The influence of entry regulation on formal employment

ECON 807 Macroeconomic Theory & Policy Policy Project Draft[*]

Daniel Sánchez Pazmiño

March 2023

1 Introduction

It is well known that informal work -legal but informal economic activities which occur outside the government's regulatory capability (Sassen, 1994)- can hinder economic development through several channels. Informal firms reduce the amount of taxes that can be collected and these businesses tend to remain relativy smaller and less efficient. Informality is also related to bigger gender gaps, higher inequality, lower education and other negative outcomes (Deléchat & Medina, 2020). Additionally, informal sector workers often lack access to social security and other employment benefits and tend to earn lower wages. The informal economy has been characterized with poorly defined work spaces, unsafe and unsanitary working conditions, long working hours and a lack of access to markets, financial services, training, and technology (International Labour Organization, n.d.).

While less present in the developed world, informality is very prevalent in developing countries, where it represents a third of low and middle-income countries' economic activity (Deléchat & Medina, 2020). The work of de Soto (2002) has motivated much research about informality in Latin America, being one of the regions with the most prevalent levels of informality, as it often is the only option for several workers on the lower end of the wealth distribution (Oviedo et al., 2009). At the macroeconomic level, informality could be regarded at the institutional level, which has been shown to be a significant factor for growth (Acemoglu et al., 2001; Glaeser et al., 2004; La Porta et al., 1997). Further, its effect on inequality and its potential as a channel for propagation of monetary and fiscal policy (Alberola & Urrutia, 2020) make informality a significant macroeconomic determinant of development.
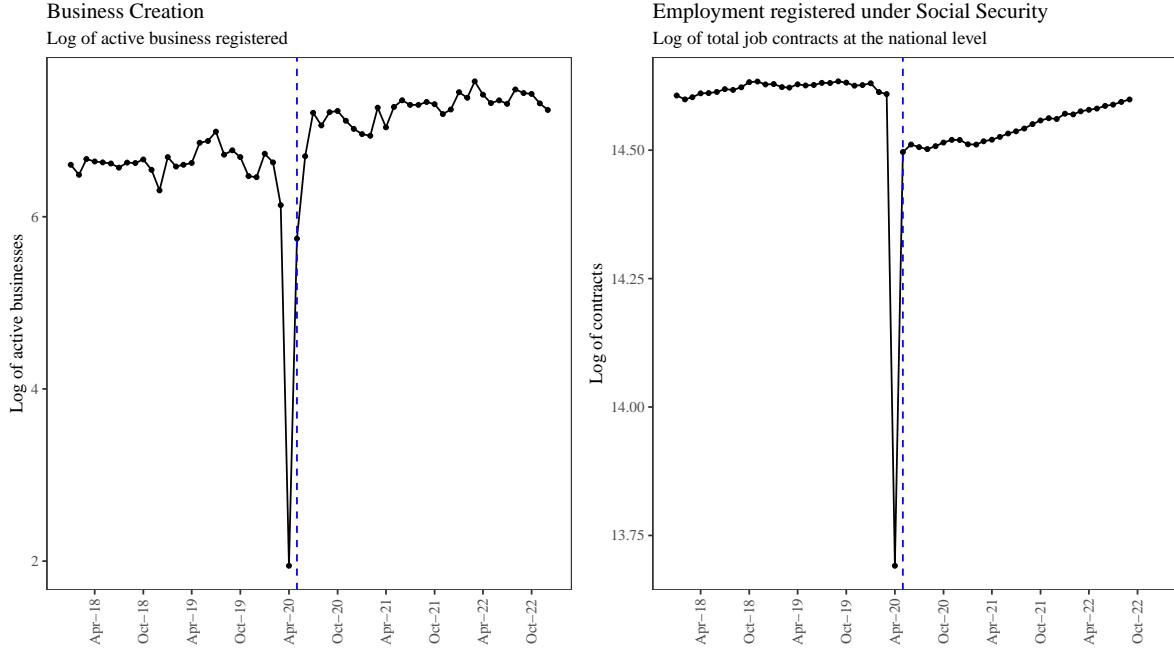
The desire for the formalization of the economy is thus well understood, especially considering that the COVID-19 pandemic has increased informality worldwide (International Labour Organization, 2022). However, the policy angle is subtle, given that the causes and consequences of informality are difficult to document and understand. Some approaches have focused on the role of governments in providing incentives for formalization. Designing tax systems that minimize distortions in the market (Bardey & Mejía, 2019) as well as reducing the costs of formalization by reducing firm entry regulation are some of this approach's implementations. Prado (2011) proposes that firms which are less productive endogenously choose to operate informally due to entry costs and taxation. Thus, reducing entry costs can directly affect formalization of businesses, which may impact formal employment.

---

[*]Length: 10 pages, not including titlepage, references or appendices.

This file has been uploaded with a `.rar` file including the R project which replicates the environment upon which this paper was written. Also, review the paper's GitHub repository to quickly glance at the data preparation or the model estimation and data visualization in a `.Rnw` file (R Sweave/Knitr). The paper's source code is in the `final` folder in the repository.

1

Figure 1: Active formal businesses and job contracts registered under Social Security in Ecuador

Business Creation
Log of active business registered

Employment registered under Social Security
Log of total job contracts at the national level

Data from the Ecuadorian Companies Superintendency and from INEC (Ecuadorian National Statistics Institute).

