of income declared. The income tax is defined as the sum of a predetermined fee and a marginal tax rate based on the income declared.⁵¹

Film Industry Incentives – Law 108 of 2010

Law 108 of 2010 defines cinematographic activity to be in the public and social interest and designs a set of incentives to foster the growth of this industry in the Dominican Republic. Among multiple benefits, the legal entities that invest in organizations whose exclusive purpose is the production of cinematographic works and are previously approved by the General Directorate of Cinema can apply for the following fiscal incentives (Table 27).

Table 27. Tax Incentives, Film and Cinematographic Industries – Law 257 of 2010

Deduction	<ul style="list-style-type: none"> - 100% of the value invested in production of cinematographic products can be deducted from taxable income.⁵² - Donations can be deducted up to 5% of taxable income.
Exemption	<ul style="list-style-type: none"> - For 10 years, the income of producers and distributors of films in the Dominican Republic or abroad is exempt 100% of the income tax if is re-invested for the creation of cinematographic products. - For 15 years, all natural or legal entities that invest in building movie theaters in the National District and the district of Santiago de Caballeros are exempt 50% of the income tax. All other provinces are districts are exempt in 100% of the income tax. - 100% of building permits taxes and fees, for five years. - 100% of import tariffs on all capital goods related to the industry. - 100% of VAT and import tariffs on equipment, materials, and furniture to the installation and operation of the movie theaters for a period of five years.

⁵¹ In 2017–2018, taxpayers with income below DOP 416,220 are not subject to the income tax, and those that exceed this threshold but are below within interval 2 would pay 15 percent marginal rate over the income units above 416,220. Those taxpayers in interval 2, whose income is above DOP 624,329 but below DOP 867,123 would pay a fee of DOP 31,216 and 20 percent on the surplus of 624,329.01.

⁵² The amount should not exceed 25 percent of the income tax payable for the fiscal year in which the investment was made.

	<ul style="list-style-type: none"> - 100% of VAT on all goods, services, and leasing costs related to the production of cinematographic products. - Natural or legal entities that create studios for filming or recording are exempt from income tax on the income derived from the use of these studios for a period of 15 years .
Tax credit	<ul style="list-style-type: none"> - Any natural or legal entity can benefit from a 25% tax credit for all expenses incurred in the production of cinematographic and audiovisual works by presenting receipts for that purpose. This tax credit can be applied to any other tax or obligation if it does not exceed 25% of the payable income in a fiscal year.

Source: Authors' elaboration based on Law 257 of 2010.

In summary, there are multiple and distinct tax incentives, benefits, and requirements operating simultaneously in the Dominican Republic. Some of these regimes are compatible and can overlap with other incentives. For instance, some firms within development border zones could donate some resources for the production of some movies and obtain deductions. Other regimes have exclusionary clauses. Table 27 summarizes the incentives and multiple tax schemes operating in the Dominican Republic, their timeframe, and the plurality of exemptions that a firm in the Dominican Republic could obtain under each one.

Table 28. Special Tax Regimes in the Dominican Republic, Comparative Tax Rates

TAX REGIME	Income tax	Value-added tax	Time	Other incentives /tax reduction
General regime	27%	18%		
Free-trade zone (1990)	0%	0%	15 - 20 years depending on the location of the firm	0% construction taxes 0% taxes related to the registration and transfer of immovable assets 0% tax for the registration of commercial companies or increases in the equity. 0% municipal taxes. 0% tariffs, fees and related taxes that apply on the inputs, equipment, construction materials used to build or operate in the free-trade zone. 0% all export-related taxes 0% patent fees 0% import tariffs in equipment and transportation vehicles used in workers facilities
Border development (2001)	0% 0%	0% 0%, 9% (since 2012)	20 years	0% tariffs on inputs, raw materials, equipment and machinery 50% reduction of payments of transit and license of use of airport/ports Goods transferred to local market
Development of tourism industry (2002)	0%	18%	10 years	0% taxes for constituting societies or increase capital 0% national and municipal taxes for transferring properties 0% import taxes and all fees, including value-added tax on machinery, equipment, and all materials required for the installation and operation of the touristic facility.
Textile sector (2007)	0%	0%, 9% (since 2017)	N.D.	Purchases and imports of inputs, materials, and equipment, and zero-tariff
Renewable energies (2007)	0%	0%	10 years	Up to 75% of the costs and investments of equipment can be applied as tax credit on the income tax to be declared by: owners or tenants of family dwellings, commercial or industrial houses that change or expand for renewable sources systems in the provision of their private energy self-consumption and whose projects have been approved by the competent agencies
PROINDUSTRIA (2007)	0%* (1% since 2014) 0%*	* % of reimbursement defined as the share of exports on the total sales	N.D. Transitory (5 years) + 3 years added by Law 2014	0% import tariff on raw materials, inputs and intermediate goods, and industrial machinery and capital goods for industries defined in Art 24 of Law 557-05. Expedite depreciation, reduce in half the time established for machinery, equipment and technology Deduct up 50% of the taxable income the investments in machinery and equipment
Book and libraries (2008)	0%	0%	10 years	0% import tariffs on paper and inputs, photographs, films, prints, cardboards, plates, lithographic inks, raw materials and supplies, machinery and equipment for printing or publishing books and publishing products
Simplified tax regimen (2008)	27%	18%	N.D.	Before 2008, those small taxpayers (below 2 million RD\$) payed a differentiated tax rate of 15%, 20% or 25% depending on the taxable income. Since 2008, the determination of the taxable income is determined as a function of purchases for businesses and on income for natural person.
Film industry (2010)	0% - 13.5%	0% on inputs used for the production of the films	10 years	If reinvested in the creation of cinematographic products, up to 25% of the payable tax in each fiscal year. Any other firm can benefit up to 25% tax credit and donations can be deducted up to 5% of the taxable income

Source: Authors' elaboration based on review of regulations.

Note: N.D. = not defined.

4. Special Tax Regimes and Productivity in the Dominican Republic

This section explores how the presence of multiple special tax regimes interacts with decision on growth and productivity at the micro-level and analyzes some implications of the use of these instruments for the firms' behavior. As special tax regimes treat different economic units differently, they could affect the allocation of productive resources across an economy and, in turn, affect the aggregate productivity. Special tax regimes could become mechanisms that encourage the survival of less productive firms and punish the growth of larger firms, diverting resources from the most efficient allocation and diluting the potential of growth in an economy (Levy, 2018).⁵³ As a result, these policies can distort the optimal size of the firms by implicitly subsidizing the less productive firms while levying excessively high taxes on the highly productive companies (Restuccia and Rogerson, 2008).⁵⁴ The result is the emergence of smaller and unproductive firms along with the migration of productive resources toward less productive establishments, impacting negatively both output and productivity in an economy.

In an undistorted and fully competitive environment, a firm should compete, invest, and grow to ensure its survival in the market. Firms that are not efficient or competitive enough are supposed to exit the market, releasing resources such as labor and capital to be reallocated among the most productive surviving firms. Analogous to the natural selection process, individuals that are best adapted to the environment will grow, survive, and reproduce, while the less developed will perish. However, some market frictions and even policy interventions disrupt this selection process. Instead of adapting through investments and productivity-enhancing strategies, some firms alter their strategic decisions to benefit from a less competitive environment or policy incentives such as tax benefits, affecting their performance and shrinking the growth potential of the economy.

Special tax regimes modify the incentive structure of agents and generate distortions, altering the efficient allocation of productive resources. For example, in presence of simplified tax regimes, being small might be profitable and rewarding as well as create some room for strategic reporting (Azuero and Lagomarsino, 2018; Levy, 2018). Remaining small offers the benefit of reduced tax rates, simplified procedures, and most important, lower probabilities of being under tax supervision (Almunia and Lopez-Rodriguez, 2018). By contrast, a large and mature firms are penalized. Larger firms must cope with more stringent procedures, higher tax rates, and closer supervision. In this scenario, there are few incentives to report the true size of a firm or even to grow, if it translates into more taxes and more oversight under the radar of the tax authority.⁵⁵

The combination of limited enforcement capability of the tax agency with tax systems that offer generous benefits to subsegments of firms and levy higher taxes to others creates incentives for producing in the informal sector and even modifying the optimal size of firms (Busso, Madrigal, and Pagés, 2013). Consequently, the allocation of productive resources would not be aligned with the

⁵³ Levy (2018) argues that the STR in Mexico covers 42 percent of the tax base and accounts for 1.5 percent of GDP in foregone revenue. In addition, the lack of perfect supervision of the special tax regime represents an implicit subsidy to the smaller and less productive units in Mexico that amounts to about 0.5 percent of GDP.

