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# Tax Enforcement and Young Formal Businesses in Shocks: Microeconomic Evidence for the Ecuadorian Case

## Aplicación de impuestos y empresas formales jóvenes en crisis: evidencia microeconómica para el caso ecuatoriano

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**Abstract**

While tax revenues are important for the government, they are also intimately related to agent behavior when there is margin to underreport. Moreover, implementing appropriate tax policies is a complex problem since the enforcer does not know the real profits agents make, and because such policy must be well targeted to improve the economic environment. And, defining a policy is particularly complex when the economy is in a contractive phase of the cycle, as then tax revenues are certainly endogenous to economic activity and measuring the effect of taxation becomes even more difficult. In this light, this paper provides an investigation into underreporting behavior and how it affects income taxes, both during regular and contractive periods, using disaggregated microeconomic data from a sample of Ecuadorean firms. It is found that there is a tendency to underreport over regular phases of the economic cycle and to shift onto deductible margins during the most recent contractive period. Also, it is seen that experimented, older firms increased their deductible margins on average, while young, newer firms have not. These results serve to see how the pandemic affected firms differentially across groups, indicating the need to implement policies with a focus on young firms and in turn incentivize formal entrepreneurship.

**Keywords:** Tax, underreporting, recessions, young firms. D22, E62

**Resumen**

Si bien los ingresos fiscales son importantes para el Estado, también están íntimamente relacionados con el comportamiento de los agentes cuando hay margen para subreportar. Aún más, implementar políticas tributarias adecuadas es un problema complejo de por sí ya que el ejecutor no conoce las ganancias reales que obtienen los agentes, y porque dicha política debe estar bien orientada para mejorar el entorno económico. Y, definir una política es particularmente complejo cuando la economía se encuentra en una fase contractiva del ciclo económico, ya que entonces los ingresos tributarios son ciertamente endógenos a la actividad económica y medir el efecto de los impuestos se vuelve aún más difícil. En este sentido, este trabajo proporciona una investigación sobre el comportamiento de subreporte de ganancias y cómo afecta el impuesto a la renta, tanto durante los períodos regulares como contractuales, utilizando datos microeconómicos desagregados de una muestra de empresas ecuatorianas. Se encuentra una tendencia a

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reportar menos en las fases regulares del ciclo económico y a pasar a los márgenes deducibles durante el período contractual más reciente. Además, se observa que las empresas más antiguas aumentaron sus márgenes deducibles en promedio respecto a periodos anteriores, mientras que las empresas jóvenes y más nuevas no lo han hecho. Estos resultados sirven para ver el efecto diferencial de la pandemia en las empresas, resaltando la necesidad de implementar políticas con un enfoque en las empresas jóvenes que, a su vez, podría incentivar el la creación de negocios formales.

**Palabras clave:** Impuestos, subregistro, recesiones, empresas jóvenes. D22, E62.

## I. INTRODUCTION

While there is an extensive literature analyzing the cyclicality of *fiscal policy* —which is how government spending fluctuates according to the business cycle— the cyclicality of *tax policy* is a concept that has surged only recently (Vegh & Vuletin, 2015). On the fiscal side, policy is generally procyclical in developing countries: during recessions, increases in government spending are the usual way to counteract the adverse effects that economic downturns impose, while on upswing phases, it is reducing the size of the fiscal apparatus. The causes and implications of government actions in these circumstances have been analyzed on both a global and individual scale [as in Tornell & Lane (1999), Riascos & Vegh (2003), Frankel et al. (2013), and Cuadra et al. (2013), to name a few]. But on the taxing side, what the government should do on these scenarios is ambiguous if one is to dissect the available evidence.

The necessity of closing this knowledge gap becomes evident during opposite phases of the economic cycle. This is when the policymaker needs to know how economic activity affects tax revenues, and most importantly, if there is something that can be done during declines to spring the economy back. And the main empirical obstacle is that evidence on a macroeconomic perspective is elusive. The total amount of taxes paid by individuals and firms is itself a response to the business cycle when there is margin for underreporting or bribing. This implies that declines in tax revenue during shocks tend to be biased, as there could be endogenous changes in the agents' behavior —like the willingness to evade taxes. The case can be made, that when firms face a low profitability, it becomes more and more attractive to underreport. Hence, studies that rely on tax revenues or measures based on it, such as the tax burden, suffer from endogeneity problems. This has led Vegh & Vuletin (2015) to make the distinction between "outcomes" and what they call "policy instruments". The latter being a variable that provides an exogenous change on tax revenues that can only be attributed to the policymaker's intent, and the former being a variable on which the intent cannot be separately identified.

In this light, the objective of this paper is two-fold. Firstly, using Ecuadorean firm-level data, underreporting is evidenced by instrumenting pre-tax revenues over income tax. The instrument corresponds to a one-time change in regulation passed in 2015, which condoned from interest and penalty fess to all delayed tax payments to the IRS in that year. This provides an exogenous variation that is strongly and negatively correlated with pre-tax profits of subsequent periods. In a regression framework with fixed effects and an unbalanced panel, it is argued that the reform affected how much income tax firms paid only through the effect it had on reported profits.

Secondly, the recent decline of economic activity due to the COVID-19 pandemic serves to analyze how firms reduce individual income tax during contractive periods. As tax revenues are endogenous to the pandemic and difficult to instrument in such context, this investigation looks into deductible and exempt margins. It is seen that the difference between gross and pre-tax profits (i.e., the amount subtracted before computing the tax) has increased on average and is bigger with respect to previous periods. This

is consistent with recent evidence on firms substituting into other margins to reduce taxation (Carrillo et al., 2017). However, it is also seen that young firms (5 years or less) do not seem to advantage from exemptions or deductions, and the effect found in the whole sample is attributable to older firms. Moreover, the decline in tax revenue coming from young firms seems to be the cause of a low real profitability, likely a consequence of the COVID-19 crisis.

All of this suggests a tendency to underreport over regular phases of the economic cycle and to shift onto deductible margins during the most recent contractive period. From a policy point of view, this suggests the need to toughen tax enforcement on a regular basis and allow for differential flexibility during economic downturns. Particularly, the effect of the COVID-19 shutdown seems to have affected tax revenues the most through the effect it has had on relatively small and new firms. Hence, this opens up debate on the taxation of the entrepreneurial sector. For one, a reason for the shift into deductible margins may be that there are not enough tax incentives put in place for new firms to avoid low profitability periods. It also may be a problem on the way regulation is set up, so that the eligibility criteria to obtain exoneration and exemptions is not well targeted.

