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Role of Individual Characteristics and Policies in Driving Labor Informality in Vietnam

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Abstract

Using data from the Vietnam Labor Force Survey, this paper takes a granular look at the most salient drivers of labor informality in Vietnam by examining: (i) the nature of labor informality and transitions from formal to informal employment status and the role of worker characteristics; (ii) the empirical likelihood of being in informal employment and the policy determinants of informality using within-in country variation in the business climate and governance; and (iii) whether different policy reforms have a differential impact on workers. Our analysis sheds light on how individual characteristics and policy impediments contribute to high levels of informality and points to the need for a comprehensive agenda to tackle informality.

JEL Classification Numbers: J21, J24, J31, J46

Keywords: informality, Vietnam, Labor Force Survey, labor market segmentation, structural reforms, economic governance, PCI.

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I. Introduction

As in many other emerging and developing economies, Vietnam's labor market is characterized by a high degree of informality.[1] While informal employment can also act as a shock absorber, pervasive informality, can exacerbate vulnerability to economic shocks as highlighted by the COVID-19 pandemic.[2] Informal workers in Vietnam typically have no access to sick leave or unemployment benefits, precarious access to health benefits, and limited savings.[3] Informality can also result in a misallocation of resources in the economy and constrain investment in human capital as informal workers typically have more limited training and career opportunities, thereby undermining economy-wide productivity and potential growth (Amin et al., 2019; Boly, 2018; de Soto, 1989; Gonzalez and Lamanna, 2007).

This paper takes a granular look at the most salient drivers of informality in Vietnam and the policies need to address it. We document the nature of labor informality in the country using labor force surveys and examine transitions from formal-informal employment status and the role of worker characteristics. We then empirically examine the likelihood of being in informal employment using panel probit regressions for the period 2015-2018. Finally, we examine the policy determinants of informality using variation in policy and insitutional settings at a regional-level within Vietnam. We investigate whether policy reforms have a differential impact on workers by introducing interaction terms of individual workers characteristics with policy variables. Our analysis can shed light on how individual characteristics and policy impediments contribute to high levels of informality within the country.

We document that labor informality in Vietnam has remained sizable in recent years, and a substantial share of workers have informal contractual relationships even in formal, registered firms. For instance, out of the 19 million workers working informally in 2018, nearly a third were employed by registered firms, mostly in retail, hospitality, transportation, textiles and garments—sectors that have been hit hard by the COVID-19 shock. Econometric analysis suggests that there is a statistically significant but modest formal wage premium, which is partially mitigated by high mobility between informal and formal employment status. Controlling for both observable and unobserved characteristics, we find that a given worker would earn 8 percent more if he moved to formal from informal employment. We also find that labor informality in Vietnam reflects a mix of opting out of formal employment and exclusion. In particular, we find the existence of an upper tier of informal

[1] Throughout the paper we largely define informality in terms of workers' employment status and their participation in the social security system (see also Levy, 2018, for Mexico).

[2] Evidence from past crises suggests that job losses in the formal economy are often accompanied by a shift to informal employment (Loayza and Rigolini, 2006). One unique aspect of the COVID-19 crisis, however, is the need to discourage production and consumption on public health grounds. The usual means of smoothing income shocks, casual work and migration to rural areas, are not possible when economic activity and mobility are restricted.

[3] See Ganelli, G., A Nguyen, and V.A. Nguyen (2020) "Implications of the COVID-19 Shock for Vietnam's Labor Market and Policy Responses," IMF note.

workers comprised of high-skill workers, whose employment decisions are driven by choice, and of a lower-tier, low-skilled workers potentially stuck in informal employment.

Empirical examination of the individual drivers of informality suggests that the likelihood of being informally employed is higher for workers who are less educated, young, male, lacking work experience, living in rural areas and for those working for a nonregistered firm (especially non-FDI firms). Among these determinants, education, work experience and working in a registered (formal) firm are the most important determinates of formal employment. Estimated marginal effects suggest that the likelihood of a high school graduate working informally is 10 percent lower than for a worker without a high-school education. Similarly, having more than 5 years of work experience can reduce the likelihood of being in informal employment by roughly 20 percent compared to a person with less than one year of work experience. Working fora formal firm can reduce the likelihood of informal employment by as much as 60 percent.