⁵⁴ Restuccia and Rogerson (2008) call these productivity-dependent policies "correlated idiosyncratic distortions."

⁵⁵ For illustrative purposes, see the example in Levy (2018) for the special tax regime in Mexico. The author shows that the STR affects the margins of the firm such that being under the special tax regime and below the sales threshold represents a profitability 33 percent higher than if the firm were under the general tax regime.

most productive units in the economy. In the aggregate, all these elements will contribute to the misallocation of resources and constitute a productivity leak for an economy.

As described in Section 2, the Dominican Republic has more than 10 different special tax regimes with diverse tax incentives besides the simplified tax regime, operating in different segments of firms. These regimes are based on firm size, location, economic activity, source of inputs, among others. This section explores the functioning of these regimes to:

- Characterize firms that register under special tax regimes in the Dominican Republic by size, age, capital intensity, and productivity to identify the profile of a representative firm that participates in a special tax regime vis-à-vis a firm in the general regime.
- Analyze whether participation in a special tax regime could increase the probability of survival of a firm in the market.
- Explore how the growth and productivity performance of a firm in a special tax regime differs from a firm in the general regime from both a static and a dynamic perspective.

This section builds on the productivity estimations presented in Section 1, but it differs in two ways. First, for the analysis of characterization and survival of firms, all the records available in the dataset were used. However, when productivity is considered, the sample size falls because of the data required for consistent firm-level productivity estimations. Second, this section exploits the panel structure of the data to explore firm dynamics, separating them by tax regime to complement the static approach presented in Section 1.

Characterization of Firms in Special and General Tax Regimes

How different are firms registered in special regimes vis-à-vis firms operating in the general tax regime in the Dominican Republic?⁵⁶ To answer this question, a descriptive analysis was conducted to identify the profile of a representative firm in each tax scheme. This exercise provides interesting findings. First, the number of firms in special tax regimes has increased over time. In 2007, fewer than 2 percent of all formal firms were registered in a special tax regime. This number expanded steadily by a factor of 6, reaching 12.6 percent of the formal firms by 2017. Firms in special tax regimes are mainly registered in the simplified tax regime (purchases and income). Due to the lack of information on the main variables required for characterization purposes, the exercise that follows was conducted on other tax regimes but the simplified tax regime at the level of detail in the information about labor, capital, and productivity is not available for those firms (Table 29).⁵⁷

⁵⁶ As firms in the simplified tax regime are not required to declare information in the same degree of detail, in Annexes A and B, some of the main variables, such as number of employees and capital, are not available for those firms. Consequently, they are not included in this subsection and estimations here might consist of a lower bound.

⁵⁷ Firms (single-owner businesses, family businesses, and liberal professionals) registered in the simplified tax regime are not required to declare following Annex A and B. Therefore, the subsequent exercise excludes those firms, as they do not report number of employees, capital, intermediate inputs, value-added, wage bills, among other variables of interest. These data do not include NGOs and non-profit corporations.

Table 29. Number of Firms by Tax Regime, 2007–2017

Tax regime	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
General regime	50,636	58,278	62,094	66,056	70,303	74,312	79,656	83,614	87,509	87,921	82,342
STR Purchases	-	542	527	569	603	676	992	1,282	1,591	1,694	1,836
STR Income	-	1,318	1,889	2,695	3,545	4,839	5,939	6,799	7,564	7,826	8,222
Free-trade zone	404	520	582	615	593	629	654	681	732	753	715
Exporters	425	376	337	325	349	344	338	322	307	290	271
PROINDUSTRIA	-	148	253	295	210	219	237	239	251	259	255
Exempt products	81	138	177	205	213	224	251	255	257	245	224
Tourism	20	49	63	65	70	84	99	114	118	118	106
Film	-	-	-	-	2	5	23	42	68	83	104
Border development	24	57	62	65	76	101	105	100	99	90	81
Textile	24	41	50	54	56	61	61	66	67	67	73
Book and library	-	-	-	1	6	10	13	15	15	15	16
Renewable energies	-	-	-	-	1	2	3	6	6	5	5

Source: Authors' calculations using DGII data.

Alternative special tax regimes to the simplified tax regime accounted for 2.2 percent of all formal firms declaring to the tax agency in 2017. Without considering the simplified tax regime, the free-trade regime tops the list with the largest number of firms, followed by the exporters regime and PROINDUSTRIA. Although this number seems relatively small as a fraction of total formal firms observed in 2017, Table 30 illustrates that they account for a significant share of resources. About 37 percent of the capital, 31 percent the total labor force is allocated to these 2.2 percent of firms, about 27 percent of the total wage bill is paid in them. In addition, these 1,850 firms create 30.2 percent of the value-added and represent almost 30 percent of the income tax collected by the DGII in 2017.⁵⁸

Table 30. Relative Importance of Firms Registered in Special Tax Regimes, 2017

	Firms	Capital	Labor	Sales	Wage bill	Value-added	Income tax
Levels							
General regime	82,342	1,239,000	732,887	2,398,000	269,600	1,290,000	38,290
Special tax regime	1,853	722,800	324,030	949,400	98,710	558,100	16,200
Total	84,195	1,961,800	1,056,917	3,347,400	368,310	1,848,100	54,490
Participation							
General regime	97.8%	63.2%	69.3%	71.6%	73.2%	69.8%	70.3%
Special tax regime	2.2%	36.8%	30.7%	28.4%	26.8%	30.2%	29.7%

Source: Authors' calculations using DGII data,

Note: sales, capital and wage bill are in million Dominican Pesos (DOP).

Breaking down these indicators by tax regime, it is evident that the largest fraction of capital, labor, sales, and value-added is assigned to firms in the regimes of PROINDUSTRIA, exporters and free-trade zone (Table 31). PROINDUSTRIA concentrates 10.5 percent of the capital and 5.8 percent

⁵⁸ The shares described here would correspond to a lower-bound estimate. STR firms are not included as the variables are not available for that set of firms.

of the labor, creates about 8.4 percent of the total value-added, and represented 14.5 percent of the income tax collected in 2017. Firms registered in the free-trade regime encompass 14.1 percent of the total labor force in the formal sector and 7.4 percent of the capital included in the administrative records, and they create the 9.5 percent total value-added. Exporters cover about 8.1 percent of the total capital and 5.3 percent of total employment, and they represented about 11.8 percent of the total income tax reported in 2017.

Table 31. Relative Participation (%) of Special Tax Regimes—Main Variables, 2017

Regime	Firms	Capital	Labor	Sales	Wage bill	Value-added	Income tax
General regime	97.8	63.2	69.3	71.6	73.2	69.8	70.3
Free-trade zone	0.8	7.4	14.1	8.2	9.0	9.5	0.0
Exporters	0.3	8.1	5.3	6.2	6.3	6.8	11.8
PROINDUSTRIA	0.3	10.5	5.8	9.7	6.6	8.4	14.5
Exempt products	0.3	1.2	1.8	1.9	1.4	1.2	1.5
Tourism	0.1	7.8	2.4	1.5	2.6	2.9	0.3
Film	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Border development	0.1	0.5	0.7	0.5	0.4	0.6	0.0
Textile	0.1	0.1	0.4	0.1	0.1	0.2	0.0
Book and library	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewable energies	0.0	1.1	0.1	0.3	0.3	0.5	1.6
TOTAL	100	100	100	100	100	100	100

Source: Authors' calculations using DGII data.

Note: wage bill covers salaries and social security contributions.

These results suggest that, on average, firms registered in special tax regimes are larger than firms in the general regime, and they account for a significant fraction of productive resources allocated. To characterize a representative firm within each regime, the median of the capital, labor, capital-labor ratio, age, and salary are computed for firms within each tax regime. Table 32 shows the comparison between a representative firm in the general tax regime and a firm registered in a special tax regime.⁵⁹ It suggests that a median firm registered in a special tax regime is on average larger than a firm in the general regime. A firm in a special tax regime in the Dominican Republic is 9 times larger in terms of labor force, 5 times more capital-intensive, and is on average twice as old as a firm in the general regime. Nonetheless, it is not necessarily more productive than a firm in the general tax regime. Even though a firm in a special tax regime is larger and faces a lower effective income tax rate—4.6 percent compared to the statutory rate of 27 percent—a firm in the general regime is about 80 percent more productive than a firm in the special tax regime.

⁵⁹ In this case, due to the lack of availability of the data for STR firms, the analysis includes only the 10 special tax regimes as presented in Table 30, but it is illustrative of what occurs within the special tax regime category.