Additionally, as this has to do with age and entrepreneurship, the debate is tightly related with the size of the informal sector. With high informality rates, determining an optimal policy during recessions is complicated because a big part of the economy is unobservable and does not report its activity. Moreover, as has been observed, contractive periods may affect business formation and its applications (Dinlersoz et al., 2021), complicating the matter even further when trying to develop a tributary policy that aims for economic rebound. An important part of the challenge is determining the reasons why entrepreneurial activity is reluctant to make the jump into formality[2], and the evidence presented here suggests there are not enough mechanisms in place that foster formal business formation during phases of economic hardship.

In a broader sense, the policy implications and conclusions of this analysis are relevant for the Ecuadorean case in several ways. While a handful of authors have recognized the possibility of underreporting in the country on an aggregate perspective [for example, Ramírez-Álvarez & Carrillo-Maldonado (2020)], there has been no explicit acknowledgment of the potential endogeneity problems in the computed measures of tax revenue. As a result, revenue increases have been associated to a greater enforcement efficiency and a reduction of tax gaps, but the real effect may be overestimated since the amount of revenues is an outcome itself. That is, there is little to infer from year-to-year fluctuations in tax revenue as it is correlated with the business cycle, and thus papers that rely in this or other transformations of the same aggregate measure yield ambiguous results. By using an instrument and an estimation strategy built upon disaggregated data, this investigation documents a clearer effect of enforcement on taxes. On the opposite of what intuition may initially suggest, the flexibility change in regulation on a "normal" period of economic activity has had a negative impact on the individual tax generation through reported profits. Also, while there is evidence of underreporting with VAT taxes (Carrillo et al., 2017) and avoidance through tax haven ownership (Granda, 2021), this investigation also emphasizes the need to pursue causal estimation in experimental settings.

Section 2 provides a brief review of the literature and describes the conceptual framework. Section 3 describes the methodology regarding the estimation strategy and the data. Section 4 presents the results of the estimation and section 5 concludes.

## II. LITERATURE REVIEW

There is evidence that tax rates are much more volatile in developing countries while suggesting their tax policy tends to be procyclical in the same sense government spending is (Vegh & Vuletin, 2015).

[2] See McKenzie & Seynabou Sakho, (2010) for evidence in an informal setting.

And while this by itself does not mean that taxation systems used in developing countries are ineffective or perverse, this illustrates how the problem of taxation is much more difficult and complex for them. A particular challenge in deciphering the mechanism behind tax rates in this context, is that the complexity of the linkages between economic outcomes, political systems and institutions are difficult to isolate.

The problem behind trying to see whether such tax systems are in fact perverse, or if they are beneficial, is mainly an empirical one. We cannot attribute the effect of changes in taxation to economic outcomes because there is, evidently, the possibility that this relationship is endogenous and subject to omitted variable bias. Specifically, during upswing phases it is plausible that the marginal rate of taxation (the additional percentage point in the average rate) would not drive economic activity down; but if implemented, are we seeing the results of the policy or the already-optimistic environment? In any case, we will find that the effect of the rates of taxation is difficult to measure consistently not so much because of it the underlying theory, but because we do not know what would have happened to a particular country *if it had a completely different tax regime at that particular point in time*. As such, the empirical setting we are facing is ex ante biased, and while it is tempting to suggest that taxes pose an aggregate effect one way or another, there is not much quality evidence in favor either side of the tax debate—which is how should the tax rates fluctuate, if they do, and how can they be used at different instances of the economic cycle.

With respect to the theory, the political economy literature has a tradition of associating political systems and institutions with policy outcomes such as taxation. It relates how agents decide their vote on political elections based on their preferences, being an implicit relationship between how people want to be governed and how much taxes are they willing to pay [see for example, Meltzer & Richard (1981) and Romer (1975)]. Nevertheless, this way of approaching the theory is not useful when considering developing countries, and it does not provide a good framework to think about how the cyclicality of the economy influences the agents' decisions after the voting has taken place.

Moreover, on different branches of the literature the problem of taxation has been analyzed under several different motives. For instance, the tax rates have been scrutinized for the plausibility that the inefficiency (or "leakage") in the institutional systems is too high, so that the redistribution properties discussed in the political economy lecture are not realized ex ante. This theme is particularly akin to the study of corruption, where the most convincing and robust in this realm comes from experimental evidence [good examples of this are the seminal papers by Bertrand et al. (2007), Fisman (2001) and Olken (2007)]. Taxation in this area has been thought of as an imperfect system on which agents are able to avoid paying the totality of the amount they owe, so that they may incur in `shady' practices to increase their profitability margin. Interestingly, a detailed analysis of this theoretical framework reveals that it is broader than that of political systems, in the sense that it allows for the inclusion of changes in the economic environment to determine the individuals' tax behavior. Because of this, it is possible to adapt this well-known framework to capture how agents would behave regarding taxes when faced with opposite phases of the economic cycle. This is discussed in detail in what follows.

## III. METHODOLOGY

Here, the conceptual framework of underreporting used throughout the investigation is laid out. Building upon the fundamentals of the Allingham-Sandmo model,[3] the one developed here differs in the way enforcement influences the decisions and the motives of firms. Instead of considering it as a form of cheating or stigma, which is how it is usually thought about (Benjamini & Maital, 1985; Alm et al., 1993; Tedds, 2010; Hurst et al., 2014; Alm et al., 2016; Adhikari et al., 2020), we are interested in

[3] Which is itself a development on the seminal work by Becker & Stigler (1974), the first attempt at modelling the individual's decision problem when considering cheating or corruption.

seeing whether underreporting is the response to a low profitability under an optimization point of view.

We shall consider a representative firm that operates in some industry that is well observed by a centralized tax entity. This entity or collector does not observe the real profit the firm makes but is able to impose penalties and varying degrees of regulation for all the players in the market. The fundamental notion that the model captures is that of a setting with imperfect information: the enforcer sees the tax reports of all the other firms and is able to assess whether any particular firm is evading, but the firm does not. Instead, firms assess the probability of getting detected on what is available to them, which are their own real revenues and production costs.