In this paper, I investigate the relationship between entry regulation and labour market formalization by exploiting an exogenous shock on entry regulation in Ecuador. By using administrative data from various Ecuadorian public institutions and a comprehensive event study or interrupted time series empirical framework, I exploit variation in formal employment across time at the province level in Ecuador before and after the reform. The policy change was enacted in May 2020 and allowed for the creation of a new legal form of business, the *Sociedad de Acciones Simplificada*[1] (SAS). The reform sought to reduce monetary and time costs relative to other legal figures in the firm creation process, and has proven to be effective in doing so and fostering business creation (Camino-Mogro & Armijos Bravo, 2022). Figure 1 displays all active businesses before and after the policy change as well as the amount of job contracts registered under Social Security in Ecuador, showing how employment and business creation tend to move together.

I base my empirical analysis on a theoretical framework informed by the work of Branstetter et al. (2014). In a simple model of entrepreneurship it is predicted that reduced entry costs will increase firm entry and employment, however, all impacts are *at the margin*: new firms will be generally smaller, less productive and less likely to hire large amounts of new workers. While the results from the empirical analysis show a positive effect of the reform on employment, the effect is not robust to different specifications. Further, event study specifications suggest that due to the timing of the policy, the immediate effects of the policy might be due to catch-up effects from the pandemic rather than due to the reform itself. These results suggest that the true causal effect of the policy on employment is too small to identify with this empirical strategy. Some evidence which supports the validity of the model with Ecuadorian data, as the empirical validations in Portugal (Branstetter et al., 2014) and Mexico (Kaplan et al., 2011), also find small positive effects of entry cost deregulation. However, the possibility of a null effect of the reform in Ecuador might be explained by the lack of coordination between entry and labour market regulation.

---

[1]In English, *Simplified Shares Society*.

Through this paper, I contribute to the very reduced stream of research which analyses the impact of entry regulations on employment, considering the existence of informal and formal sectors. Further, the use of administrative instead of survey data enhances the possibilities of extracting insight which is valid at any level of aggregation. No other research links these types of policies to the creation of formal employment, given that these policies are more geared towards fostering entrepreneurship. However, given that Branstetter et al. (2014) identifies marginal firms as smaller, which are more likely to be informal (Eliane El Badaoui et al., 2010), entry cost regulation may be an important policy tool for tackling informality, especially when labour market reform is politically blocked, as is the case of Ecuador.

2 Literature Review

The literature on informality and entry cost regulation is extensive, but few papers explore the relationship between the two. The theory points to informality being an endogenous decision, where firms with low productivity often prefer to remain informal, the size of the firm often being an important determinant of this decision (Deléchat & Medina, 2020; Eliane El Badaoui et al., 2010; Prado, 2011). This endogeneity makes informality difficult to investigate empirically: many informal workers are not officially registered and may not report their activities accurately Oviedo et al. (2009). In the macroeconomic context, it has been shown that informality lowers TFP, increases output volatility and may produce significant input misallocation. Further, informal jobs have been found to respond heavily to changes in formal employment (Leyva & Urrutia, 2020).

Research on Ecuador is limited and has focused on the effect of exogenous shocks on measurements of informality, notably measuring the effects of an earthquake in 2016 (Mendoza & Jara, 2020) and the labour market impact of Venezuelan migration (Olivieri et al., 2022), both finding positive effects on informality. It is found that poverty and informality are jointly determined, where informal workers often come from low education and low income backgrounds. Further, the informal labour market is mainly supply-led but it is so heterogeneously: low-skilled workers often have no choice to work informally, while better educated workers sometimes choose to operate informally (Canelas, 2019). On the firm side, it is determined that the endogenous choice of sector is also present in Ecuador (Medvedev & Oviedo, 2016). Ecuador also documents a formal sector wage premium MacIsaac and Rama (1997), which, according to Eliane El Badaoui et al. (2010), responds to a firm size wage premium due to the endogenous choice of the firm to operate in the informal sector.

Estimating the size and nature of the informal economy and to assess the impact of policies aimed at reducing informality is difficult, however, one common idea that has come up as a policy angle is reducing distortions for businesses by simplifying entry regulation. These types of policies have been implemented across Latin America as well as in Europe, which have had positive results (Oviedo et al., 2009). However, research has been focused on the policy's effectiveness at creating formal businesses, not measuring their labour market impact. Branstetter et al. (2014) develop a simple entrepreneurship model and validate it with a reduction of entry costs in Portugal, finding the reform significantly impacted business creation but mostly for marginal firms. These marginal firms were typically small, owned by relatively poorly educated entrepreneurs, and operating in low-technology sectors and less likely to survive after two years. Employment effects of the reform were positive but small, as was the case of a Mexican deregulation of entry by Kaplan et al. (2011). Further, Bertrand and Kramarz (2002) find that both product market and entry regulation were sources of employment growth in France in the 1970s, focusing on the retail sector in France. Further, a macroeconomic study of product and labour market regulation, modelled as higher entry costs, links higher levels of regulations to lower employment (Blanchard & Giavazzi, 2003). However, none of these papers acknowledge the existence of formal and informal sectors.