Table 32. A Representative Firm - General Regime vis-à-vis Special Tax Regime, 2007–2017

	Labor	Capital	K/L ratio	Age	Wage per worker	Effective income tax	Productivity
General regime	5	1,102,506	92,145	6	9,666	27%	1.8
Special tax regime	45	22,935,325	461,765	12	13,593	4.6%	1.0

Source: Authors' calculations using DGII data.

Replicating the exercise by tax regime, it is possible to observe in Table 33 that firms registered in PROINDUSTRIA, free-trade zone, and tourism regimes are larger than a representative firm in the general tax regime in terms of labor and capital. Firms with the longest time in the market are registered mainly in PROINDUSTRIA, with exporter and textile sectors exceeding the age of a representative firm in the general regime on average by a factor of 3.

The largest firms in terms of capital and labor are registered in the tourism, PROINDUSTRIA, and free-trade zone regimes, whereas the highest wage per worker according to the administrative records is paid by firms in the film regime. Regarding the effective income tax computed as the ratio between the profits and the income tax paid, firms in the general regime, film, and exempted products are paying on average the statutory 27 percent of income tax rate, whereas the median tax rate applicable to a representative firm in tourism, border development, free-trade zone, renewable energies and textiles is 0 percent.

Table 33. A Representative Firm by Special Tax Regime, 2007–2017

Regime	Labor	Capital	K/L ratio	Age	Wage per worker	Effective income tax	Productivity
General regime	5	1,102,506	92,145	6	9,666	27%	1.00
Book and library	5	1,387,631	246,131	10	21,192	2.9%	1.59
Textile	42	6,442,551	161,162	15	7,458	0.0%	0.99
Renewable energies	9	6,293,165	490,137	9	23,425	0.0%	0.97
Film	4	1,823,446	554,253	2	27,907	27%	0.91
Free-trade zone	59	17,454,893	222,742	9	12,664	0.0%	0.67
Exporters	30	17,126,318	507,665	20	18,069	25%	0.65
Border development	24	19,192,586	683,350	8	8,586	0.0%	0.45
PROINDUSTRIA	81	71,859,868	975,385	20	16,760	25%	0.40
Exempt products	35	17,394,369 333,700,00	477,083	13	9,652	27%	0.38
Tourism	50	0	3,462,187	8	25,644	0.0%	0.17

Source: Authors' calculations using DGII data.

Note: values refer to the median value (50th percentile) in each category.

Surprisingly, in terms of productivity (general regime indexed to 1), a median firm operating in a special tax regime—except for book and library—reports levels of productivity below the median firm in the general tax regime (normalized to 1 for illustrative purposes). The lowest productivity gaps are observed in the textiles, renewable energies, and film regimes, where the difference is about 10 percent compared to the value observed for a firm in the general regime (Table 32). By contrast, a representative firm registered in border development, PROINDUSTRIA, exempt

products, and tourism is below the median productivity declared by a firm in the general regime despite having about 8 times the number of employees and older in the market.

This descriptive approach suggests that despite being larger, older, and more capital-intensive, firms in the Dominican Republic registered in special tax regimes are not necessarily the most productive ones. As a more systematic approach, a linear probability model (proposed in (18)) is estimated to find the characteristics that might be associated with a higher likelihood of registering in a special tax regime.

$$(18) \text{ } STR_{ij,t+1} = X_{ijt} + \delta_j + \delta_p + \delta_t + e_{ijt}$$

Model (18) relates the probability of participating in a special tax regime in $t + 1$ with a set of firm-level characteristics grouped in the vector X_{ijt} that controls for firm size, age, location. In addition, fixed effects are included by sector j , province p , and year t . The results are presented in Columns (1) to (3) in Table 34, which includes robust standard errors and a robustness check, including clustered standard errors.⁶⁰

Overall, the exercise suggests that the probability of participating in a special tax regime increases with firm size, age and province, particularly those where a border development regime operates, mainly in Dajabon, Independencia, and Montecristi. Interestingly, the exercise reveals that the higher the productivity, the smaller the likelihood of participating in a special tax regime, although this finding is not statistically significant.

Table 34. Linear Probability Model of Registering in a Special Tax Regime, 2007–2017

VARIABLES	(1) $STR_{ij,t+1}$	(2) $STR_{ij,t+1}$	(3) $STR_{ij,t+1}$
Small	0.0041*** (0.0006)	0.0041*** (0.0013)	0.0041*** (0.0012)
Medium	0.0134*** (0.0014)	0.0134*** (0.0043)	0.0134*** (0.0045)
Large	0.0335*** (0.0027)	0.0335*** (0.0100)	0.0335*** (0.0086)
Ln (age+1)	0.0082*** (0.0009)	0.0082*** (0.0013)	0.0082*** (0.0019)
Log TFP	-0.0002 (0.0003)	-0.0002 (0.0002)	-0.0002 (0.0003)
AZUA	0.0287 (0.0205)	0.0287*** (0.0019)	0.0287 (0.0373)
BAHORUCO	0.0628 (0.0469)	0.0628*** (0.0018)	0.0628 (0.0674)
BARAHONA	0.0063 (0.0144)	0.0063*** (0.0014)	0.0063 (0.0204)
DAJABON	0.2143*** (0.0537)	0.2143*** (0.0023)	0.2143*** (0.0741)
DISTRITO NACIONAL	-0.0064 (0.0044)	-0.0064*** (0.0009)	-0.0064 (0.0078)
DUARTE	-0.0052 (0.0071)	-0.0052*** (0.0010)	-0.0052 (0.0137)
EL SEYBO	-0.0506*** (0.0103)	-0.0506*** (0.0039)	-0.0506*** (0.0186)

⁶⁰ Clustered standard errors are included to allow any potential auto-correlation among firms within the same province or economic sector.

	No	Province	Sector
ELIAS PINA	0.1396 (0.1901)	0.1396*** (0.0126)	0.1396 (0.0867)
ESPAILLAT	0.0037 (0.0085)	0.0037 (0.0034)	0.0037 (0.0152)
HATO MAYOR	0.0404* (0.0242)	0.0404*** (0.0019)	0.0404 (0.0409)
INDEPENDENCIA	0.3098*** (0.1188)	0.3098*** (0.0096)	0.3098* (0.1652)
LA ROMANA	0.0016 (0.0067)	0.0016* (0.0009)	0.0016 (0.0119)
LA VEGA	0.0110 (0.0071)	0.0110*** (0.0018)	0.0110 (0.0170)
MARIA TRINIDAD SANCHEZ	-0.0062 (0.0100)	-0.0062*** (0.0017)	-0.0062 (0.0135)
MONSECNOR NOUEL	0.0008 (0.0086)	0.0008 (0.0009)	0.0008 (0.0125)
MONTE PLATA	0.0039 (0.0280)	0.0039 (0.0051)	0.0039 (0.0228)
MONTECRISTI	0.2653*** (0.0361)	0.2653*** (0.0074)	0.2653*** (0.0498)
PEDERNALES	0.0785 (0.0783)	0.0785*** (0.0022)	0.0785 (0.0881)
PERAVIA	0.0279** (0.0134)	0.0279*** (0.0016)	0.0279 (0.0177)
PUERTO PLATA	-0.0064 (0.0061)	-0.0064*** (0.0007)	-0.0064 (0.0095)
SALCEDO	-0.0028 (0.0129)	-0.0028** (0.0012)	-0.0028 (0.0138)
SAMANA	-0.0100 (0.0108)	-0.0100*** (0.0011)	-0.0100 (0.0120)
SAN CRISTOBAL	0.0331*** (0.0086)	0.0331*** (0.0043)	0.0331* (0.0191)
SAN JOSE DE OCOA	-0.0069 (0.0243)	-0.0069** (0.0028)	-0.0069 (0.0330)
SAN JUAN DE LA MAGUANA	0.0001 (0.0116)	0.0001 (0.0018)	0.0001 (0.0154)
SAN PEDRO DE MACORIS	0.0568*** (0.0116)	0.0568*** (0.0052)	0.0568 (0.0350)
SANCHEZ RAMIREZ	-0.0127 (0.0094)	-0.0127*** (0.0022)	-0.0127 (0.0125)
SANTIAGO DE LOS CABALLEROS	0.0171*** (0.0051)	0.0171*** (0.0027)	0.0171 (0.0145)
SANTIAGO RODRIGUEZ	0.0370 (0.0301)	0.0370*** (0.0019)	0.0370 (0.0387)
SANTO DOMINGO	0.0096** (0.0047)	0.0096*** (0.0021)	0.0096 (0.0107)
VALVERDE	0.0292* (0.0150)	0.0292*** (0.0034)	0.0292 (0.0267)
Observations	231,938	231,938	231,938
Number of firms	45,526	45,526	45,526
Cluster	No	Province	Sector

Robust standard errors in parentheses. Fixed effects by sector, province and year included.