Following Yaniv (1995), denote the firm's profits as $\pi = \pi(A, r, x)$ where $A$ is the firm's activity level, $r > 0$ is the tax rate which is applied on a certain tax base that is common knowledge, and $x$ is a vector of market parameters. Let $s$ $(\geq 0)$ be margin of underreporting. Denote the probability of detection by the enforcer as $p$, exogenously given for now, and let the sanction or penalty of being detected be $m > 0$. When the firm underreports and is not detected, then the net profits after underreporting are

$$\Gamma = \pi + rS,$$

and if it gets detected the net profits are

$$\Gamma^d = \pi - mrS.$$

We will write the firm's utility function as $U(.)$ assuming it solely depends on the amount of net profits the firm has. The firm solves

$$\mathbf{max_s} \quad \boldsymbol{EU} = \boldsymbol{(1-p)U(\Gamma) + pU(\Gamma^d)},$$

which has an interior solution if the first-order condition is satisfied with respect to $\boldsymbol{s}$,

$$EU_s = r[(1-p)U_\pi(\Gamma) - pmU_\pi(\Gamma^d)] = 0,$$

where $U_s = \partial U/\partial s$. This implies that the firm will underreport if $1 > p(m+1)$ since $\Gamma > \Gamma^d$ and $U(.)$ is a *marginally* non-increasing function[4]. Conceptually, if $1 \leq p(m+1)$, then $s = 0$ meaning that the penalties and/or the probability of being detected are high enough that it is not attractive for the firm to underreport its profits. This is a first approximation to the notion of tougher enforcement, that either by increasing surveillance intensity or making it more difficult for firms to cheat, tax revenues may increase.

In reality the firm cannot easily set $\pi = 0$ as the second-case solution to (1) suggests, and it is also important to leave the assumption of an exogenous probability of detection. Following Carrillo et al. (2017), the probability should increase if the reported profits are relatively smaller than the reported revenues $\hat{R}$. In other words, we regard the collector as having information about the distribution of profit rates, and it could approximately tell if cheating is taking place by looking at the profit-revenue ratio of firms[5]. Thus, let $\hat{\pi}$ be the reported amount of profits. The subjective probability of detection $p(\hat{\pi}/\hat{R})$ is such that $p' < 0$. For simplicity we will specialize somewhat and consider $p' = -1$ with $p = 1 - \hat{\pi}/\hat{R}$. The firm's objective function is now

$$\left(\frac{\hat{\pi}}{\hat{R}}\right)U(\Gamma) + \left(1 - \frac{\hat{\pi}}{\hat{R}}\right)U(\Gamma^d) = \left(\frac{\pi - s}{\hat{R}}\right)U(\Gamma) + \left(1 - \frac{\pi - s}{\hat{R}}\right)U(\Gamma^d)$$

[4] It is assumed $U(.)$ can be either a risk-neutral or risk-averse utility function.

[5] As Carrillo et al. (2015) put it, \$100 profits from \$1,000 in revenue are more credible than reporting \$100 profits from \$1,000,000 in revenue.

since $s = \pi - \hat{\pi}$. We see that in this setting the preferable thing for the firm is to do is underreport its revenues (knowing that it could also overreport its costs). This is due to the fact that revenues may help lower the probability of being detected, as clearly seen in the objective function.

Finally, we introduce the possibility of allocating resources into deductible or exempt margins, which enable the firm to pay a lower rate by decreasing taxable profits. Writing $\pi = \hat{\pi} - s - \pi^{\delta}$, where $\pi^{\delta}$ is the component that is exempt from taxes, the optimization problem surmounts to determining $\pi^{\delta} + s$. However, it is important to note that the deductible component may not increase the probability of detection, given governments and tax authorities tend to implement them as incentives (e.g., increases in the amount of workers employed). Hence, the firm would try to allocate as much into $\pi^{\delta}$ as possible, and then solve the optimization problem to determine $s$. In fact, if the firm cannot lie about its deductions, then $\pi^{\delta}$ is endogenous to the production decision and the firm jointly determines how much to exempt from its revenues and deduct from its costs along with all other productive inputs — increasing $\pi^{\delta}$ allows to improve real profitability. But, if the firm is able to cheat on this side, then the best the firm can do is set $\hat{\pi} = \pi^{\delta}$ which implies that $\pi = -s$. That is, the firm will try to deduct/exempt the totality of its real profits.

## IV. DATA AND ESTIMATION

### Data

This paper uses Ecuadorean firm-level panel data from the *Superintendencia de Compañías, Valores y Seguros (SCVS)*, from 2006 to 2020. The panel corresponds to the administrative and financial records which are made available publicly by the SCVS. Specifically, all data comes from the fillings of Tax Form 101[6] which are obligatory for registered firms at the end of each calendar year. Variables for growth of each industrial and service sector are obtained from the World Bank.

The full data set has more than 60 000 units, with the relevant sample being compromised of all active firms (as of 2020). Firms that were founded before 2006 have records over the 14-year span, and those born after 2006 have records for the years they have been operational. Firms from the following industries or sectors are excluded: healthcare, public services, mining, art and recreation, public management, defense, and in general sectors that do not have a well-defined or a for-profit operational purpose in the economy. Those firms included belong to the manufacturing industries and final-consumption services. Firms registering negative assets, zero revenues, zero costs and those having inconsistencies over the relevant years are also kept out of the sample. The final database has 18,644 firms.

The main variables extracted from the financial reports are total assets, liabilities, and equity value. From the income statements, we extract revenues, total costs, profits before deductions and pre-tax profits, along with the generated income tax (GIT). The GIT is defined as the amount to be paid *before* discounting deductions, tributary credits, and amortizations of losses from previous periods, and *after* accounting for tributary exonerations from acting laws.

There are two laws that define absolute income tax exoneration in the country. First, firms that are created on "strategic" economic sectors and hold other eligibility criteria as defined by the 2010's "*Código Orgánico De La Producción, Comercio e Inversiones (COPCI)*", are exempt from all income tax payments for either 3, 5 or 10 years starting from the period in which they have operational revenues. Second, a recent law passed by the country's authorities, called "*Ley Orgánica para el Fomento Productivo (LOFP)*", also

[6] This is the most recent one. Forms have changed three times during the 2006-2020 period.

discharges new firms for an 8-, 12- or 15-year period to further stimulate investment on priority sectors. This last law was passed with a transitory purpose in 2018 and has recently been approved for an extension that will last until 2022. Dummy variables are created according to the regulation specifications for those firms that qualify for exoneration and register positive profits and zero income tax. This controls for the effect of the laws in the estimation.