3 Theoretical Framework

I use the theoretical model of entrepreneurship proposed by Branstetter et al. (2014) to guide my empirical analysis. In this model, individuals with different entrepreneurial ability endowments θ are drawn from a continuous probability distribution. Individuals have the possibility to (a) work in the labour market for a wage rate w, (b) become an entrepreneur or (c) consume leisure. The payoff to being an entrepreneur, π is

$$h(\theta) + \eta \tag{1}$$

where h is a function of the agent's entrepreneurial ability and η is an idiosyncratic term, also drawn from a probability distribution and unknown to the entrepreneur before starting their entrepreneurship operation. By defining h as Cobb-Douglas, considering only labour L as a production input and introducing two periods, it is possible to define two profit functions, where the difference between the two is that a fixed cost F is included in π_t for $t = 1$ but not for $t = 2$ and η is revealed to the agent in $t = 2$.

The value for operation as an entrepreneur depends on the level of entrepreneurial ability relative to the market wage rate w as well as on fixed costs F. The model predicts that a decrease on F increases the value of entrepreneurship, allowing for more business entry. Further, the level of employment depends on the level of entrepreneurship, and each entrepreneur's labour demand will depend once again on their endowment θ relative to w. Any decrease in F will increase overall employment, considering that there will be more entrepreneurs. However, since reductions in F will work *at the margin*, all extra entrepreneurs will have relatively low θ and thus smaller labour demand.

This model does not consider the level of capital K and liquidity constraints, and assumes that all workers are hired formally. By observing formal employment fluctuations, it is possible to apply this model to the empirical analysis. However, the model is not able to explain changes in informal employment per se, only changes in formal employment. The extent to which changes in formal employment relate to informal employment is dependent on the ability to observe the pre-policy status of workers hired after the policy change, which is out of the scope of this paper.

4 Institutional Background

Ecuador is a middle income country located in upper South America next to Colombia and Peru. The country is comprised of twenty-four provinces across four regions and all provinces encompass a central unified republic. After its full dollarization in 2000, the country saw an economic surge between 2007-2014 as a result of high oil prices and a relatively indebted government (Weisbrot et al., 2017). However, after a sharp decline in oil prices and the COVID-19 pandemic, the country seems to be unable to return to its pre-pandemic levels, with employment indicators at an all-time low.

However, informality and underemployment[2] in this labour market have been shown to be historically high (Chávez & Medina, 2012; Mendoza & Jara, 2020; Meneses et al., 2021). It has been determined that minimum wage increases in Ecuador (which have been frequent and substantial) have had no effect on employment levels due to high-level of non-compliance and informality in the labour market (Canelas, 2014). Further, Ecuador has been shown to have one of the most cumbersome labour market legislations in the region (MacIsaac & Rama, 1997), whose effect is attenuated by smaller base earnings over which benefits are paid.

---

[2] The Ecuadorian National Institute of Statistics considers "adequate employment" as people with a job who earn labour income equal to or greater than the minimum wage on an hourly basis. In this sense, underemployment in this paper is considered as any employment which does not comply with this condition.

Not only the labour market is highly regulated in the country: the business environment in Ecuador is cumbersome, including several artificial costs which could create inefficiencies. Ecuador constantly ranks very low in terms of property rights, judicial transparency and economic freedom. Its low standing in economic freedom responds to a flawed and corrupt judiciary, characterized by inefficiency and difficulty to start a business Euromonitor Passport (2022). Further, an unstable economic and political environment after the election of conservative businessman Guillermo Lasso not long after a decade-long leftist regime has taken a toll on the government's financing capabilities. The political instability has also made the deregulation of labour markets difficult only one set of market-friendly policies set forth by the new president have been passed, the labour market reform being immediately rejected by a strong opposing majority in Congress. Thus, other types of reforms which indirectly target the labour market would be welcome.

The SAS reform, enacted in May 2020, allowed a new type of legal business to exist, which also exists in other countries in the region. This type of business is known to be much less burdensome than other types of companies like anonymous societies or limited liability companies. A SAS business can be created with lower monetary and time costs (notarization, registering, etc.) as well as with lower amounts of capital contributions. It is sensible to believe that the reform was unexpected and exogenous since, while the law that allowed for this reform came into force in early 2020, the law did not specifically plan for the creation of this type of business, only allowed for its creation under the Ecuadorian corporate law. Further, Camino-Mogro and Armijos Bravo (2022) find causal evidence that this reform was effective in formalizing/creating businesses and in reducing time and money entry costs. However, the effects of the policy in the labour market have not been studied so far.

5 Methodology

5.1 Data

I construct a province-month panel dataset of the country with variables stemming from various government sources. The variable of interest is the log of total job contracts registered with Social Security. Table A.1 defines all variables used in the paper along with their source. Any kind of job contract which is registered in Social Security is thought to be formal, as Social Security formalization implies that all employment benefits mandated by the Ecuadorian Labour Code are being met by the employer and the government.