With respect to the policy drivers, our empirical results highlight the importance of education, training and business formalization for individuals to find formal jobs. Reforms to encourage business registration, for example, by reducing entry costs for start-ups and securing property rights, can play a key role in encouraging labor formality. Further, we find that structural reforms can have a differential impact across workers, calling for a comprehensive agenda to tackle informality. For instance, we find that workers with low levels of education benefit disproportionately from reforms to strengthen property rights (access to land, law and orders, corruption control) that encourage greater firm formalization). Better labor training and efforts to reduce skill mismatches have a positive and significant impact on tackling informal employment among the young, and for workers in urban as compared to rural areas.

This paper is related to several strands of literature. First, we contribute to a growing literature that examines market segmentation in terms of wage gaps and mobility between formal and informal employment. The pioneering work of Gong and van Soest (2002), Maloney (2004) and Fields (2009) suggests that informal employment comprises two tiers of workers: a lower-tier of low-skilled workers who find it challenging to enter formal employment regardless of their willingness, and an upper-tier of skilled workers who can get a formal job but decide to operate informally on the basis of a cost-benefit decision. However, studies on labor market segmentation in Vietnam remain limited. Rand and Torm (2012b) focus on wage gaps between workers in formal and informal firms, and Nguyen et al. (2013) examine how the earnings gap depends on the workers' job status. Our paper contributes to this literature by examining the hypothesis of a "two-tier" informal labor market in Vietnam, and by shedding light on wage dynamics before and after formalization.

Our paper also contributes to a growing literature on the determinants and implications of informality in Vietnam. Research on the determinants of informality in Vietnam so far has only focused on business formalization. Boly (2018) finds that formalization takes place in relatively stronger firms who have higher profits and value added, even before formalization, compared to those who choose to stay informal. Malesky and Taussig (2009) find that better institutional governance makes firms more likely to formalize. Previous literature has also shown that becoming formal helps firms increase their profits and value added (Boly, 2018; Demenet et al., 2016), hire more

formal workers (Rand and Torm, 2012a), have better access to information and be better protected from corruption (Cling et al., 2012). In this context, our paper complements the literature by looking at the determinants and implications of informality from a labor market perspective.

Finally, our paper is also related to the literature that has emphasized the role of property rights, taxation, regulatory and enforcement policies in driving informality (See Dabla-Norris et al., 2008; Loayza and Rigolini, 2006 for empirical analysis using cross-country data). A number of recent papers have used micro-data and model-based analysis to examine the role of size-dependent policies and other regulatory distortions in inducing labor and capital misallocation towards informal employment in specific country settings (see, for example, Dabla-Norris et al., 2018 for Peru; Alvarez and Ruane, 2019, for Mexico; Ulyssea, 2018, for Brazil). In this paper, we empirically examine the role of the investment climate and economic governance in driving informality, exploiting regional variation within Vietnam. To our knowledge, the only paper looking at this aspect in Vietnam is Malesky and Taussig (2009), but they focus is on firm formalization rather than worker informality as in this paper.

The remainder of the paper is structured as follow. Section 2 documents stylized facts and implications of informality in Vietnam, including a discussion on labor market segmentation. Section 3 explains the data and methodology used in our empirical analysis. Section 4 presents the results. Section 5 concludes.

II. Stylized Facts about Labor Informality in Vietnam

In this section, we describe the definitions of labor informality and data used, document informality levels and trends in Vietnam, and decompose the distribution of wages across workers.

A. Definitions and Data Used

While there is no universally agreed-upon definition of informality, the term is typically discussed with reference to either firm or labor informality. With respect to the first concept, informality can be described as the collection of firms that operate outside legal and regulatory frameworks (Loayza et al. 2009). Labor informality is typically defined with respect to the working condition of workers, especially lack of long-term contracts and access to social insurance. According to the ILO (2018), workers are considered to be informally employed if they either do not have a contract of more than three months or, if they have such a contract, do not participate in social insurance. We only consider non-agricultural informal employment and use available information on economic ownership of firm, status of employment, labor contracts and social insurance. All data is taken from the Vietnam Labor Force Survey (LFS).[4]

We first define the economic sectors in the economy based on economic ownership: the formal sector (registered firms), the informal sector, and the non-farming household sector. We then

[4] Detailed description on the definitions of economic sector and status of employment can be found at ILO and VGSO (2018).

incorporate information on employment status with the above economic sectors to define informal employment. In the LFS, workers are divided into five categories of employment: (i) employer, (ii) own-account or self-employed worker, (iii) family-contributing worker, (iv) member of producers' cooperatives and (v) wage or salaried worker.[5] Wage workers account for the largest share (44 percent in 2018) of total employment in Vietnam, followed by own-account workers (39 percent), family-contributing workers (15 percent), employers (2 percent) and members of producers' cooperatives (0.1 percent).