Similarly, deductions and amounts exempt from income tax are defined in art. 27 and art. 28 of the "*Reglamento Para Aplicación Ley De Régimen Tributario Interno (LORTI)*" , with its most recent modification happening in 2018 along the approval of the LOFP[7]. The LORTI stipulates deductible costs and expenses are those related to: compensations and social benefits, certain types of credit (with limitations), supplies and production materials, repairs, maintenance, depreciations, amortizations, operational losses, administration fees, promotion and advertising, royalties, technical and consulting services, certain travel expenses, among others. All targeted (and absolute) exonerations in the LORTI are as defined in the COPCI and the LOFP. Interestingly, a firm that is completely exonerated from paying income taxes on a particular year will have registered a deducted amount that is equal to its gross profits. This is just the same as a non-exonerated firm that deducts a quantity greater than or equal to its gross profits.

**Estimation strategy**

To fix ideas, it is worth briefly discussing the ideal setting on which the mentioned firm behavior is precisely measured. This is of course, an experimental one[8].

Ideally, we would have a sample of firms on which the tax authority presumes underreporting is taking place. Instead of auditing all of them, provided that the number of suspected firms is large enough for statistical power, the authority randomly selects some to undergo auditing as a form of treatment leaving the rest for control. Because treatment is randomly assigned, it is negligible that any change in the behavior of firms is due to unobserved characteristics *on average*. Then, any change in the amount of tax paid by the firms can be regarded as existing only because of the effect treatment has on the treated. The difference in averages between treatment and control groups is the Average Treatment Effect (ATE) and is pretty much causal if the null hypothesis cannot be neglected. In the tax setting we are considering, if the ATE is greater than zero and its t-statistic shows significance, then there is strong evidence that underreporting has been carried out by the suspected firms[9].

Now, in the midst of having observational data, focus is put on correcting for omitted variable bias that may arise[10]. Because we do not now ex ante which firms should be audited and because such an observation can only be done by the tax authority, the relation between profits and generated income tax is exploited. From our experimental ideal, we are interested in seeing the effect of an *exogenous* variation in regulation or in the probability of underreporting detection (which is guaranteed when assignation is done randomly). So, we propose a variable that that will work as instrument.

In April 2015, the Ecuadorean National Assembly approved the "*Ley Orgánica de Remisión de Intereses, Multas y Recargos*", which condoned all delayed payments to the tax authority from interest, penalty fees and surcharges as long as the totality of the owed amount was paid up to 60 days after the law was made effective. This was a one-time, transitory change in the regulation with potential negative effects on tax

[7] See https://www.aea.ec/wp-content/uploads/2019/05/Reglamento-a-la-Ley-de-R%C3%A9gimen-Tributario-Interno.pdf

[8] We closely follow the seminal exposition in (Imbens & Angrist, 1994).

[9] Readers are also referred to a book by (Imbens & Rubin, 2015). In fact, the philosophy behind causality in this way of conducting experimental research is due to much of the contributions of Donald Rubin. Unfortunately, an experimental study of this nature is yet to be implemented for the Ecuadorean case in the available literature.

[10] Endogeneity, on the other hand, is unlikely to be a concern as the GIT is calculated on the profits of each particular year.

recollection of subsequent periods. In fact, as it will be seen in the results, the law is strongly and negatively correlated to the reported profits of 2015 and later. The exclusion restrictions for the validity of the instrument are discussed in the next section.

A 2SLS regression is estimated, with the first stage being

(I-A) $$\pi_{it} = \gamma_0 + \gamma_1 I_{\{t \geq 2015\}} + \mathrm{X}'_{it}\gamma + \theta_t + \eta_i + \zeta_{it} \,,$$

where $i$ indexes firms (units), $t$ indexes time, $\pi_{it}$ are the gross profits, $I_{\{t \geq 2015\}}$ is a dummy variable that equals 1 if $t \geq 2015$ and is 0 otherwise, $\mathrm{X}_{it}$ is a column vector of firm control variables, $\theta_t$ are year fixed effects, $\eta_i$ are firm fixed effects and $\zeta_{it}$ is the error term. Here all variables are indexed by units and time. The second stage is

(II-A) $$GIT_{it} = \beta_0 + \beta_1 \tilde{\pi}_{it} + \mathrm{X}'_{it}\beta + \theta_t + \eta_i + \epsilon_{it} \,,$$

where $\tilde{\pi}_{it}$ are the predicted profits.

Since we are dealing with a big number of dummy variables in $\eta_i$ (18,644 firms), the 2SLS is not feasible to compute with the conventional IV modules in statistical packages. Instead, the regressions are computed absorbing the firm effects[11] to obtain the estimates in (I-A) and predict values to obtain those in (II-A). But, as a result of computing the two stages "by hand", the procedure does not provide the correct variance-covariance matrix. To estimate it with precision, the bootstrap technique is used (Efron & Tibshirani, 1986).

Upon the results of this IV regression, attention is shifted into analyzing how firms reduce their GIT with the margins available to them —something that has already been documented with VAT taxes in Ecuador (Carrillo et al., 2017). As per our discussion about the data, regulation governing income taxes allows firms to deduct from their gross profits in several ways. It was hinted above that this may provide leeway for firms to reduce their tax burden in a more attractive way, because for every dollar of real profits that is shifted into deductible or exempt margins, the risk does not necessarily go up. The probability of detection does not change.

Hence, with most recent decay happening due to the COVID-19 pandemic, the years it has affected economic activity are seen as a contractive phase[12]. The idea is to see whether deductions change during this period, for the conceptual framework suggests firms should enlarge them as much as they can. It is hypothesized that in times of economic hardship deduction amounts increase. Although underreporting would increase proportionally to the lower profitability and reduced risk aversion, income tax is an endogenous outcome to the business cycle. As such, it is difficult to obtain a convincingly unbiased estimate of underreporting when considering cycles: the problem is GIT declines are certainly not only due to underreporting behavior, and thus estimation of real effects is practically impossible without an adequate policy instrument (and they are problematic to find on recessions).

The hypothesis of the amount firms deducted more from their margins during the pandemic can be tested with the following regression based on gross profits ($\pi$) and pre-tax profits ($\pi^r$):

(I-B) $$\rho_{ikt} = \alpha_0 + \alpha_1 I_{\{t=2020\}} + \alpha_3 E_{it} + \alpha_4 G_{kt} + \eta_i + \epsilon_{it} \,,$$

where $\rho = (\pi - \pi^r)/\pi$ [or $\rho = \ln(\pi) - \ln(\pi^r)$] is the proportion of gross profits that firm $i$ deducts in year $t$; $I_{\{t=2020\}}$ equals 1 if $t$ is the year 2020; $E_{it}$ is a dummy variable that equals 1 if the firm pays zero income tax and holds eligibility to exoneration under either the COPCI or LOFP laws; and $G_{kt}$ is the

[11] See (McCaffrey et al., 2012).