Table 1: Mean values by year

	2018	2019	2020	2021	2022
Formal jobs	10.24	10.23	10.16	10.08	10.14
Active businesses	2.24	2.52	2.42	2.84	3.05
Remote workers	0.93	1.37	3.15	2.37	1.79
Registered tax contributors	6.48	6.53	6.02	6.38	6.39
Reported sales	18.80	18.81	18.71	18.81	18.96
Total COVID-19 cases			6.41	6.47	6.43
Total COVID-19 deaths			2.97	2.64	1.96
Thefts	4.57	4.59	4.24	4.38	4.57
Homicides	1.10	1.18	1.25	1.46	1.91
Transit Accidents	1.04	1.10	1.01	0.92	1.14

All variables in natural log form. See Appendix A for data sources.

5.2 Empirical Strategy

To identify the causal effect of the SAS reform on formal job creation, I take an event-study approach with a regression framework (interrupted time series) in the lines of Taljaard et al. (2014). Given that Ecuador is a unified republic, I do not observe variation in treatment across the cross-section. I take pre-event data as my control group, and use the event study framework to evaluate this assumption. Two approaches are implemented: segmented regressions using an interaction term between a time trend and a "treatment" dummy after the date of the policy change, and event study specifications using month-year dummies across the study's horizon. The segmented regressions take the following general form:

$$\ln(L)_{it} = \phi_i + \beta_1 time + \delta_0 treatment_i + \delta_1 (time \cdot treatment_i) + \mathbf{x}'_{it}\gamma + u_{it} \tag{2}$$

where L is the number of formal job contracts, observed for provinces $i = 1, 2, ..., N$ and months $t = 1, 2..., T$. ϕ_i are a set of province fixed effects, where Pichincha (where the capital is located) is the reference province. u_{it} is an error term, considering unobserved variables within provinces which change across time. t is a time trend variable, centered around May 2020, for which I consider alternative polynomials. The treatment dummy equals 1 for all province observed in May 2020 or after. $\mathbf{x}_{it}$ is a vector of province-specific time-varying covariates used as controls which are thought to potentially influence L and did not remain smooth across the date of the policy change. These are all used in their natural logarithm form. In some cases, to account for an autoregressive process, I account with the a lag of the explained variable, $\ln(L)_{it-1}$.

Ultimately, I am interested in the $\hat{\delta}_1$ parameter, which measures the change in the time trend of $\ln(L)_{it}$ at the time of the policy change. This parameter can be interpreted as the causal effect of the SAS reform on formal job creation if there are no confounding effects, that is, unobserved factors left in the error term u_{it} which changed in $t = 0$ and affect formal employment.

For the event study specifications, I consider the following general form:

$$\ln(L)_{it} = \phi_i + \tau_t + \mathbf{x}'_{it}\gamma + u_{it} \tag{3}$$

where the new τ_t are a set of period fixed effects. The sign of the fixed effects after May 2020 will be ilustrative of the effect of the policy change on the outcome. Further, these event study specifications allow me to look at the pre-policy change trend for $\ln(L)_{it}$, thus being able to test the assumption that all pre-treatment effects are null (Huntington-Klein, 2021). For all specifications, I present clustered standard errors at the province and month level, but also consider autocorrelation-robust standard errors (HAC).

6 Results

Table 2 displays OLS estimation results for the empirical model specified in Equation 2 and Table B.1 in Appendix B presents the same results but with HAC standard errors. Model 1 below estimates a naive segmented regression model considering only the treatment dummy interacted with the time trend. The interaction between the time trend and the treatment dummy is not statistically significant, which is evidence for a null effect of the SAS reform on employment. The negative and statistically significant coefficient on the treatment dummy means that, as time passed, there seemed to be a negative trend after the date of the policy. Model 2 estimates the same naive model but now considering province fixed effects, which control for all province-specific factors which affect formal employment yet stay constant through time. In this case, including the FE controls renders the interaction term positive and significant. Potentially, the $\hat{\delta}_1$ coefficient in Model 1 is biased toward zero as it is possible that some provinces with less economic activity suffered from staggered pandemic effects after the policy change. If other

provinces saw a positive effect, it would mean that the average effect on the naive regression would be biased toward zero.

Table 2: Segmented Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Time	0.003*	0.000	0.000	−0.004***	0.000	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Time (quadratic)				0.000***	0.000	0.011***
				(0.000)	(0.000)	(0.001)
Treatment	−0.237***	−0.152***	−0.119***	−0.073***	0.001	0.025***
	(0.030)	(0.026)	(0.014)	(0.016)	(0.011)	(0.006)
Interaction	0.001	0.003***	0.001			
	(0.002)	(0.001)	(0.001)			
Interaction (quadratic)				0.000***	0.000	−0.011***
				(0.000)	(0.000)	(0.001)
WFH workers			0.001	0.001	0.000	0.000
			(0.002)	(0.002)	(0.001)	(0.001)
Thefts			0.019	0.011	0.015*	0.000
			(0.017)	(0.017)	(0.008)	(0.007)
Homicides			0.002	0.001	0.001**	0.001
			(0.004)	(0.004)	(0.001)	(0.002)
Tax contributors			0.001	−0.001*	0.002**	0.001
			(0.001)	(0.001)	(0.001)	(0.001)
Sales			0.039**	0.033**	0.007	0.003
			(0.016)	(0.013)	(0.004)	(0.006)
Transit Accidents			0.003	0.002	−0.001	−0.002
			(0.002)	(0.002)	(0.001)	(0.002)
Businesses					0.008***	0.006
					(0.002)	(0.004)
Lag of jobs					0.950***	0.886***
					(0.029)	(0.061)
COVID-19 cases						0.000
						(0.002)
COVID-19 deaths						−0.001
						(0.001)
N	1327	1327	439	439	439	239
Adj. R^2	0.00071	0.99835	0.99955	0.99960	0.99994	0.99991
Adj. Within R^2		0.46583	0.74803	0.77687	0.96416	0.85563
AIC	4708.41	−3771.83	−1851.95	−1904.38	−2705.34	−1398.01
BIC	4729.17	−3631.68	−1733.50	−1781.85	−2574.64	−1283.29
Province FE		X	X	X	X	X