The concept of informal workers used in this paper includes all employers working in non-regsitered firms, own-account workers working in the informal or non-farming household sectors; all family-contributing workers; members of producer' cooperatives working in the informal sector; and wage workers either not having a contract of more than three months or, if they have such a contract, not participating in social insurance.[6]

B. Trends and Stylized Facts on Informality in Vietnam

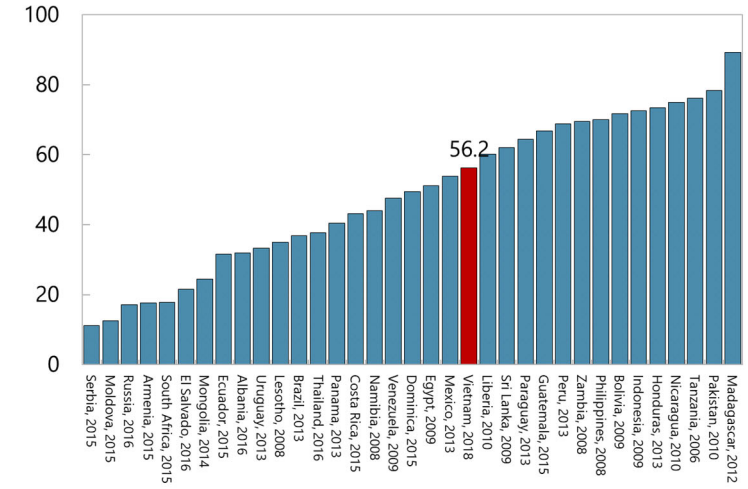
Vietnam's labor market is characterized by a high degree of informality from an international perspective (Figure 1). Although gradually decreasing over time, labor informality has remained high at 56.2 percent in 2018 (Figure 2) and is particularly elevated in the wholesale and retail business (25 percent of total informal workers), construction (18 percent) and food and beverage services (11 percent). An interesting characteristic of labor markets in Vietnam is that formal or registered firms also hire workers under informal contractual arrangements. In 2018, out of the 19.3 million workers working informally, nearly a third were employed by registered firms. Most of these workers are in the wholesale and retail business (23 percent of total informal employment in formal firms), and to a lesser extent, food and beverage services (8.9 percent), transportation, textiles and garments, sectors that have been hit hard by the COVID-19 shock.[7]

[5] Own-account workers include micro-firm owners and self-employed professionals, as well as artisans, construction laborers, taxi drivers, and street vendors. Wage workers largely comprises domestic employees, micro-firm workers, and those who work in larger firms under both formal and informal labor arrangements.

[6] Vietnam has a compulsory insurance system in place. Despite its name, the rate of compulsory insurance participation is low in many sectors, partly due to the fact that own-account workers are not covered by compulsory insurance. As such, non-participation in social insurance among informal workers is universal.

[7] See Ganelli, G., A Nguyen, and V.A. Nguyen (2020) "Implications of the COVID-19 Shock for Vietnam's Labor Market and Policy Responses," IMF note.

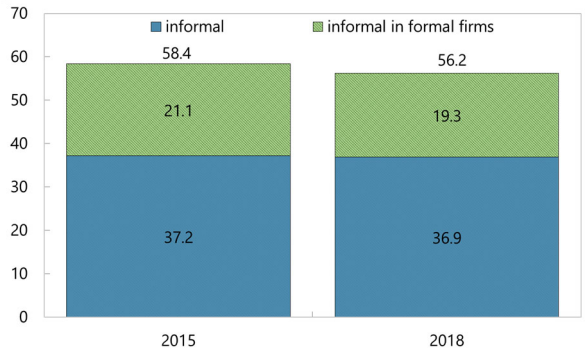
Figure 1: International Comparison of Informality
(share of non-farm informal employment in total employment, percent)



Sources: ILO & VGSO (2016) and Vietnam Labor Force Survey 2018.