[12] The emerging economic literature regarding COVID-19 discerns it somewhere between a recession and a crisis (Barro et al., 2020; Borio, 2020).

rate of growth of the industry $k$ where $i$ belongs. The growth of the industrial sector may be included as a control because it is expected that when the market is doing well, the difference may shrink. Likewise, the difference may broaden when the firm's economic environment is declining —including the average rate of growth accounts for part of the endogenous relationship between profits and reporting during opposite phases of the economic cycle. As we also include the age of firms in the next specifications, this also corresponds to evidence of formal entrepreneurial activity being related to income (Stel et al., 2005)

It is important to note that looking into deductions may provide stronger evidence *if* the reason they increased during a recession is due to the timely behavior described above. In other words, this means assuming that in the absence of the pandemic there would have been no systematical increase in deducted amounts. Although this identification assumption is not as restrictive as it may seem, it is not directly testable —because contractive phases do not have extreme *exogenous* differential effects on firms, which would allow for a differences-in-differences approach.

As per the discussion in Bartholdy & Mateus (2011), Schwellnus & Arnold (2008), the differential effects of firm age should also emphasized in the relationship between taxes and reported profits. So, to see the effect of this global characteristic across firms the following restricted regression is estimated around the discontinuity generated by the pandemic:

(II-B) $$\rho_{ikt} = \delta_0 + \delta_1 I_{\{t=2020\}} + \delta_2\left(I_{\{t=2020\}} * d_i\right) + \delta_3 E_{it} + \delta_4 G_{kt} + \eta_i + \varepsilon_{ikt} \,,$$

with $d_i$ being an age dummy that equals 1 if the firm is "young" (the standard definition and the one taken here is having 5 years or less after being constituted). It may be illustrative to note that because this is a fixed effects equation, a separate parameter for the term $d_i$ is not included as it is constant for across units and there is no additional variation in the model it can explain (also, the term would be collinear with the fixed effects dummies)[13].

Equation (II-B) simply captures the differential effect of the pandemic on deducted/exempt amounts between two large groups. The hypothesis that old firms deducted more from their gross profits on average in the pandemic corresponds to rejecting $\delta_1 = 0$, and the hypothesis that young firms deducted more than in previous periods during the pandemic corresponds to rejecting $\delta_2 = 0$.

Furthermore, equation (II-B) can be generalized to

(III-B) $$\rho_{ikt} = \omega_0 + \omega_1 I_{\{t=2020\}} + \sum_{l=2}^{L}\left(I_{\{t=2020\}} * d_{il}\right)\omega_l + \omega_{L+1} E_{it} + \omega_{L+2} G_{kt} + \eta_i + \varepsilon_{ikt} \,,$$

where $L$ is the number of age groups in the sample of firms and $d_{il}$ is a dummy variable that equals one if firm $i$ is in $L$. This unrestricted estimation exploits the full variability in the age dimension, with each coefficient $\omega_l$ being interpretable as the increase in deductions attributable to age $l$. The omitted dummy is the one for being in group $l = 1$, or the youngest age in the sample. Younger firms report more of their relative gross profits during the pandemic if *not* rejected that $\omega_l = 0$ for all $l$ below some threshold.

As the number of possible groups $L$ is too big to be presented clearly in this paper (the firms in the dataset have an age range between 0 and 100 years) the next section shows that $\omega_l = 0$ for thresholds varying from 5 to 15 years. Additionally, it can be verified that the parameter for old firms is different than zero by imposing the restriction that $l$ is greater than some positive number $h$, so that the equation is

(IV-B) $$\rho_{ikt} = \omega_0 + \omega_1 I_{\{t=2020\}} + \omega_2\left(I_{\{t=2020\}} * d_{i\{l>h\}}\right) + \omega_{L+1} E_{it} + \omega_{L+2} G_{kt} + \eta_i + \varepsilon_{ikt} \,,$$

[13] Without fixed effects, (II-B) is: $\pi_{ikt} - \pi^{\rho}_{ikt} = \delta_0 + \delta_1 I_{\{t=2020\}} + \delta_2 d_i + \delta_3\left(I_{\{t=2020\}} * d_i\right) + \delta_4 E_{it} + \delta_4 G_{kt} + \varepsilon_{ikt}$ .

with $d_{i\{l>h\}} = 1$ if the firm is more than $h$ years old. Then the result is $\omega_2 \neq 0$.

Finally, the following relationship is formulated to see how exoneration eligibility affected deductions during the pandemic:

(V-B) $$\rho_{ikt} = \theta_0 + \theta_1 I_{\{t=2020\}} + \theta_2 E_{it} + \theta_3 \left(I_{\{t=2020\}} * E_{it}\right) + \theta_4 G_{kt} + \eta_i + \varepsilon_{it} \ .$$

The estimate $\theta_1$ captures the change in the magnitude attributable to the pandemic timeline for non-exonerated firms; $\theta_2$ captures the effect attributable to firms that are exonerated from paying income tax and for whom the difference would be big *anyway*; and $\alpha_3$ is the additional increase in the margin from to firms that are exonerated during the pandemic. If non-exonerated firms shift to more deductible/exempt margins, then $\theta_1 \neq 0$.

## V. RESULTS

Table 1 shows the effects of pre-tax profits and the control variables over GIT. To account for financial variables that are not discernible from individual characteristics (like productivity and other idiosyncratic variations that are picked up by the fixed effects) among the controls are: total assets, liabilities, equity, and the profitability for each firm at every particular year. This last indicator is simply the ratio of revenues minus production costs, divided by revenues. It is opted to include the ratio, as opposed to revenues and costs having separate parameters in the regression, because the conceptual framework builds upon the notion of profitability. Financial variables are in logs. A similar set up can be seen in Castro et al. (2013), too with income taxes and the same country. Also, the growth of the industry each firm belongs to is also a control and accounts for the market conditions faced by the firms each year: it is individually significant over several functional forms, so market externalities may have an effect on GIT that cannot be ignored in the estimation.