Note: Segmented regression models across multiple specifications. Standard errors are clustered at the month-year and province level.
$*p < 0.1, **p < 0.05, ***p < 0.01$.

Models 3 through 5 consider a variety of controls and alternative specifications to check for the robustness of Model 2's results. Model 3 adds a variety of controls. WFH workers will control for temporary waves of COVID-19 contagions. The amount of transit accidents work to that effect as well. Further, thefts and homicides should control for any kind of effect of the

Figure 2: Event study plots
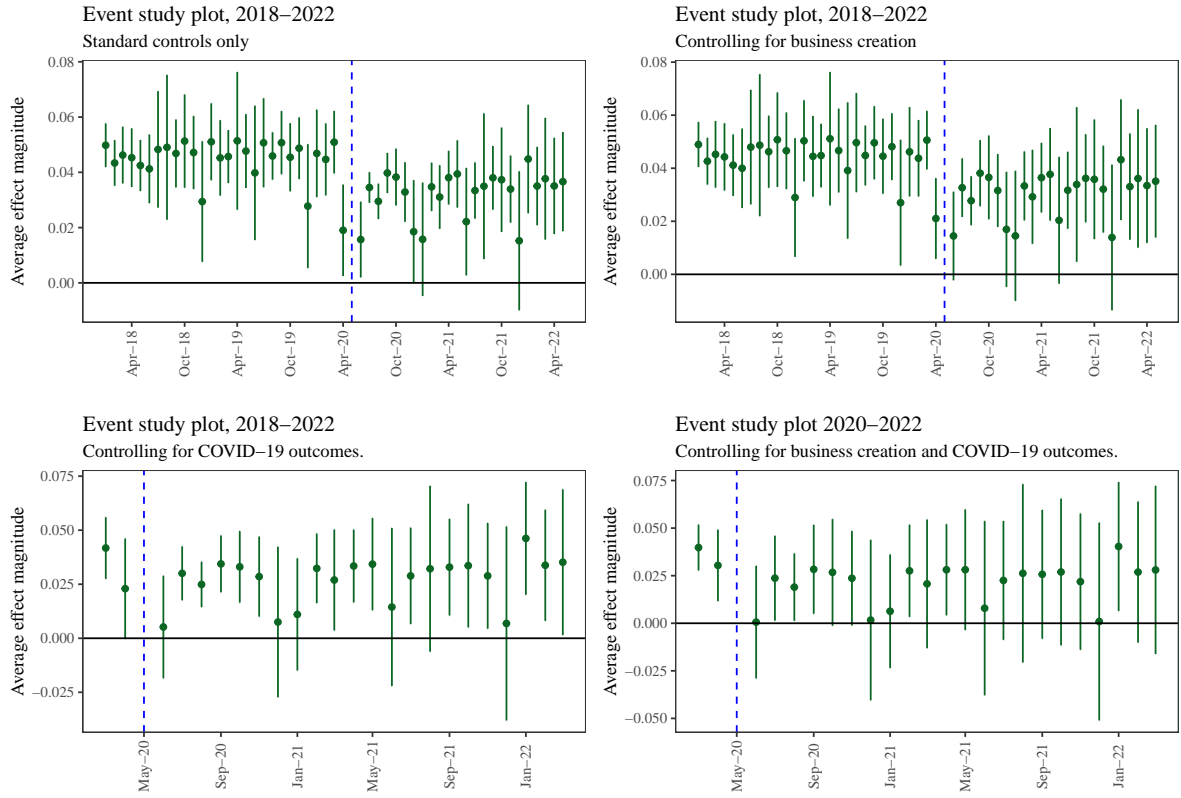
Notes: Event study plots where the coefficients of period dummies are plotted against time. The reference level is May 2020. All plots include the standard controls, which are defined in Model 3 of Table 2. COVID-19 outcomes include total suspected COVID-19 cases and deaths, as reported by the Ecuadorian Ministry of Health.

recent violence wave that has stricken the country beginning 2020 and intensified during 2022. Both the amount of firm-type tax contributors and reported sales to the tax authority control for economic fluctuations. The effect is only significant when considering a quadratic trend of the time variable (Model 4), and in even in such case, the magnitude of the effect is very small: on average, the SAS reform created 0.041533% more Social Security-registered jobs.

Model 5 performs a robustness check and controls for the natural log of active businesses. The theoretical model predicts that employment will be a result of a higher number of businesses entering the economy, which means that controlling for business creation over time should render the effect of the policy on employment statistically insignificant. Further, a positive significance of the business coefficient should be seen. Both of these results are seen in the data, which is evidence in favour of the theoretical model. Further, I take into account the possibility of an autoregressive process by adding a lag of the dependent variable, which is statistically significant, supporting the possibility of an AR(1) process.