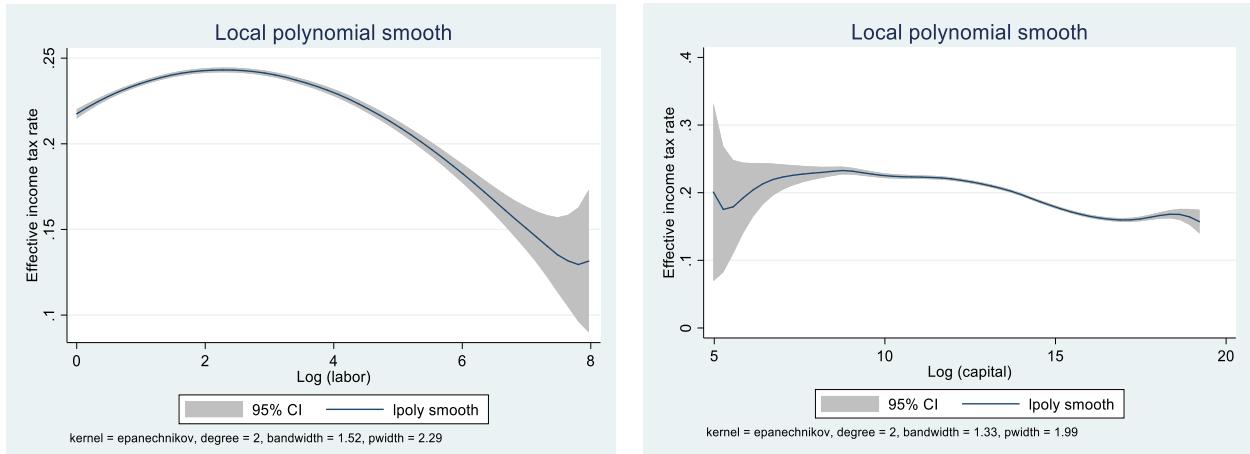
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations based on DGII dataset.

The results so far suggest that firms that have been granted special tax incentives in the Dominican Republic are larger and older than firms in the general regime, although they are not necessarily the most productive ones. One possible explanation is that, because of the complexity of the tax system in the Dominican Republic, larger firms end up registering and benefiting more from these tax schemes. Another explanation is that firms might require professional tax planning departments and specialized lawyers and accountants to navigate the regulations and benefit from the tax incentives. Allocating resources to this specialized endeavor is costly for smaller firms, which have limited capability to explore regulations and find the appropriate tax instruments to benefit from special tax provisions.

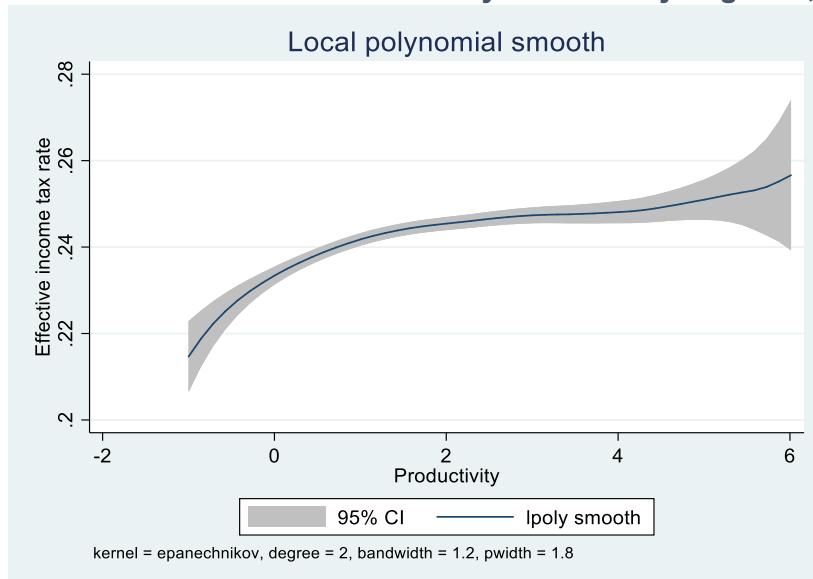
Consequently, larger firms have a comparative advantage to understand regulation, find loopholes and widen the room for maneuver to reduce their tax burden with respect to smaller firms registering in special tax regimes. As potential evidence of this hypothesis, Figure 23 shows the relationship between the effective tax rate—measured as the ratio between income tax paid and declared profits—and firm size. Measuring size by both labor and capital investments, the evidence suggests that the effective tax rate decreases as firm size increases.

Figure 23. Effective Income Tax Rate by Firm Size – Labor and Capital, 2017



Source: Authors' calculations using DGII data.

Figure 24. Effective Income Tax Rate by Productivity Segment, 2017



Source: Authors' calculations using DGII data.

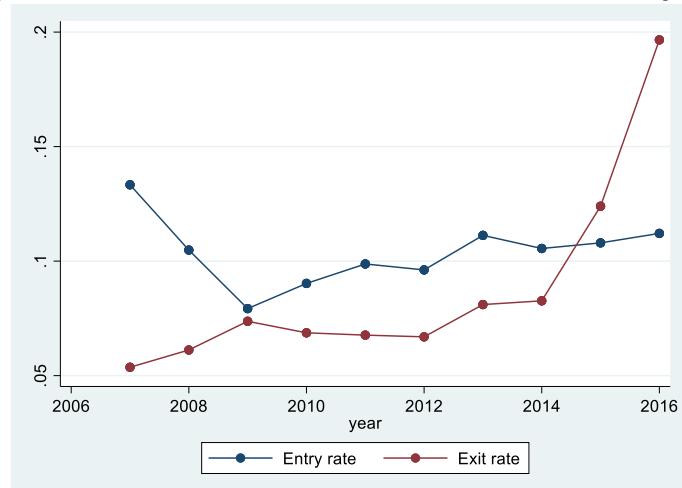
Note: Productivity refers to the log (TFPR) with respect to the sectoral mean \overline{TFPR} .

Figure 24 displays the relationship between productivity and the effective income tax rate. It is indicative that highly productive firms pay relatively more income tax compared to firms in the low-productivity segment. There is some suggestive evidence indicating that larger firms participate relatively more in special tax regimes, receiving different tax incentives and alleviating their tax burden, although it does not translate necessarily into higher productivity. Thus, this characterization exercise shows that larger firms and those with substantially more time operating in the market tend to make greater use of these tax incentives, but still are not necessarily the most productive ones. As a result, smaller and most productive firms end up paying higher taxes in the Dominican Republic.

Survival or Exit of Firms in Special Tax Regimes

This study finds evidence that firms registering in special tax regimes and receiving important tax incentives in the Dominican Republic have more employees and capital and are at least twice as old as firms in the general regime. In other words, firms registered in special tax regimes face lower frictions and costs, which allows them to survive longer vis-à-vis firms in the general regime, even though their productivity is stagnant. For example, firms in PROINDUSTRIA can apply to expedite depreciation of their investments, deducting them promptly from taxable income, whereas a firm in a general regime must follow the regular depreciation schemes and face higher costs in the short term. A similar example can be observed for a textile manufacturing firm in the general regime, which faces higher costs compared to an analogous firm registered in the textile regime, because the latter is exempt from all taxes and tariffs on imported equipment, inputs, machinery, and materials. In the aggregate, these asymmetries not only affect the costs faced by comparable firms but could also influence a firm's decision whether to exit the market. Figure 25 compares the entry and exit rate of firms in the Dominican Republic. It reveals that before 2016, about 2.4 firms entered for each firm exiting the market. Since 2015, the exit rate exceeded the entry rate, suggesting some distortions associated with the functioning of the market in the Dominican Republic.

Figure 25. Entry and Exit Rates of Formal Firms, Dominican Republic, 2006–2016



Source: Authors' calculations using DGII data.

The study also explores whether the increase in the exit rate has affected firms across productivity segments (Table 35). There are two stories related to the entry and exit of firms in the Dominican Republic. First, the entry rate was higher among firms that operate in the general tax regime across all productivity segments in 2016. Table 35 also shows that the entry rate fell among firms in the low and medium productivity segments in both the general and the special tax regimes.

Table 35. Entry and Exit Rate by Productivity Segment, 2007–2016

	Entry rate		Exit rate	
	GR	STR	GR	STR
2007				
Low productivity	3.9%	1.7%	2.8%	2.3%
Medium productivity	4.1%	0.3%	3.4%	2.1%
High productivity	2.7%	4.8%	2.7%	2.4%
2016				
Low productivity	1.7%	0.3%	9.4%	7.0%
Medium productivity	1.9%	0.2%	8.1%	4.3%
High productivity	2.3%	0.6%	8.6%	8.1%

Source: Authors' calculations using DGII data.