Table 2 Panel A shows the results of the first stage as depicted in equation (IA). The binary variable $I_{\{t\geq 2015\}}$ equals one for periods after the reform and serves as instrument. It is strongly and negatively correlated with GIT, suggesting that even after controlling for yearly and individual characteristics, reported profits declined on average. As was discussed above, the reform consisted of a one-time condonation of penalty fees and interest of delayed payments to the tax authority. It is important to note that it is the only reform of this type to have been enacted before the advent of the COVID-19 crisis. The next condonation was put forward after the government declared state of sanitary emergency in 2020. It was immediately made effective for VAT retentions from third-party reporting and for delayed payments of firms that had their reports overdue as of May 2020[14]. This last element is unlikely to affect the observations in the data over the time period, as only those firms with their last report dating 2020 were included. Meaning that firms that have both late reports and payments as of mid-2020, are not in the sample. As such, from the results in Table 2, it can be inferred that the reporting of profits decreased GIT through the reform.

Columns 1 and 2 in Table 3 show the estimation of (I-B) and (II-B) respectively. The estimate of the term associated to the pandemic period varies around 0.64 in both models and it is rejected to be different from zero, implying that the proportion of deducted and exempt amounts increased for those firms that were not exonerated by either the COPCI or LOFP laws. To an underestimation of the effects, these equations are calculated over an interval of time closer to the discontinuity generated by the pandemic event. The first two columns use data from the 2016-2020 and column 3 from 2018-2020. Colum 3 also estimates (II-B) but zooming closer to the discontinuity. It is seen that the estimate remains statistically significant. Also, the term associated to exoneration does not reject the null hypothesis either, which is consistent with the construction.

[14] See https://www.sri.gob.ec/BibliotecaPortlet/descargar/84c824e4-bcd4-4f78-ba4c-4a1b237c765b/NAC-DGERCGC20-00000036.pdf

The interaction term in (II-B) captures the differential effect between firms that are older than 5 years with firms that have 5 years or less since they were constituted ("old" vs "young"). It is found that young firms did not deduct a bigger proportion of their gross profits on average with respect to younger ones during the contractive phase. Meaning that on average the proportion of profits that did not pay income tax during this period is not statistically different between these two groups.

| | Generated Income Tax | | | | | | |
|---|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] | [7] |
| Pre-tax profits | 1.103*** | 1.119*** | 0.788*** | 0.949*** | 0.954*** | 0.759*** | 0.849*** |
| | (0.023) | (0.023) | (0.022) | (0.022) | (0.022) | (0.018) | (0.023) |
| Profitability ratio | | -0.009*** | -0.005*** | -0.005*** | -0.006*** | -0.003** | -0.007*** |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Total assets | | | -0.408*** | -0.449*** | -0.404*** | -0.440*** | -0.015 |
| | | | (0.034) | (0.033) | (0.033) | (0.026) | (0.041) |
| Total liabilities | | | 0.342*** | 0.393*** | 0.362*** | 0.458*** | 0.249*** |
| | | | (0.018) | (0.017) | (0.017) | (0.013) | (0.021) |
| Equity value | | | 0.734*** | 0.740*** | 0.664*** | 0.506*** | 0.461*** |
| | | | (0.019) | (0.019) | (0.018) | (0.014) | (0.022) |
| Growth of industry | | | | -0.180*** | -0.216*** | -0.023*** | 0.017** |
| | | | | (0.003) | (0.004) | (0.007) | (0.008) |
| COPCI | | | | | -3.186*** | -3.780*** | -5.397*** |
| | | | | | (0.094) | (0.074) | (0.133) |
| LOFP | | | | | -3.062*** | -2.591*** | -2.947*** |
| | | | | | (0.111) | (0.087) | (0.238) |
| Year FE | | | | | | Yes | Yes |
| Firm FE | | | | | | | Yes |
| Constant | 4.289*** | 4.284*** | -2.752*** | -2.726*** | -1.860*** | -6.406*** | -8.020*** |
| | (0.018) | (0.018) | (0.102) | (0.101) | (0.101) | (0.840) | (0.861) |
| Observations | 84,684 | 84,684 | 84,684 | 84,684 | 84,684 | 84,684 | 84,684 |
| Firms | 18,644 | 18,644 | 18,644 | 18,644 | 18,644 | 18,644 | 18,644 |
| R-squared | 0.027 | 0.027 | 0.124 | 0.151 | 0.177 | 0.504 | 0.659 |
| Adj. R-squared | 0.027 | 0.027 | 0.124 | 0.151 | 0.177 | 0.504 | 0.563 |

**Table 1:** Pooled OLS regressions on income tax payment. Profits, assets, liabilities and equity value are in logs. The LFO and CPO variables are dummies that take the value of 1 if the firm pays zero income tax and holds eligibility to exoneration under either law. Year fixed effects are a set of dummy variables for each year in the data (2006-2020) and firm fixed effects are dummies for each of the 18,644 firms in the sample. For multicollinearity, the 2020 dummy is dropped. Standard errors are in parenthesis.

**Panel A: First stage and identification tests**

| Pre-tax profits | Coef. | Std. Error | $P > z$ |
|---|---|---|---|
| $I_{\{t \geq 2015\}}$ (Post reform) | -0.703 | 0.141 | 0.000 |
| Profitability ratio | 0.012 | 0.000 | 0.000 |
| Total assets | -0.025 | 0.007 | 0.000 |
| Total liabilities | 0.014 | 0.004 | 0.000 |
| Equity value | 0.068 | 0.004 | 0.000 |
| Growth of industry | -0.040 | 0.001 | 0.000 |
| Exonerated (COP) | -0.184 | 0.022 | 0.000 |
| Exonerated (LFO) | -0.092 | 0.040 | 0.023 |
| Under-identification LM statistic: | | 2723.66 | ($p = 0.000$) |
| Weak identification statistic: | | 2883.59 | ($p = 0.000$) |
| Over-identification test P-value: | | 0.000 | |

**Panel B: Second stage**

| Generated Income Tax | Coef. | Bootstrap Std. Error | $P > z$ |
|---|---|---|---|
| Pre-tax profits | -6.652 | 1.115 | 0.000 |
| Profitability ratio | 0.084 | 0.069 | 0.220 |
| Total assets | -0.200 | 0.092 | 0.030 |
| Total liabilities | 0.351 | 0.054 | 0.000 |
| Equity value | 0.973 | 0.089 | 0.000 |
| Growth of industry | -0.280 | 0.044 | 0.000 |
| Exonerated (COP) | -6.775 | 0.389 | 0.000 |
| Exonerated (LFO) | -3.636 | 0.481 | 0.000 |