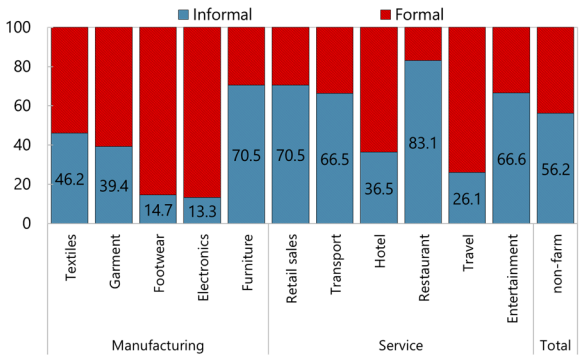
Figure 2: Overall Labor Informality and Sectoral Breakdown

Informality
(percent)



Sources: Vietnam Labor Force Survey; IMF staff calculations.

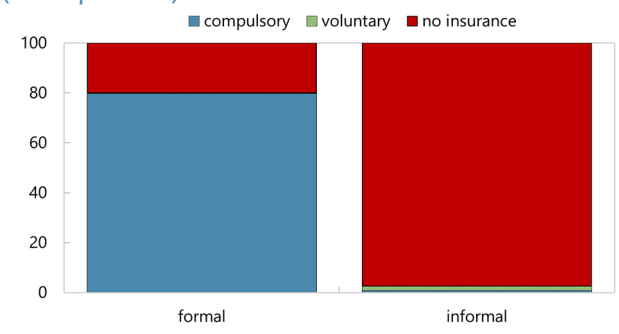
Informality Rate by Sector
(percent)



Sources: Vietnam Labor Force Survey 2018; IMF staff calculations.

Most informal workers are not covered by social insurance. Workers in Vietnam are covered by two types of insurance: compulsory and voluntary. Compulsory insurance, which according to law is compulsory for all workers and employers, covers sickness, labor accidents, pensions, death, and unemployment. In contrast, the voluntary insurance, only covers pensions and death. However, only 35 percent of non-farm workers overall have access to compulsory insurance, and the non-participation in social insurance among informal workers is universal. The low coverage of compulsory

Figure 3. Social Insurance by Informality
(2018 percent)



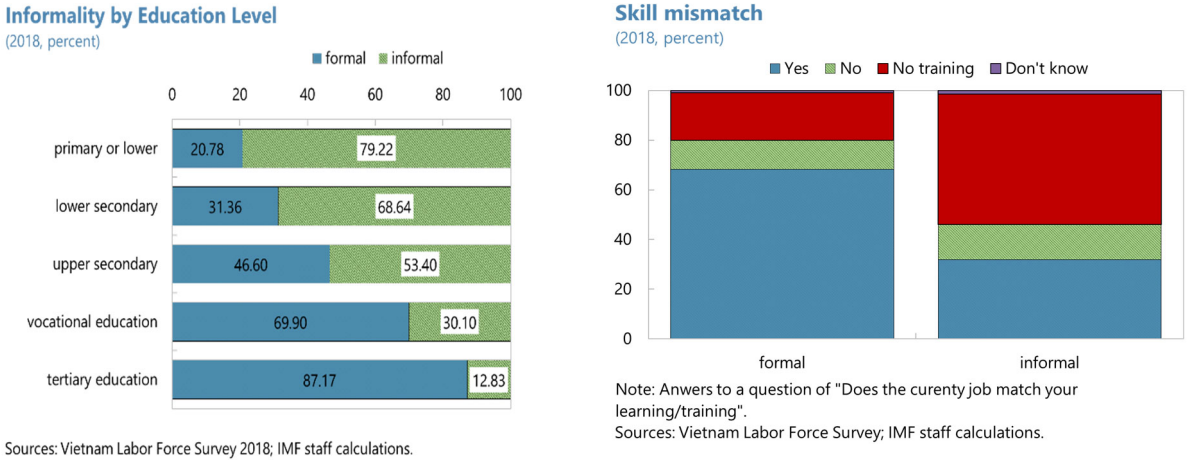
Sources: Vietnam Labor Force Survey; IMF staff calculations.

insurance is partly due to the non-requirement of employers and own-account workers to participate in compulsory insurance; and potential non-compliance of firms to reduce labor costs.

Informal workers tend to be less educated and are more prone to skill mismatches. Almost 80 percent of workers with only a primary education or lower tend to be in informal employment. It is notable that a significant share of tertiary-educated workers was also in informal employment (13 percent). Most of these workers (66 percent) are young (between the ages of 20–34). However, the share of tertiary-educated workers in informal employment declines sharply with age. This suggests that informal salaried work is a point of entry to the labor market for many of the educated young, and, as they accumulate experience or simply queue, they are more able to find a job in the formal sector.