In Model 6 I take into account COVID-19 cases and deaths to control for all fluctuations caused by the pandemic in employment, however, I must then restrict to a shorter horizon and perhaps ignore the underlying trend of employment in the data. In this case, I also include businesses and the lagged term. It would be again expected that the effect of the policy on employment is insignificant, however, the model finds a negative effect of the policy on employment. This could mean that after the policy implementation there may be unobserved variables affecting employment. Note that all results with HAC standard errors are similar.

Figure 2 displays the event study plots for four different specifications which follow Equation 3. The figures plot the coefficients of each period dummy, and the reference level is May 2020. The leftmost figures consider the period dummies and the controls used for Model 3 in Table 2. The rightmost figures consider the amount of active businesses prevalent at the province-level as a robustness check: it would be expected that all post-policy change effects are zero if the SAS reform affects employment through business creation.

The event study plots cast doubt on the results obtained with the segmented regression specifications. First, the pre-policy change coefficients are in almost all cases statistically different from zero, which suggests that an assumption for segmented regression analysis may be faulty, given that other unobserved factors may have changed along with the policy. Further, it is unsure whether or not the policy affected employment through business creation only given that the rightmost figures show that the post-policy change dummies are statistically different from zero. This means that even after controlling for businesses at the province-level, there is a significant difference between employment at post-policy periods relative to the period where the policy was enacted. Only the case where I restrict for 2020-2022 data and include COVID-19 outcomes as controls there is evidence that the effect of the policy on employment is zero after controlling for business creation, which implies the theoretical model motivating the analysis is sound. Nevertheless, since this result is sensitive to functional form as well as the choice of sample, more empirical tests are needed to confirm that the effect of the policy change, in the framework that I've established here, indeed affects employment only through business creation.

7 Conclusions

The results of the empirical analysis provide evidence on the policy change having a near negligible effect on employment across provinces in Ecuador. Using segmented regression to analyse an interrupted time series, I find a small positive effect of the reform on the amount of jobs registered with Social Security, however, the effect is not robust to different specifications. Using event study specifications which consider period dummies instead of continuous time trends, I discover that the prior to the policy change there is evidence of non-null effects, which suggests the possibility of omitted variable bias in the segmented regressions. Though the inclusion of a control group would aid me in the attempt to control for omitted variables, the

lack of cross-sectional treatment variation due to Ecuador being a unified republic does not allow me to do so.

The entrepreneurship model proposed by Branstetter et al. (2014) predicts that any reduction on the fixed costs of entrepreneurship increase the number of agents in the economy who start a business, but all new entrants will employ less workers than their already existent counterparts and in general are less likely to survive after various periods. Thus, the finding that the effect of the policy is small if even existent supports the model. A key implication of the model is that employment creation is only caused by the reduced entry costs through their effect on business creation, as businesses who already entered the formal economy have already paid the cost of entry. Some evidence is found for this prediction in the empirical analysis, but it is inconclusive.

Future research should perhaps focus on controlling for omitted variables as much as possible, using additional data available at a monthly frequency and at the province level. Some possibilities are to include Google mobility reports available since 2020, however, it would restrict the sample to pandemic years only, which may render conclusions which are not externally valid. Further, mobility data may overcontrol for factors and thus not work for the identification of the policy, however, these data should be useful to perform robustness checks for the soundness of the model. Additionally, a better approach to the study of this event study without a control group is time series forecasting, given that the empirical analysis found evidence of an autoregresive process. Using ARIMA or SARIMAX models may prove useful for the identification of the causal effect, however, once again the reduced sample problem may happen.

One method that has been used in the past with event studies is a regression discontinuity in-time approach (RDiT), however, the assumptions of this design are difficult to justify with low amounts of time disaggregation (Hausman & Rapson, 2018). Camino-Mogro and Armijos Bravo (2022) performs an RDiT analysis of the SAS reform and its effect on the entry rate, however, they use weekly-level data of businesses created. Unfortunately, job data at the weekly level is not publicly available for the Social Security Institute in Ecuador (IESS). A collaboration with this institution as well as with other government institutions to perform a more adequate impact evaluation of the SAS reform may be well suited to inform other flexibilization policies currently attempted by the current government.

These results speak to the importance of the coordination of policy aimed to foster market flexibility. Camino-Mogro and Armijos Bravo (2022) finds conclusive evidence of the positive effect of the SAS reform on business creation, however, it is not clear whether or not business creation by itself is positive for society. There are scenarios where higher business entry cause social inefficacy, specially in the context of imperfectly competitive markets (Mankiw & Whinston, 1986). Thus, it is important that new research focuses on how to coordinate policy in a way that the problem of superoptimal business creation is addressed. In the case of Ecuador, it is possible that, given marginal firms are the ones affected by entry cost deregulation, the high costs of labour restrict the extent that entrant companies can formally expand themselves. It is fully plausible that, while a company exists formally, they endogenously choose to hire informal workers. In this environment, entry cost deregulation may not be a useful tool on its own to tackle informality.