**Table 2:** IV estimates of GIT on profits. Standard errors are corrected in the second stage using bootstrap. Stages are each a pooled OLS that allows for a constant term (not included in the table), along with year and firm fixed effects.

| | Proportion of deducted and exempt amounts | | |
|---|---|---|---|
| | 2016-2020 | 2016-2020 | 2018-2020 |
| | [1] | [2] | [3] |
| Pandemic | 0.646*** | 0.631*** | 0.454*** |
| | (0.088) | (0.089) | (0.118) |
| Pandemic*Young | | 0.166 | -0.011 |
| | | (0.154) | (0.176) |
| Exonerated | 5.208*** | 5.1822*** | 5.611*** |
| | (0.154) | (0.158) | (0.210) |
| Constant | -7.442*** | -7.375*** | -12.940*** |
| | (0.552) | (0.555) | (1.042) |
| Observations | 60,894 | 60,894 | 43,762 |
| Firms | 25,749 | 25,749 | 25,749 |
| R-squared | 0.676 | 0.676 | 0.766 |
| Adj. R-Squared | 0.438 | 0.438 | 0.431 |
| Prob F > 0 | 0.000 | 0.000 | 0.000 |

**Table 3:** Pooled OLS regressions corresponding to equation (I-B) and (II-B). All three regressions control for firm fixed effects, financial characteristics such as assets, liabilities, equity, and industry growth (not shown). Columns 1 and 2 estimate with the years 2016-2020 and column 3 with 2018-2020. Standard errors are in parenthesis.

With this, Table 4 shows further results into the differential effects between age groups estimating equations (III-B) in columns 1-3 and (IV-B) in columns 4-6. For the first part of in 1-3, the number of elements in the set of dummy variables of age is varied, so as to see the how significance changes with the number of variables in the model. There are no patterns found in the significance between specifications expect for some of them. This is consistent with the results shown in Table 3, in that for the most part young firms have not increased their proportion of deducted profits with arrival of the pandemic.

On the other hand, columns 3-6 show equation (IV-B) varying the number categories that the dummy variable allows for the age group. The dummy variables take the value of 1 if the firm has more than 11, 16 and 21 years respectively, and its interaction with the post-pandemic phase is the interest variable in these columns. It is found that firms who have more than 21 years since constituted have deducted less during the pandemic; the parameter being significant at a 1% level. Interestingly, significance is lost as the dummy variables include younger categories, with the coefficient of the interaction for firms with 16 years or more being significant to the 10% level and the rightmost specification having an interaction that is not significant. It is also important to note that, still, the proportion of deductions/exemptions seems to have increased in 2020.

All this tells us that on average younger firms have not deducted a greater proportion of their profits compared to older firms, so then focus is put into measuring the variation *within* age groups. It is expected that the difference in proportions between exonerated and non-exonerated firms changed with the event of interest. To test this, Table 5 displays the calculations of equation (V-B) and, as before, this is also computed using two different intervals of time. It is seen that exonerated firms did not deduct more of their profits with respect to previous periods in general, but older firms (taking again the definition of $\geq$5 years) increased the proportion of deduction while young firms have not. In fact, this suggests that $\theta_1$ is significant for the entire sample (column 1 and 4) as it may be capturing the effect of the bigger subset conformed by older firms. Note than in this specification all exemptions and deductions done by firms are captured by the binary variable of exoneration, with no recent modifications in regulation (as was discussed above, all COVID-19 related changes were passed after firms provided their 2020 reports). Young firms do not seem to advantage from exemptions or deductions during the most recent phase of economic decay, and the effect found in the whole sample is attributable to older firms. There may be several explanations, however, the following are proposed for their contrast with recent literature.

A reason for the shift into deductible margins may be that there are not enough tax incentives put in place for new firms to avoid low profitability periods, and even if they wanted, they cannot shift their margins. Moreover, its tax function (which relates how its production decision changes with the tax rate) may be more convex than that of a corporation[15], and this is a difference that the market may accentuate when regulation is not well targeted. In fact, as noted in Zarutskie & Yang (2017), young firms in particular are disproportionately affected by shocks and may respond differently than bigger firms to policy shocks. This highlights the need to treat entrepreneurial activity with a contrasting

[15] See (Graham & Smith, 1999) for evidence on how the tax function changes for corporations.

perception in mind when on contractive phases of the economic cycle. Interestingly, although there is a wide range of literature that accepts how young firms are different in many ways (such as access to credit, ability to capitalize and productivity), the literature examining how to deal with this scenario is scarce. The evidence presented motivates the need to delve further into investigation that determines the responses of young businesses.

| | Proportion of deducted and exempt amounts | | | | | |
|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] |
| Pandemic | 0.556*** | 0.655*** | 0.633*** | 0.725*** | 0.721*** | 0.695*** |
| | (0.103) | (0.094) | (0.089) | (0.093) | (0.097) | (0.108) |
| Exonerated | 5.224*** | 5.224*** | 5.218*** | 5.176*** | 5.178*** | 5.188*** |
| | (0.160) | (0.160) | (0.159) | -0.157 | (0.157) | (0.158) |
| *"OLD" DUMMY INTERACTIONS:* | | | | | | |
| More than 11 years | | | | | | -0.078 |
| | | | | | | (0.101) |
| More than 16 years | | | | | -0.178* | |
| | | | | | (0.101) | |
| More than 21 years | | | | -0.290*** | | |
| | | | | (0.112) | | |
| *"YOUNG" DUMMY INTERACTIONS:* | | | | | | |
| 1 year * Pandemic | 0.141 | 0.0423 | 0.066 | | | |
| | (0.315) | (0.312) | (0.310) | | | |
| 2 years * Pandemic | -0.301 | -0.399 | -0.377 | | | |
| | (0.270) | (0.267) | (0.264) | | | |
| 3 years * Pandemic | 0.656** | 0.558** | 0.580** | | | |
| | (0.288) | (0.284) | (0.282) | | | |
| 4 years * Pandemic | 0.584* | 0.486 | 0.508 | | | |
| | (0.314) | (0.311) | (0.309) | | | |
| 5 years * Pandemic | 0.151 | 0.054 | | | | |
| | (0.245) | (0.242) | | | | |
| 6 years * Pandemic | -0.042 | -0.140 | | | | |
| | (0.239) | (0.235) | | | | |
| 7 years * Pandemic | -0.176 | -0.273 | | | | |
| | (0.220) | (0.216) | | | | |
| 8 years * Pandemic | 0.516** | 0.419* | | | | |
| | (0.234) | (0.230) | | | | |
| 9 years * Pandemic | -0.281 | -0.378* | | | | |
| | (0.231) | (0.227) | | | | |
| 10 years * Pandemic | 0.514** | | | | | |
| | (0.242) | | | | | |
| 11 years * Pandemic | 0.436* | | | | | |
| | (0.248) | | | | | |
| 12 years * Pandemic | 0.110 | | | | | |
| | (0.246) | | | | | |
| 13 years * Pandemic | 0.182 | | | | | |
| | (0.259) | | | | | |
| 14 years * Pandemic | 0.225 | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.271) | | | | | |
| Observations | 60,894 | 60,894 | 60,894 | 60,894 | 60,894 | 60,894 |
| Firms | 25,749 | 25,749 | 25,749 | 25,749 | 25,749 | 25,749 |
| R-squared | 0.676 | 0.676 | 0.676 | 0.676 | 0.676 | 0.676 |
| Adj. R-Squared | 0.438 | 0.438 | 0.438 | 0.438 | 0.438 | 0.438 |
| Prob F > 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Table 4:** Pooled OLS regressions of proportional deductions on age dummy interactions. Standard errors are in parentheses.