Due to lower education levels on average, informal workers are also more likely to suffer from skill mismatches. In 2018, more than half of the informal workers were not trained for their jobs, and only 31 percent reported doing jobs matching their learning and/or training. Skill mismatches are significantly lower for formal workers, with 68 percent of them reporting working in areas that fit their background and experience.

Figure 4: Informality, Education and Skill Mismatch



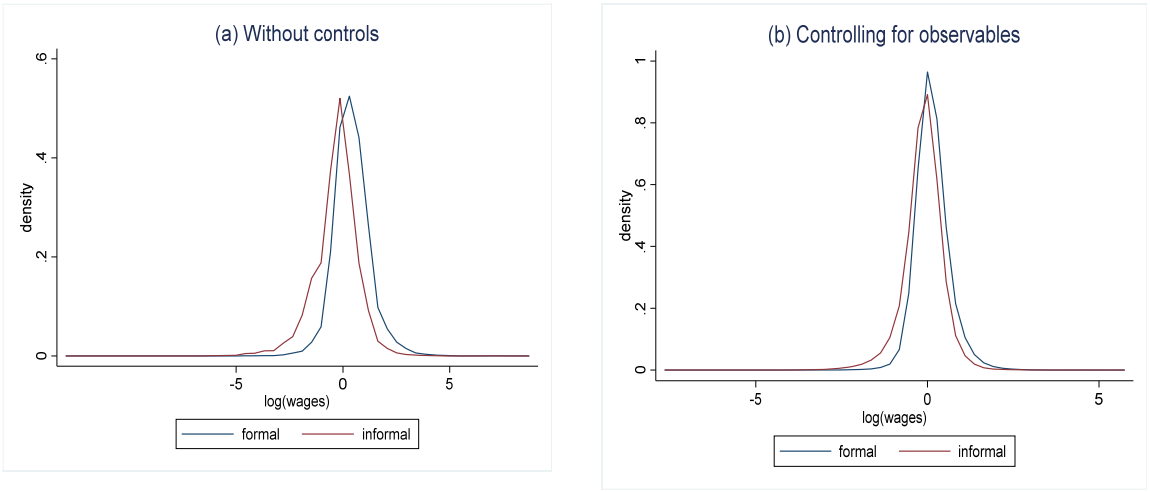
Sources: Vietnam Labor Force Survey 2018; IMF staff calculations.

Note: Anwers to a question of "Does the curenty job match your learning/training".
Sources: Vietnam Labor Force Survey; IMF staff calculations.

We next examine the wage premium for workers and find that a large wage gap exists between informal and formal workers, even after controlling for worker characteristics. Figure 4 shows the distribution of (log) wages of formal and informal workers using data for the 2015-2018 period.[8] By plotting the density of log wages without any controls, Panel graph (a) shows a higher wage distribution for workers in formal as compared to informal employment. Even after controlling for worker characteristics, such as age and education as well as year and industry fixed effects, the gap—although narrowing—still persists (Panel graph (b)).

[8] The LFS collects data on the net income received from the primary job, which includes both wages and overtime remuneration, bonus, and other welfare payment.

Figure 5: Distribution of Wages



Source: Vietnam Labor Force Survey; IMF staff calculations.

OLS regressions show that the informal-formal wage gaps are statistically significant. We first regress log wages on two dummies capturing formality using the pooled 2015-2018 dataset, and in a second step consider panel regressions to control for unobservable characteristics. Specifically, we construct two dummy variables, a "formal" dummy and an "informal at formal firms" dummy that compare earnings of formal workers and informal workers working in formal firms with earnings of informal workers in the informal sector, respectively. In addition, as workers' unobservable characteristics can also play a role in determining wages, we construct a quarterly panel data which tracks specific individuals in 2017 and 2018.[9] The panel regressions allow us to use individual fixed effects to control for both observable and unobservable individual characteristics. All results are reported in Table 1, with the results of the pooled regressions shown in Column (1)–(4), and the results of panel regressions reported in Columns (5)- (6).