References

Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, *91*(5), 1369–1401. https://doi.org/10.1257/aer.91.5.1369

Alberola, E., & Urrutia, C. (2020). Does informality facilitate inflation stability? *Journal of Development Economics*, *146*, 102505.

Bardey, D., & Mejía, D. (2019). Informality and Optimal Public Policy. *Economía*, *19*(2), 1–19. https://doi.org/10.1353/eco.2019.0000

Bertrand, M., & Kramarz, F. (2002). Does Entry Regulation Hinder Job Creation? Evidence from the French Retail Industry. *The Quarterly Journal of Economics*, *117*(4), 1369–1413. https://doi.org/10.1162/003355302320935052

Blanchard, O., & Giavazzi, F. (2003). Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets. *The Quarterly Journal of Economics*, *118*(3), 879–907. https://doi.org/10.1162/00335530360698450

Branstetter, L., Lima, F., Taylor, L. J., & Venâncio, A. (2014). Do Entry Regulations Deter Entrepreneurship and Job Creation? Evidence from Recent Reforms in Portugal. *The Economic Journal*, *124*(577), 805–832. https://doi.org/10.1111/ecoj.12044

Camino-Mogro, S., & Armijos Bravo, G. (2022). Red Tape Reduction, More New Firms? Saving Time and Money: Evidence from an Ecuadorian Reform. *The Journal of Development Studies*, 1–25. https://doi.org/10.1080/00220388.2022.2154149

Canelas, C. (2014). Minimum wage and informality in Ecuador.

Canelas, C. (2019). Informality and poverty in Ecuador. *Small Business Economics*, *53*(4), 1097–1115. https://doi.org/10.1007/s11187-018-0102-9

Chávez, Y., & Medina, P. (2012). Revista de Métodos Cuantitativos para la Economía y la Empresa. *Revista de Métodos Cuantitativos para la Economía y la Empresa*, *13*, 24–53. https://www.upo.es/revistas/index.php/RevMetCuant/article/view/2138

Deléchat, C., & Medina, L. (2020). What is the Informal Economy? Having fewer workers outside the formal economy can support sustainable development. https://www.imf.org/en/Publications/fandd/issues/2020/12/what-is-the-informal-economy-basics

de Soto, H. (2002). *The other path : the economic answer to terrorism*. New York : Basic Books.

Eliane El Badaoui, Eric Strobl, & Frank Walsh. (2010). The formal sector wage premium and firm size. *Journal of Development Economics*, *91*(1), 37–47. https://doi.org/10.1016/j.jdeveco.2009.03.007

Euromonitor Passport. (2022). Country Report: Business Dynamics in Ecuador. https://www-portal-euromonitor-com.proxy.lib.sfu.ca/portal/Analysis/Tab

Glaeser, E. L., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2004). Do Institutions Cause Growth? *Journal of economic Growth*, *9*(3), 271–303. https://doi.org/10.1023/B:JOEG.0000038933.16398.ed

Hausman, C., & Rapson, D. S. (2018). Regression Discontinuity in Time: Considerations for Empirical Applications. *Annual review of resource economics*, *10*(1), 533–552. https://doi.org/10.1146/annurev-resource-121517-033306

Huntington-Klein, N. (2021). *The effect: An introduction to research design and causality / Nick Huntington-Klein* (1st). Chapman & Hall/CRC. https://theeffectbook.net/

International Labour Organization. (n.d.). Informal Economy (Decent work for sustainable development (DW4SD) Resource Platform). https://www.ilo.org/global/topics/dw4sd/themes/informal-economy/lang--en/index.htm

International Labour Organization. (2022). Impact of the Covid-19 pandemic on informality: Has informal employment increased or decreased? Retrieved March 2, 2023, from https://www.ilo.org/global/topics/employment-promotion/informal-economy/publications/WCMS_840067/lang--en/index.htm

Kaplan, D. S., Piedra, E., & Seira, E. (2011). Entry regulation and business start-ups: Evidence from Mexico. *Journal of public economics*, *95*(11), 1501–1515. https://doi.org/10.1016/j.jpubeco.2011.03.007

La Porta, R., Lopez-De-Silanes, R., Andrei Shleifer, & Robert W. Vishny. (1997). Legal Determinants of External Finance. *The Journal of Finance*, *52*(3), 1131–1150. Retrieved February 4, 2023, from http://www.jstor.org/stable/2329518

Leyva, G., & Urrutia, C. (2020). Informality, labor regulation, and the business cycle. *Journal of International Economics*, *126*, 103340. https://doi.org/10.1016/j.jinteco.2020.103340

MacIsaac, D., & Rama, M. (1997). Determinants of Hourly Earnings in Ecuador: The Role of Labor Market Regulations. *Journal of Labor Economics*, *15*(S3), S136–S165. https://doi.org/10.1086/209879

Mankiw, N. G., & Whinston, M. D. (1986). Free Entry and Social Inefficiency. *The RAND Journal of Economics*, *17*(1), 48. https://doi.org/10.2307/2555627

Medvedev, D., & Oviedo, A. M. (2016). Informality and profitability: Evidence from a new firm survey in Ecuador. *The Journal of Development Studies*, *52*(3), 412–427.