Regarding the exit process, Table 35 shows that firms registered in special tax regimes remain in the market longer, as the exit rate is lower for those firms independently of their productivity level. On average, 9.4 percent of the firms in the general tax regime exit the market annually when reporting low productivity, whereas this fraction is only 7 percent among firms in a special tax regime. In the aggregate, this could have harmful consequences for the process of destructive creation in the Dominican Republic. Furthermore, the exit process among firms in the special tax regimes is inadequate, because firms in the highest productivity segment are more likely to exit when registered in the special tax regime—8.1 percent compared to 7 percent of firms in the low-productivity segment in 2016.

These findings indicate that firms in special tax regimes tend to exit at a lower rate than firms in the general regime, with lower-productivity firms staying longer. To complement this and study whether the probability of exiting the market varies as the firm participates in a special tax regime, the model is estimated in (19) controlling by a set of firm-level characteristics.

$$(19) \text{Exit}_{ij,t+1} = X_{ijt} + \text{STR}_{ijt} + \delta_j + \delta_p + \delta_t + e_{ijt}$$

where $\text{Exit}_{ij,t+1}$ refers to a binary variable that takes the value of 1 if the firm exited the market in $t+1$, vector X_{ijt} denotes firm-level characteristics as firm size (measured by labor and capital), age, and geographic location; STR_{ijt} is a dummy variable that takes the value of 1 if the firm i , operating in sector j , in year t is registered in a special tax regime. Components δ_j , δ_p , δ_t denote the fixed effects by sector, province, and year, respectively.⁶¹

Table 36 presents the results of this correlation exercise, specifically, that the probability of exiting the market decreases with firm size and productivity. It also suggests an important finding. The likelihood of exiting the market decreases as firm size increases, but decreases in those firms that participate in a special tax regime. These findings are robust to the inclusion of controls and clustered standard errors by province and economic sector.⁶² In addition, the results indicate that more productive firms exhibit a lower probability of exit. However, as the interaction term between total factor productivity (TFP) and the dummy of the special tax regime is not statistically significant, there is no statistical evidence suggesting that the likelihood of exit of less productive firms systematically varies when they participate in a special tax regime.

Table 36. Linear Probability Model of Registering in a Special Tax Regime, 2007–2017

VARIABLES	(1) $\text{Exit}_{ij,t+1}$	(2) $\text{Exit}_{ij,t+1}$	(3) $\text{Exit}_{ij,t+1}$
Labor (thousands)	-0.0573*** (0.0096)	-0.0573*** (0.0074)	-0.0573*** (0.0037)
Capital (millions of DOP)	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000* (0.0000)
Ln (age+1)	0.0055*** (0.0008)	0.0055*** (0.0011)	0.0055*** (0.0017)
=1 if registered in STR	-0.0148*** (0.0033)	-0.0148*** (0.0043)	-0.0148*** (0.0028)
Log TFP	-0.0032*** (0.0005)	-0.0032*** (0.0007)	-0.0032*** (0.0003)
Log TFP * STR	0.0012 (0.0020)	0.0012 (0.0020)	0.0012 (0.0024)
AZUA	-0.0365** (0.0158)	-0.0365*** (0.0124)	-0.0365*** (0.0004)
BAHORUCO	-0.0334	-0.0334	-0.0334***

⁶¹ “Firm exit” is defined as those cases where the firm is no longer observed in the DGII dataset. In this sense, these data has the caveat of potentially considering exiting firms those that move to the informal sector and may therefore not strictly exit the market.

⁶² As capital seems not to be statistically significant, there may be some misreporting in this variable that will require further analysis and could be associated with some evasion.

	(0.0206)	(0.0258)	(0.0015)
BARAHONA	-0.0019 (0.0150)	-0.0019 (0.0105)	-0.0019** (0.0008)
DAJABON	-0.0495*** (0.0110)	-0.0495*** (0.0128)	-0.0495*** (0.0014)
DISTRITO NACIONAL	0.0052 (0.0051)	0.0052 (0.0069)	0.0052*** (0.0013)
DUARTE	-0.0192** (0.0078)	-0.0192** (0.0092)	-0.0192*** (0.0007)
EL SEYBO	-0.0597*** (0.0096)	-0.0597*** (0.0068)	-0.0597*** (0.0012)
ELIAS PINA	-0.0665*** (0.0152)	-0.0665*** (0.0155)	-0.0665*** (0.0042)
ESPAILLAT	-0.0375*** (0.0071)	-0.0375*** (0.0099)	-0.0375*** (0.0005)
HATO MAYOR	-0.0210 (0.0168)	-0.0210* (0.0125)	-0.0210*** (0.0010)
INDEPENDENCIA	-0.0304 (0.0333)	-0.0304 (0.0365)	-0.0304*** (0.0023)
LA ROMANA	-0.0182** (0.0072)	-0.0182** (0.0076)	-0.0182*** (0.0009)
LA VEGA	-0.0208*** (0.0069)	-0.0208* (0.0109)	-0.0208*** (0.0008)
MARIA TRINIDAD SANCHEZ	-0.0353*** (0.0102)	-0.0353** (0.0176)	-0.0353*** (0.0008)
MONSEÑOR NOUEL	-0.0006 (0.0110)	-0.0006 (0.0111)	-0.0006 (0.0006)
MONTE PLATA	0.0108 (0.0272)	0.0108 (0.0266)	0.0108*** (0.0011)
MONTECRISTI	-0.0200 (0.0130)	-0.0200 (0.0154)	-0.0200*** (0.0017)
PEDERNALES	-0.0443** (0.0191)	-0.0443** (0.0219)	-0.0443*** (0.0019)
PERAVIA	-0.0294*** (0.0101)	-0.0294 (0.0186)	-0.0294*** (0.0008)
PUERTO PLATA	-0.0064 (0.0069)	-0.0064 (0.0101)	-0.0064*** (0.0009)
SALCEDO	-0.0387*** (0.0103)	-0.0387*** (0.0140)	-0.0387*** (0.0011)
SAMANA	-0.0143 (0.0126)	-0.0143 (0.0152)	-0.0143*** (0.0008)
SAN CRISTOBAL	-0.0025 (0.0072)	-0.0025 (0.0092)	-0.0025*** (0.0006)
SAN JOSE DE OCOA	0.0263 (0.0306)	0.0263 (0.0230)	0.0263*** (0.0012)

	-0.0163 (0.0126)	-0.0163 (0.0139)	-0.0163*** (0.0007)
SAN JUAN DE LA MAGUANA			
SAN PEDRO DE MACORIS	0.0009 (0.0086)	0.0009 (0.0101)	0.0009 (0.0009)
SANCHEZ RAMIREZ	-0.0166 (0.0108)	-0.0166* (0.0087)	-0.0166*** (0.0006)
SANTIAGO DE LOS CABALLEROS	-0.0124** (0.0055)	-0.0124** (0.0060)	-0.0124*** (0.0008)
SANTIAGO RODRIGUEZ	-0.0174 (0.0245)	-0.0174 (0.0214)	-0.0174*** (0.0010)
SANTO DOMINGO	0.0075 (0.0054)	0.0075 (0.0061)	0.0075*** (0.0008)
VALVERDE	-0.0263*** (0.0094)	-0.0263** (0.0128)	-0.0263*** (0.0007)
Observations	231,938	231,938	231,938
Number of Firms	45,526	45,526	45,526
Cluster	No	Sector	Province

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations using DGII data.