The results in Column (1) and (2) indicate that formal workers are paid 42 log points, or 53 percent, more than informal workers with observables (age, education and experience) are not controlled for, and 67 percent more once sectoral differences are accounted for.[10] By contrast, informal workers employed in formal firms earn no better than informal workers working in informal firms. Taking industry controls in column (2) and (4) as a baseline, the wage premium of formality is still high, but is reduced from 67 percent to 51 percent (41.1 log points) after controlling for age, education and

[9] The Labor Force Survey (LFS) is designed to choose a sample of households by location and change the sample every year. First, designated areas for each urban and rural stratum in a province are selected. Two alternative household groups in the areas are then selected. Each group is visited over two continuous quarters, and then replaced by the alternative group in the next two continuous quarters before being visited again in the next two continuous quarters. In addition, one area can only be selected in the survey sample for no more than four times in a year. Therefore, most households (individuals) appear only two times (two continuous quarters) in the survey. Due to data availability, we are able to construct panel data only for2017 and 2018.

[10] Following Halvorsen and Palmquist (1980), the impact of the informal dummy on log wages is calculated as $(\exp(\text{dummy coefficient}) - 1)$.

years of experience. This implies that age, education and years of experience only account for roughly 25 percent of the overall gap in formal-informal wages.

Results of panel regressions that control for individual fixed effects, show that the wage premium is reduced to 8 log points. This implies that 86 percent of the wage premium can be explained by worker's fixed characteristics: a given worker would earn 8 percent more if he moved to formal from informal employment.[11] Compared to the formal-informal wage gaps estimated in other countries ,such as Mexico, Brazil and South Africa (see Bargain and Kwenda 2011), Vietnam has a similar wage gap level with those on the lower end of the gap, such as Mexico and Brazil (5 percent and 4 percent wage premium for formal workers, respectively). In addition, there is almost no difference (only 1 percent) in earnings of informal workers regardless of their workplace.[12]

Mobility between the informal and formal sectors also points to market segmentation in Vietnam, suggesting that workers are potentially rationed out. Slonimczyk and Gimpelson (2015) argue that a market is segmented if there are barriers that hinder workers, especially low-skilled workers, from moving to the formal sector regardless of their willingness to do so. Therefore, under a segmented market, a uni-directional flow of labor from the formal to informal jobs should dominate while flows in the reverse direction should be limited. In constrast, an integrated labor market implies that flows between the formal and informal sectors should go in both directions with roughly the same intensity, suggesting the voluntary character of informal employment.

Using data for 2017–18, we examine quarterly flows between informal and formal employment for workers for whom we have information on employment status for at least two continuous quarters. The flows are plotted in Figure 5, and reveal a bidirectional-flow pattern in the Vietnam's labor market. Around 4 percent of workers move from formal to informal jobs in a given quarter, and a marginally higher proportion move in the opposite direction.[13,14] We further break down types of informality by incorporating informality and employment status. We find that in a given quarter,

[11] As pointed out by Alvarez and Ruane (2019), wage gaps in panel data are only estimated using workers who switch across sectors. Therefore, it might still be the case that gains from formalization are greater for workers who do not switch across sectors. Another caveat here is the panel data only follows a worker for at most four quarters. Hence, the wage gaps are most driven by short-term gains while long-term gains from formalization, which might be significant, are not captured in these estimated gaps. Utilizing a longer time-span panel data constructed from Vietnam Household Living Standards Surveys in 2002, 2004 and 2006, Nguyen et al (2013) find that the informal wage penalties are 15 percent.

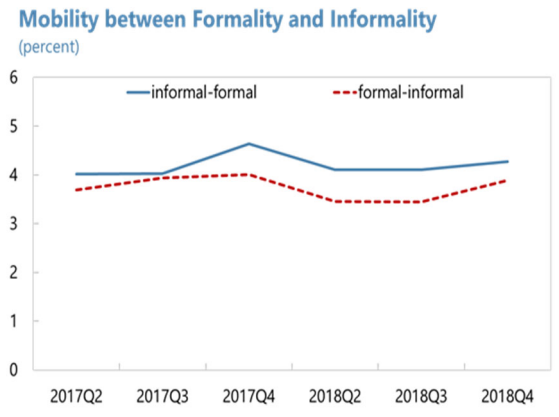
[12] Nguyen et al (2013) utilize quantile regressions and show that compared to formal wage workers, informal wage workers suffer from earning penalties while informal self-employed workers in fact receive a wage premium. They conclude that the feature of informal self-employed workers receiving a higher premium vis-à-vis formal wage workers along the pay ladder indicates a more integrated labor market.