| | Proportion of deducted and exempt amounts | | | | | |
|---|---|---|---|---|---|---|
| | Discontinuity in 2019 (2016-2020) | | | Discontinuity in 2020 (2018-2020) | | |
| | All firms | "Old" | "Young" | All firms | "Old" | "Young" |
| | [1] | [2] | [3] | [4] | [5] | [6] |
| Pandemic | 0.888*** | 0.940** | 0.360 | 0.563*** | 0.608*** | 0.336 |
| | (0.088) | (0.092) | (0.301) | (0.119) | (0.126) | (0.347) |
| Exonerated | 5.100*** | 4.691*** | 5.941*** | 5.823*** | 5.521*** | 6.22*** |
| | (0.196) | (0.246) | (0.313) | (0.275) | (0.398) | (0.360) |
| Pandemic*Exonerated | 0.953 | -0.422 | 0.038 | -0.412 | -1.25*** | -0.182 |
| | (0.232) | (0.315) | (0.371) | (0.283) | (0.412) | (0.411) |
| Growth of industry | -0.013 | -0.025** | -0.111*** | -0.014 | -0.001 | -0.107** |
| | (0.011) | (0.011) | (0.035) | (0.015) | (0.016) | (0.042) |
| Constant | 0.047 | 0.015 | -0.068 | 0.115** | 0.120*** | -0.090 |
| | (0.029) | (0.029) | (0.116) | (0.045) | (0.046) | (0.138) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 60,892 | 51,728 | 9,164 | 43,762 | 35,379 | 8,383 |
| Firms | 25,749 | 19,595 | 6,154 | 25,749 | 19,595 | 6,154 |
| R-squared | 0.671 | 0.628 | 0.854 | 0.761 | 0.729 | 0.874 |
| Adj. R-squared | 0.430 | 0.400 | 0.553 | 0.412 | 0.391 | 0.525 |
| Prob. F > 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Table 5:** Proportion of deducted and exempt amounts on differences between exonerated and non-exonerated firms, across age groups. Standard errors are in parenthesis.

With respect to targeting, it also may be a problem on the way regulation is set up, so that the eligibility criteria to obtain exoneration and exemptions are restrictive because the policymaker has a different purpose in mind (for instance, it may be targeting other economic sectors, like those over with the deductions are applicable). Although this is valid from the tax authority's point of view, the fact that firms may respond differentially during shocks highlights the need to account for the opposite ends of the economic cycle.

## VI. CONCLUSIONS

This paper detailed an investigation of how firms underreport profits during regular periods of economic activity and reduce their tax burden during period of economic downturn. Using an IV estimation, evidence of underreporting during regular phases of the economic cycle is presented. It is shown that after a 2015 reform, gross profits declined after controlling for individual and market characteristics. The case was made that the only channel through which the reform affected generated

income taxes was through profits. As such, this provides a view of how changes in tax enforcement may affect tax revenues in a day-to-day basis.

Then, attention was put into how the most recent contractive phase of the economy affected the amount of generated taxes. As per concerns with endogeneity, it was preferred to analyze how deductible margins (the difference between gross and pre-tax profits) changed during the relevant period. It was seen that on average, the amount firms deducted from their gross profits increased during the pandemic after accounting for firms that are eligible to law exonerations and already pay zero income tax. As there were no other reforms affecting how firms could deduct from their costs and have exempt revenues during the period analyzed in this investigation, it is found that found that older firms without applicable exonerations had the biggest deducted proportion of their profits. And, while it is rejected that old firms deducted more from their profits than young firms on average, within age groups the effect is different. It is seen that young firms did not increase the proportion of profits they deducted with respect to previous periods. All this, combined with the fact that on the aggregate the shutdown due to the pandemic could have reduced real profitability, suggests that young firms may have not encountered ways to alleviate the decline.

Regarding the specific context of the Ecuadorean case, there were two main channels hinted above as plausible explanations for the ability of older firms to exempt and deduct a greater proportion of their profits:

(i) Young firms may behave inherently different under shocks, because they may not possess the knowledge and/or technologies required to offset the negative effects by deducting more profits and pay a lower total of taxes. This would imply that older and longer-established firms have an informational advantage, which itself could be a barrier to market participation and even profitability itself.

(ii) This may be associated with regulation. Particularly, it is plausible that the younger forms are not being exonerated from certain taxes and cost deductions, while older firms do. In this case, if the younger firms are the ones affected the most by shocks in the economic environment, one could further make the case that the existing regulation governing exemptions and deductions is not well targeted.

Finally, it is important to remark that, even if the results point out to differential effects of the most recent phase of economic decay being the most stressful on new (formal) entrepreneurship, there is still much left to see regarding the informal side of the economy. And while the lack of data may pose problems in the realm, the fact that entrepreneurship as a whole is not constrained to the formal (observed) creation of businesses means that new research for the local environment is the next step. If it is seen that new informal businesses respond similarly to formal ones as seen in this investigation, then the picture is much clearer in terms of the policies to be implemented.

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