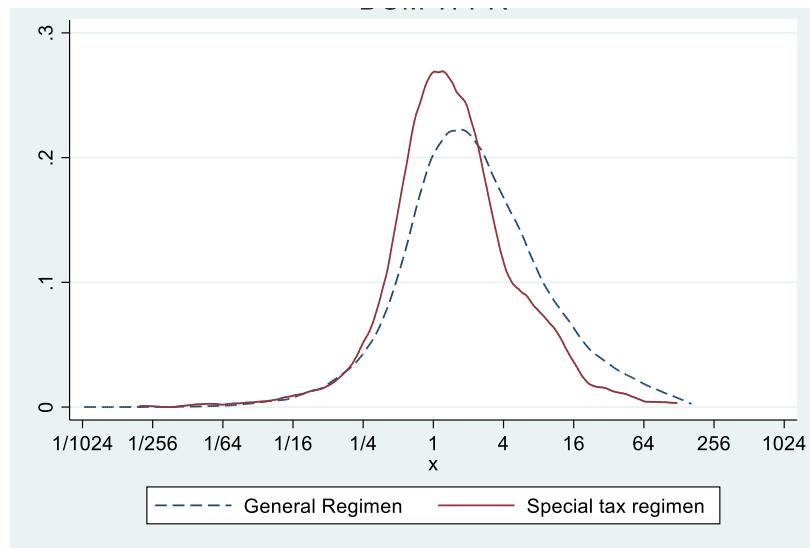
Special Tax Regimes, Productivity, and Growth Decisions

Do firms change their growth patterns and productivity performance once they register in a special tax regime? Although further analysis is required to determine a causal relationship to answer this question, a set of facts and descriptive findings are presented that indicate a suggestive link between special tax regimes and firm strategic behavior. Two approaches are employed in this analysis. The first is a static comparative analysis following the Hsieh and Klenow methodology and contrasting 2007 and 2017 results. The second is a further exploitation of the panel data structure to evaluate the performance of the firms over their life cycle and determine whether there are significant differences in the growth profiles of the firms by tax regime.

Static Approach

The static approach follows Hsieh and Klenow (2009) to obtain the TFP at the firm level and explore possible relationships between estimated productivity values and participation in a special tax regime. The cornerstone of this methodology is that in an efficient scenario with no distortions, the marginal product of capital and labor might be equated within narrowly defined sectors in an economy. Therefore, departures from the efficient benchmark suggest the presence of distortions that can be traced out through observed differences in revenue productivity (TFPR). In this case, the TFPR distribution is compared between firms in special tax regimes vis-à-vis those in the general regime. Figure 26 shows the distribution of TFPR by tax regime. Overall, deviations from the sectoral mean (indexed as 1 in the graph), that is, distortions are revealed in both groups. The distribution of productivity for firms in the general tax regime is particularly skewed toward the right tail, which indicates that firms in the general tax regime are relatively more productive.

Figure 26. Total Factor Productivity in the Dominican Republic by Tax Regime, 2017



Source: Authors' calculations employing the DGII database.

In addition, Table 37 shows the share of firms that fit in each productivity segment and which firms are located in the right or left tail of the distribution. It suggests that a larger fraction of firms in the general tax regime are in the high-productivity segment, which is equivalent to saying that firms in the general tax regime are smaller than in the efficient scenario, as some distortions prevent them from absorbing more capital and labor. On the other side, firms in special tax regimes participate in the low-productivity segment, meaning that they are too large compared to their efficient scale and absorb either too much capital or labor.

Table 37. Productivity Segment by Tax Regime, 2017

	Low	Medium	High
General tax regime	24.7%	49.9%	25.4%
Special tax regime	33.2%	51.7%	15.1%

Source: Authors' calculations employing the DGII database.

To explore systematic differences in productivity between firms in the general regime and those registered in a special tax regime, regressions are run on the log of total TFPR with respect to the sectoral average Log ($\frac{TFPR_{Si}}{TFPR_S}$). Rather than assuming any causal relationship, this statistical tool is used to obtain correlations following Levy (2018) to search for differences in productivity between firms.

The results in Table 38 present the correlations between firm-level productivity and the dummy variables used for each special tax regime. These results include controls for firm size, age, and geographic location. The excluded category corresponds to firms in the general tax regime such that the coefficients should be interpreted as the average percentage difference of each special tax regime with respect to an average firm in the general regime. The specification of the regression in Table 37 is the following:

$$(20) \ln\left(\frac{TFPR_{ji}}{\overline{TFPR}_j}\right) = \beta_0 + \beta_1 STR_{1,i} + \beta_2 STR_{2,i} + \beta_3 STR_{3,i} + \beta_4 STR_{4,i} + \beta_5 STR_{5,i} + \beta_6 STR_{6,i} + \beta_7 STR_{7,i} + \beta_8 STR_{8,i} + \beta_9 STR_{9,i} + \beta_{10} STR_{10,i} + \theta_p + \theta_t$$

where \overline{TFPR}_j denotes the mean of TFPR in sector j , and each $STR_{r,i}$ is a dummy for each special tax regime considered in the following order: textiles, film, border development, renewable energies, exporter, book and library, exempt products, PROINDUSTRIA, tourism, and free-trade zones. This regression also includes fixed effects by province and year.⁶³

Table 38. Correlation between Productivity and Special Tax Regimes, 2007–2017

VARIABLES	TFPR
Textile	0.321*** (0.0507)
Film	-0.358*** (0.131)
Border development	-0.569*** (0.0691)
Renewable energies	0.549** (0.263)
Exporter	0.0251 (0.0258)
Book and library	0.379*** (0.114)
Exempt products	-0.784*** (0.0257)
PROINDUSTRIA	-0.574*** (0.0239)
Tourism	-1.243*** (0.0996)
Free-trade zone	-0.512*** (0.0232)
Observations	268,429
R-squared	0.176

Robust standard errors in parentheses. Controls include size (labor and capital), age, and location.

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations using DGII data.

Correlation results indicate that firms registered in special tax regimes, particularly those related to free-trade zone, tourism, PROINDUSTRIA, and film industry special regimes are relatively less productive or larger than the average sector firm in the general tax regime. On average, the

⁶³ Fixed effects by sector are omitted as the dependent variable is built with respect to the sectoral TFPR.

productivity of a firm registered in the tourism tax scheme, free-trade zone, PROINDUSTRIA, exempt products, border development or film regime is lower than an analogous firm with same size, age, and location in the general regime. By contrast, productivity in firms within the textiles, renewable energies, and book and library regimes is comparatively higher than a peer in the general regime. Exporters do not report statistically significant differences.

These findings shed light on the productivity costs related to the existence of special tax regimes, particularly the plurality of them. Although firms operating under the shelter of a special tax regime are few in number in the Dominican Republic, they are larger than the efficient scale, absorb a substantial share of productive resources, and are on average less productive. In the aggregate, they represent a productivity leak for the Dominican Republic. This study does not claim that all firms in the general tax regime are strictly more or less productive than firms operating in a special tax regime; rather, on average, for each unit of labor and capital allocated to a firm operating under the rules of the general regime, revenues could be 43.6 percent higher compared to the results of a firm in a special regime.⁶⁴

These findings also indicate a potential negative relationship between firm productivity and its participation in a special tax regime. The static approach reveals that the heterogeneous tax treatment offered to firms in special tax regimes seems not to be reflected proportionately in terms of productivity performance. Although firm productivity depends on other factors in addition to special tax regime, such as innovation and investment strategies, synergies with other sectors, transaction costs, among others, the differences observed in productivity cannot be solely attributed to the presence of special tax regimes. Nonetheless, the evidence points to a substantial potential relationship between the productivity decisions of the firm and its having entered a special tax regime in the Dominican Republic.

Exploiting the panel structure of the data enables the short-term adjustments of the firm and its life cycle to be followed. This exercise is decisive to monitor the growth pattern of firms and identify any differences across firms once they transit from one tax regime to other.

Dynamic Approach: Life Cycle of Firms in the Dominican Republic

This analysis is conducted on three different segments of firms: first, those that survived over 11 consecutive years of the sample period and remained in the same tax regime. These firms are denoted as no-transition firms. Second, the transitions among regimes is exploited as a mechanism to unveil potential behavior changes once the firm enters or exits a specific tax regime.

- **Survival Firms: General Tax Regime and Special Tax Regime with No Transitions**

The study explores the growth pattern of surviving firms that stayed in the same regime over the period 2007-2017. In the dataset, 97 percent of the surviving firms remained in the same regime during the decade studied, while only 3 percent reported having transitioned to another regime. Consequently, this sub-segment of firms is the most representative of what occurred during the period studied.

To start, labor, capital, and productivity trends of firms were analyzed to determine the presence of any differentiated patterns depending on the tax regime of those firms that remained

⁶⁴ The coefficient mentioned here corresponds to the correlation of a unique dummy that takes the value of 1 if the firm is in any special tax regime and 0 otherwise. The coefficient is -0.4360, the standard error is .013165, and t-stat is -33.12. This regression includes the former controls such as firm size, age, and geographic location.

in the same tax regime over the whole period. This analysis evaluated 25,805 firms in total, where 25,313 firms corresponded to firms that operated under the general tax regime and 492 that remained in the same special tax regime. Table 39 describes the distribution of surviving firms by tax regime.