[13] Using the Vietnam Household Living Standard Survey, Nguyen et al. (2013) find that for the two time periods (i.e. within two years), around 20 percent of the total number of non-farm workers moved from informal to formal jobs, while the rate of formal-informal transitions is about 40 percent.

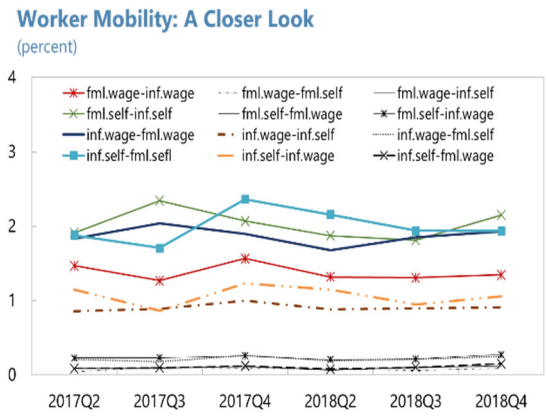
[14] According to Appendix Table 1, most informal wage workers (95 percent) do not change their jobs. The most likely to change jobs are formal self-employed workers, when 23 percent of formal self-employed workers change jobs within a quarter.

around 2 percent of workers shift from informal self-employment into formal self-employment and the same proportion move in the opposite direction.[15] Around 2 percent of workers move from informal to formal wage employment, while the revese flow accounts for a smaller proportion of 1.5 percent. Interestingly, the fluidity between informal and formal jobs mostly happens within a given employment status, i.e. workers do not move from self-employment to wage work (or the other way around) when they move from formal to informal employment (or vice versa).[16]

Figure 6: Worker Mobility between Formal and Informal Employment



Notes: These are the shares of workers moving between sectors in the total number of workers who has informaltion of informality for two continous quarters.
Sources: Labor Force Survey; IMF staff calculations.



Notes: fml.wage, inf.wage, fml.self, inf.self denotes formal waged employment, informal waged employment, formal self-employment and informal self-employment, respectively.
Sources: Labor Force Survey; IMF staff calculations.

Given that informal jobs provide employment and income to many people who might otherwise be unemployed, the bidirectional movement of labor can provide a cushion against shocks. However, as described earlier, informal workers are likely to be worse off than formal peers in terms of income and social protection..

The bidirectional flows of workers begs the question of why, given the significant wage premium for formal jobs, there remains a large proportion of workers working informally in Vietnam. Previous studies (e.g. Maloney 2004, Fields 2009) suggest that informal employment comprises two tiers of workers. The lower-tier is composed of low-skilled workers for whom it may not be possible to enter into formal employment regardless of their willingnes. The upper-tier composed of skilled workers who can get a formal job but decide to operate informally on the basis of a cost-benefit decision. Thus, lower-tier workers could suffer from market segmentation, while workers in the upper-tier are relatively integrated with formal employment and are able to move freely between the two sectors. In line with this literature, we try to shed additional light on Vietnam's labor formalization dynamics by comparing the initial wages of workers who move with their peers who do not move, as well as by

[15] Self-employment includes employers, own-account workers, family-contributing workers and members of producers' cooperatives.

[16] Change of employment status between wage employment and self-employment occurs mainly in the informal sector as showed in the right chart in Figure 5.

looking at changes in wages after moving to the new sector. The results of this exercise are presented in Table 2.

The first 4 columns of Table 2 refers to wages of workers who intially worked informally but obtained a formal position. Column (1) and (2) compare the "before-formalization" wages of those workers with those of workers continuing to stay informal. The results imply that after controlling for age, education and work experience, the switchers have 13–16 percent higher informal wages than non-switchers, even before switching to formalization. As non-observables are not controlled for in the estimation, the high wage gap within the initially-informal workers suggests that those who can move to the formal sectors belong to the upper-tier. Furthermore, as shown in Column (3) and (4), moving to formal jobs increases their salaries by roughly 10 percent compared to wages received while working informally. In constrast, workers who were formally employed but moved to informal employment were doing worse in terms of wages, compared to those who continued to stay formal (Column 5 and 6), even before joning informal employment. After moving, their wages decline further but at a marginal rate of 4 percent (Column 7 and 8). Although further analysis is waranted, this evidence suggests that workers become informal either because of non-wage benefits or because they are involuntarily excluded from formal jobs.