Mendoza, C. A., & Jara, B. (2020). Natural Disasters and Informality: Are local labor markets impacted after an earthquake? *Regional Science Policy & Practice*, *12*(1), 125–157. https://doi.org/10.1111/rsp3.12258

Meneses, K., Córdova, G., & Aguirre, K. (2021). Lo más destacado y sobresaliente que caracteriza al mercado laboral ecuatoriano en siete hechos estilizados. *Revista Economía y Política*, (33). https://www.redalyc.org/journal/5711/571165147001/html/

Olivieri, S., Ortega, F., Rivadeneira, A., & Carranza, E. (2022). The Labour Market Effects of Venezuelan Migration in Ecuador. *The Journal of Development Studies*, *58*(4), 713–729. https://doi.org/10.1080/00220388.2021.1988077

Oviedo, A. M., Thomas, M. R., & Karakurum-Özdemir, K. (2009). *Economic informality: Causes, costs, and policies : a literature survey / Ana Maria Oviedo, Mark R. Thomas, Kamer Karakurum-Özdemir* (Vol. no. 167). World Bank.

Prado, M. (2011). Government policy in the formal and informal sectors. *European Economic Review*, *55*(8), 1120–1136. https://doi.org/10.1016/j.euroecorev.2011.04.010

Sassen, S. (1994). The Informal Economy: Between New Developments and Old Regulations. *The Yale law journal*, *103*(8), 2289–2304.

Taljaard, M., McKenzie, J. E., Ramsay, C. R., & Grimshaw, J. M. (2014). The use of segmented regression in analysing interrupted time series studies: an example in pre-hospital ambulance care. *Implement Sci*, *9*(1), 77. https://doi.org/10.1186/1748-5908-9-77

Weisbrot, M., Johnston, J., & Merling, L. (2017). Decade of Reform: Ecuador's Macroeconomic Policies, Institutional Changes, and Results. https://cepr.net/images/stories/reports/ecuador-2017-02.pdf

Appendix A: Data sources

Table A.1: Data Sources

Variable	Description	Source
Formal jobs	Job contracts registered with the Ecuadorian Social Security Institute	Social Security Employment Registry at INEC
Active Businesses	Active companies registered under the Companies' Superintendency (SUPERCIAS)	Companies Directory at SUPERCIAS
Remote workers	Number of WFH workers registered under the Unique Labour System (SUT) in the public and private sectors.	Open Data Ecuador
Registered tax contributors	Number of registered tax contributors at the Internal Revenue Service (SRI)	Open Data Ecuador
Reported sales	Total number of reported sales to the IRS by registered tax contributors	Open Data Ecuador
Total COVID-19 Cases	The sum of confirmed, suspected and likely cases, as categorized by the Ministry of Health	Open Data Ecuador
Total COVID-19 Deaths	The sum of patients who died and with confirmed COVID-19 status.	Open Data Ecuador
Thefts	Theft reports to the police	Ministry of Government's National Security Indicators
Homicides	Violent deaths reported to the police	Ministry of Government's National Security Indicators
Transit Accidents	All transit accidents reported to the National Transit Agency (ANT)	ANT Accidents Dashboard

Appendix B: Table 2's results with HAC standard errors

Table B.1: Segmented regressions with HAC standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
Time	0.003	0.000	0.000	−0.004***	0.000	0.001
	(0.006)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Time (quadratic)				0.000***	0.000	0.011***
				(0.000)	(0.000)	(0.003)
Treatment	−0.237***	−0.152***	−0.119***	−0.073***	0.001	0.025*
	(0.040)	(0.022)	(0.011)	(0.014)	(0.006)	(0.014)
Interaction	0.001	0.003***	0.001			
	(0.006)	(0.001)	(0.001)			
Interaction (quadratic)				0.000***	0.000	−0.011***
				(0.000)	(0.000)	(0.003)
WFH workers			0.001	0.001	0.000	0.000
			(0.002)	(0.002)	(0.000)	(0.001)
Thefts			0.019	0.011	0.015***	0.000
			(0.011)	(0.011)	(0.004)	(0.006)
Homicides			0.002	0.001	0.001	0.001
			(0.003)	(0.003)	(0.001)	(0.002)
Tax contributors			0.001	−0.001	0.002***	0.001
			(0.001)	(0.001)	(0.001)	(0.001)
Sales			0.039***	0.033***	0.007**	0.003
			(0.011)	(0.010)	(0.003)	(0.004)
Transit Accidents			0.003	0.002	−0.001	−0.002
			(0.002)	(0.002)	(0.001)	(0.002)
Businesses					0.008***	0.006**
					(0.002)	(0.003)
Lag of jobs					0.950***	0.886***
					(0.031)	(0.056)
COVID-19 cases						0.000
						(0.002)
COVID-19 deaths						−0.001
						(0.001)
N	1327	1327	439	439	439	239
Adj. R^2	0.000 71	0.998 35	0.999 55	0.999 60	0.999 94	0.999 91
Adj. Within R^2		0.465 83	0.748 03	0.776 87	0.964 16	0.855 63
AIC	4708.41	−3771.83	−1851.95	−1904.38	−2705.34	−1398.01
BIC	4729.17	−3631.68	−1733.50	−1781.85	−2574.64	−1283.29
Province FE		X	X	X	X	X