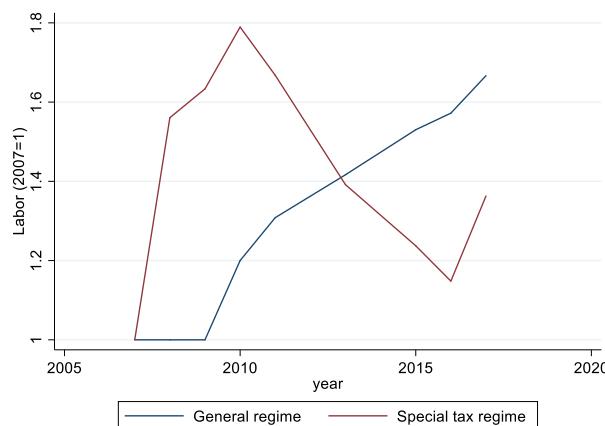
Table 39. Surviving Firms (%) by Tax Regime – No-transition Firms

Regime	%
General regime	98.1
Free-trade zone	0.8
Exporters	0.8
Exempt products	0.2
Textile	0.1
Border development	0.1
Tourism	0.0

Source: Authors' calculations employing the DGII database.

Now, firm performance is analyzed over the 11 year period to determine whether there are any differences in the growth profile of the firms as they participate in a special tax regime. This comparison exercise controls by sector, geographic location, and age of the firm. Figures 27, 28, and 29 compare the performance of a new firm in 2007 controlling by firm size, location, and economic sector. The values reported correspond to the relative growth in size or productivity reported when the firm entered the market in 2007 (indexed as 1). Thus, the index refers to the expansion in percentage points compared to its initial size. For example, a new firm that registered in the special tax regime exhibits a steep growth in its labor force in its initial years of operation. Comparatively, a new firm that registered into the general tax regime shows a slower and sustained growth in its initial years.

Figure 27. Average Employment Growth (2007=1) of Firms in Special Tax Regimes and the General Tax Regime – No Transitions between Regimes

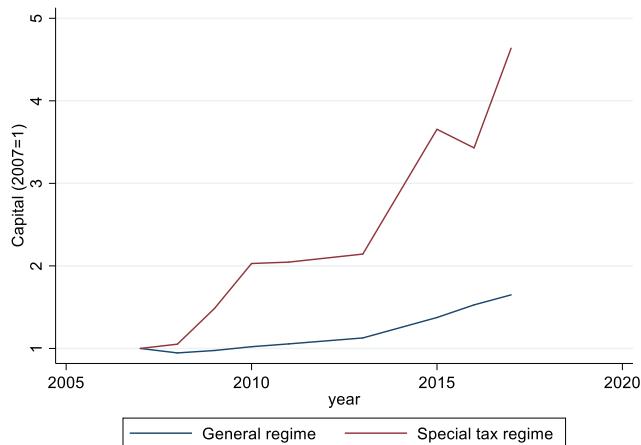


Source: Authors' calculations employing the DGII database.

Two analogous firms, both of which began operations in 2007, of similar size, sector, and location show heterogeneous growth profiles as they age. A firm in the special tax regime grows faster in the first three years, and later contracts in terms of number of employees. After 11 years, a firm in the

general regime that originally grew at a slower pace expands its labor force by more than 60 percent, compared to a firm in the special tax regime, which expands by less than 40 percent over the same period.

Figure 28. Average Capital Growth (2007=1) Firms in the Special Tax Regime and General Tax Regime – No Transitions between Regimes

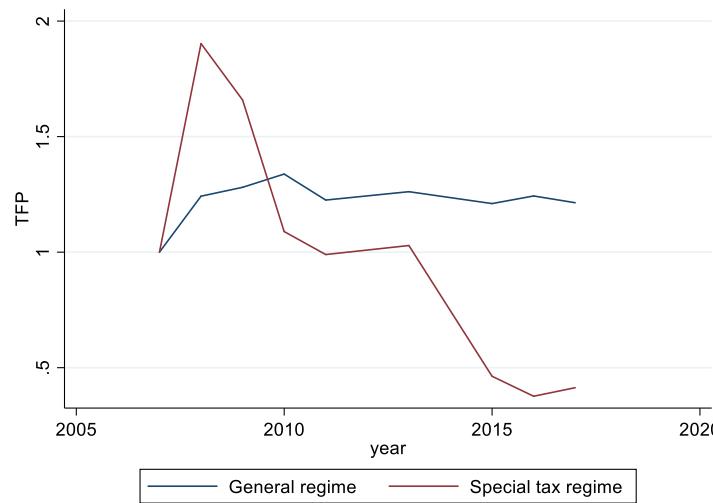


Source: Authors' calculations employing the DGII database.

On the other side, registering in a special tax regime seems to foster more capital investment and capital accumulation than firms in the general tax regime. There is a fourfold increase in the total fixed capital declared by new firms that register in the special tax regime compared to new firms in the general tax regime.

Heterogeneous growth rates are also observed in productivity values. New firms seem to report faster productivity growth in the first two years of operation. Subsequently, his trend reverses itself, with productivity levels dropping below those observed in the firm's first year. About 51 percent less output is obtained for each unit of capital and labor invested in these firms after 11 years in the market as opposed to the steady but positive productivity growth exhibited by firms that remained in the general tax regime.

Figure 29. Average Revenue Productivity Growth (2007=1) Firms in the Special Tax Regime and the General Tax Regime – No Transitions between Regimes



Source: Authors' calculations employing the DGII database.

Growth performance by cohort is also explored, as firms of different ages could exhibit distinct growth rhythms. That is, larger and older firms could grow at a slower pace compared to younger firms. As a first approach, Table 40 illustrates that firms in special tax regimes in the Dominican Republic are larger and relatively less productive than firms in the general tax regime. Interestingly, it also suggests that those differences hold across all firm ages. Firms grow over time, but even among firms with more than 20 years in the market, the gap between firms in the general tax regime and the special tax regime remains.

Table 40. Average Size (labor and capital) and Average Productivity by Age and Tax Regime, 2017

Age	Number of firms		Labor		Capital (in millions of DOP)		TFP	
	GR	STR	GR	STR	GR	STR	GR	STR
<5	10,315	97	23	159	24	206	9.9	3.2
5-9	6,230	110	45	229	242	268	7.2	8.1
10-14	3,888	89	37	86	96	306	6.9	2.9
15-19	2,056	69	60	483	167	235	5.7	3.3
20	2,871	127	88	557	137	5910	5.2	2.7

Source: Authors' calculations employing the DGII database.

Table 41 presents the 10-year change in the average size of a firm in each five-year cohort, considering the size declared in 2007 as 1. It can be read as the relative size of a firm in each regime and cohort in 2017 relative to the size reported in 2007. It suggests that firms that operate in a special tax regime grow relatively more when they are younger compared to firms in the general tax regime. For instance, an average firm in special tax regime less than 1 year old reported growth of 70 percent compared to the growth of labor of 40 percent of a firm in the general tax regime.

However, once growth reported by firms in the general regime is compared with special tax regimes for firms more than 5 years old, differences in growth performance tend to neutralize over time.

Table 41. Ten-year Change by Tax Regime and Age between 2007 and 2017

Age	Labor		Capital		TFP	
	GR	STR	GR	STR	GR	STR
<1	1.7	1.4	1.4	6.0	1.2	0.4
1-5	1.6	1.6	1.6	2.6	0.9	1.0
5-9	1.4	1.5	1.4	1.7	0.9	1.0
10-14	1.3	1.3	1.4	1.9	0.9	0.9
+20	1.1	1.0	1.4	1.7	1.0	1.0

Source: Authors' calculations employing the DGII database.

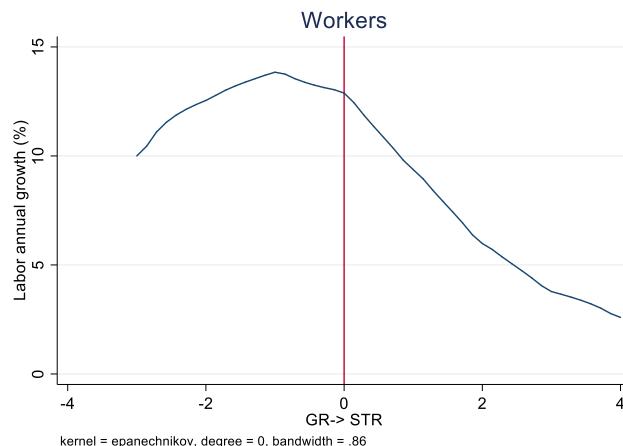
This finding can be explained by the fact that most of the tax regimes has been in force for even more than a decade and that the growth observed for older firms in the special tax regime is already in the stationary phase of their life cycle. Still, further and more systematic research should be conducted before a causal relationship can be determined.

- Firms that Transited from the General Tax Regime to the Special Tax Regime

The next step in the analysis is determining what occurs in the growth profile of a firm once it shifts from the general to the special tax regime. Time 0 in Figures 30, 31, and 32 denotes the year of the firm's transition from the general to the special tax regime. These figures illustrate the average growth rate of 632 firms that reported this transition pattern and follow the growth rate four years before and after the change in the tax regime.

Figure 30 shows that on average, employment in a firm that migrated from the general to the special tax regime was growing at a rate of 10 to 15 percent, and once it entered the special tax regime, this growth diminished progressively such that after years of having entered the special tax regime, the labor force grew at less than 5 percent.

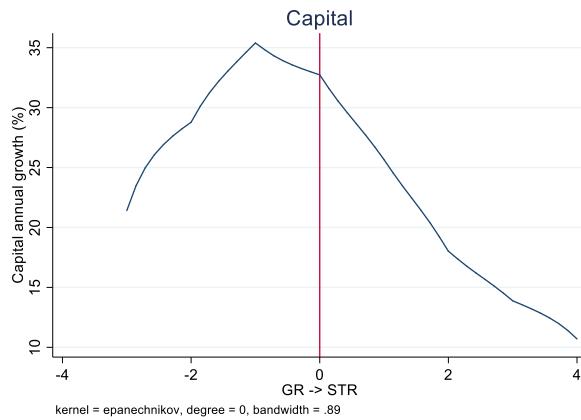
Figure 30. Rate of Growth of the Labor Force before and after Registering in a Special Tax Regime



Source: Authors' calculations employing the DGII database.

Similarly, capital investments decrease in subsequent years after the transition to the special tax regime. On average, firms that moved from the general to the special tax regime experienced had less capital investment. Before registering in the special tax regime, firms were increasing progressively in their capital investments and, although the rate of growth is positive after moving to the special tax regime, it is significantly lower, as shown in Figure 31.

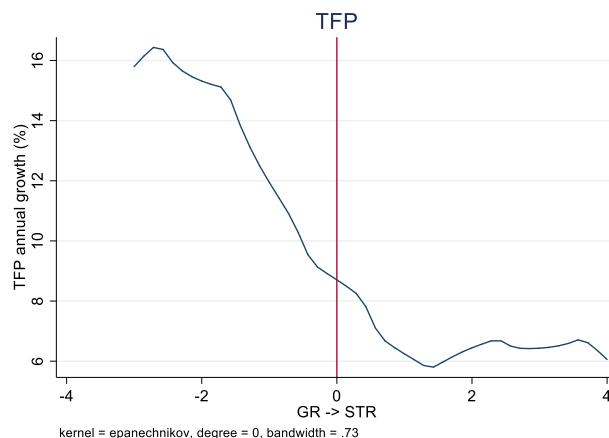
Figure 31. Rate of Growth of Capital Investment before and after Registering in a Special Tax Regime



Source: Authors' calculations employing the DGII database.

With respect to productivity performance, productivity was declining prior to the transition to the special tax regime. Once the firm registers for one of these incentive schemes or special tax regimes, TFP variations are stabilized but with growth rates that are substantially lower, as illustrated in Figure 31.

Figure 32. Productivity Growth before and after Registering in a Special Tax Regime



Source: Authors' calculations employing the DGII database.

- Firms that Transited from the Special Tax Regime to the General Tax Regime

The findings in this section offer important insights about the functioning of special tax regimes in the Dominican Republic. First, larger and older firms are mainly using the tax incentives granted by these instruments, while smaller and more productive firms pay relatively higher taxes. The complexity of the regulatory framework and design of special tax regimes make it expensive for smaller firms to take advantage of these resources; consequently, larger firms tend to use them because they are better equipped to navigate the regulations.

Second, the rate of entry and exit of firms differs depending on the tax regime. Firms in special tax regimes tend to stay longer in the market even though they tend to be in the low segment of the productivity distribution. Evidence suggests that a firm registered in a special tax regime has a lower probability of exiting the market than an analogous firm in the general tax regime.

Finally, there are differences in the growth patterns of firms over time, and their behavior tends to change when they register in a special tax regime. On average a surviving firm operating within the general regime over the 10 years studied grew more in number of employees, accumulated less capital, but reported significant improvements in productivity. On average, a firm in the special tax regime did not grow as much in terms of labor force and, despite reporting higher capital investments, it uses those resources less efficiently and exhibits lower productivity.

Among the firms that moved from the general to the special tax regime, systematic differences were found in growth performance once they registered in a special tax regime. In general, the growth rate slowed for labor and TFP, while it improves for capital accumulation. Therefore, stylized facts show some differential patterns among firms operating in special tax regimes that could affect their expansion plans and strategies to improve their productivity.

5. Conclusions

Economic distortions are indeed present in the Dominican economy, and they have increased between 2007 to 2017, confirming significant productivity and growth leaks. Firms face significant frictions in the market. Primarily, younger, newer and smaller firms are confronting these distortions, but larger, established firms are not immune to them. Estimations suggest that the potential gains from removing all distortions could amount to 355 percent in 2017. This means that with the same amount of resources allocated more efficiently, the Dominican Republic would increase its TFP by more than threefold. Substantial potential productivity gains were found in all provinces, but particularly significant gains were found for the eastern provinces of Altagracia, La Romana, and El Seibo, as well as some northern provinces in the Cibao region.

Section 1 demonstrated how the process of destructive creation is malfunctioning in the Dominican Republic as a possible result of these distortions, and consequently how economic distortions may be contributing to the exit of productive firms while aiding unproductive units to enter and remain in the market. This has harmful consequences for the allocation of resources, as a high fraction of labor and capital is concentrated among firms that are not growing over time.

Section 2 explored a potential source of these distortions by analyzing the functioning of more than 10 special tax regimes, including their incentives and coverage. Over the past two decades, 13 provisions were issued creating special tax schemes and incentives that vary according to economic sector, geographic location, sources of inputs, and firm size, among others. As a result, firms in the Dominican Republic navigate in a dense and complex tax system that might explain the rise of the economic distortions described in this document. The presence and interaction of the multiple incentives with differential treatment for similar economic units could create room for tax evasion and misreporting, but more importantly, for changes in the strategic behavior of firms. Even within the simplified tax regime, some heterogeneous treatment and significant discontinuities could induce firms to choose arbitrage, as they could adjust their scale or under-report their true size to pay relatively lower taxes. Better governance and monitoring of these tax regimes is required, because under some of them there are no clear performance criteria for exiting a special tax regime. Therefore, some firms could stay indefinitely within the protection of this tax armor without the proper incentives to grow.

Section 3 explored the relationship between participation in a special tax regime and productivity performance and growth decisions. The number of firms operating in special tax regimes in the Dominican Republic is relatively low—fewer than 13 percent of all firms. Nonetheless, those firms represent 31 percent of the total labor force and 37 percent of the capital allocated to firms in the formal sector. Larger and older firms were found to be more prone to using these tax incentives, but they are not necessarily the most productive ones. Moreover, participating in a special tax regime reduces the probability of exiting the market compared to an analogous firm in the general tax regime, which is also accompanied by a larger exit rate of highly productivity firms in the Dominican Republic. Among the surviving firms, evidence presented in Section 3 illustrates that firms operating in a special tax regime are relatively less productive than analogous firms in the general tax regime.

Overall, the findings in Section 3 show that firms operating under the umbrella of special tax regimes are relatively larger and older in the market but grow at a slower pace compared to firms in the general tax regime. Comparing the life cycle of both group of firms, the latter exhibited a 25

percent growth in employment, a 21 percent growth in capital investment, and a 20 percent increase in productivity, while firms registered in special tax regimes showed relatively no improvements in these indicators. Over the 10 years studied, firms in special tax regimes reported almost the same size and productivity as in 2007. Controlling for firm-age, the study found that mainly firms under 5 years old grow faster when they participate in a special tax regime, compared to firms in the general tax regime, but this relationship reverses in firms 10 years old and above. This would suggest that special tax regimes could potentially favor the growth of small and younger firms for a certain period, but once established in the market and reach a certain scale and age, they do not report further improvements in growth; on the contrary they report lower productivity by staying in the special tax regime.

The evidence gathered in this document provides interesting stylized facts for the economy of the Dominican Republic for further public policy discussion rather than assuming or testing any causality relationships. It unveils a heretofore unnoticed link between special tax regimes and firms' growth performance and how it could affect aggregate productivity in the Dominican Republic. Further studies could explore in greater detail specific cause-effect relationships, and structural models could be useful to quantify the economy-wide gains that could accrue from adjusting tax regimes, as well as its impact on growth, informality, and tax evasion.

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