In summary, the presence of bidirectional formality-informality flows and a significant, but modest, wage premium from formality suggest that the labor market in Vietnam is relatively integrated. However, a closer look at the wage dynamics of formalization and informalization suggests that there is segmentation even within informal employment.

III. Data and Methodology

A. Data

Our data comes primarily from the Vietnam Labor Force Survey (LFS). The sample is chosen carefully to represent the overall population in terms of both urban-rural areas and the 6 socio-economic regions in Vietnam. For the empirical analysis, we use pooled Labor Force Survey data for the 2015-2018 period.

To investigate the role of economic governance on informality, we utilize two provincial datasets. The first dataset is the Vietnam Provincial Competitiveness Index (PCI). The index was first developed in 2005 by conducting a firm-level survey to measure economic governance in Vietnam's 63 provinces. The PCI survey includes three sets of firms: newly established enterprises, existing domestic private businesses and foreign-invested enterprises. In total, the survey reaches about 13,000 enterprises, making it the largest business survey representing firms' subjective views on the local business environment and the quality of economic governance in Vietnam. Using both "soft" data of firm evaluations in the survey and economic hard data taken from statistical handbooks, the PCI index provides an evaluation of the business environment in Vietnam.

In addiiton to the weighted overall PCI index, its ten sub-indices cover a range of policy constraints, including entry costs; land access and tenure; transparency and access to information; time costs of regulatory complicance; informal charges; competition environment and policy bias towards state-

owned and FDI enterprises; proactivity of provincial leadership; business support services; labor policy and law and order.[17] All indices are normalized such that higher values denote an improvement.

The ten sub-indices can be divided into three group of factors as in Malesky and Taussig (2009). The first group represents *entry barriers*, including subindices of entry costs and policy bias toward the state and foreign sectors. The second group represents *property rights*, consisting of the ability to gain access to land and business premises (land access and tenure), firm perceptions of the corruption of provincial officials (informal charges) and firms' confidence in legal institutions (law and order). The final group represents *business support policy at a local level*, including a vast range of measurements on transparency, labor, business support, proactivity and time costs. We calculate three groups of factors to investigate the role of policy reforms in driving informality. The weights of each subindices in the calculations of three groups of factors are taken from Malesky et al. (2018). Thus, indices for economic governance are presented at three levels: the weighted PCI as a proxy for the overall business environment, the calculated subindices for three policy types, and finally the ten public PCI subindices for detailed structural policies.

The second dataset on policies used in this paper is the Vietnam Provincial Governance and Public Adiministration Performance Index (PAPI).[18] Similar to the PCI, the PAPI overall index and its subindices are also calculated based on a survey targeted at citizens to reflect their experience with central and local government in performing their governance, public administration and public service delivery functions. The project was first started in 2009, and covers 6 dimensions: (1) participation at local levels, (2) transparency, (3) vertical accountability, (4) control of corruption, (5) public administrative procedures and (6) public service delivery. For the PAPI indices, we use the index of control of corruption as a proxy for law enforcement.

Finally, a variable on monthly average earnings at the provincial level is added to control for the economic cycle. Unemployment rate at the provincial level is also included for robustness checks. Both data are obtained from the CEIC Data database.

B. Methodology

Using individual-level data taken from the LFS, we investigate the likelihood of being informal depending on individual characteristics and policy changes. As our dependent variable is a dummy varible of informal employment, we use probit regressions throughout our empirical analysis. We start with our baseline model, which includes only individual and workplace characteristics as explanatory variables as below:

[17] Malesky and Taussig (2009) and Malesky et al. (2019) provide detailed discussion on measurements of these indices.

[18] Comprehensive analyses of overtime development as well as provincial comparisons of the PCI and PAPI are reported in Malesky et al. (2019) and CECODES et al. (2019), respectively.

$$Informal_{i,r,s,t} = \Phi\left(\alpha_s + \alpha_r + \alpha_t + \beta X_{i,r,s,t} + \varepsilon_{i,r,s,t}\right) \qquad (1)$$

where $Informal_{i,r,s,t}$ denotes a dummy that equals one if person *i* located in region *r* working in sector *s* engages in informal employment at time *t* and zero otherwise. The set of independent variables $X_{i,r,s,t}$ includes (i) worker's highest education level, (ii) demographic characteristics (sex, maritual status and age group), (iii) years of work experience, (iv) workplace characteristics (legality of workplace, existence of labor union in the workplace, FDI vs. non-FDI firms), and (v) location (rural or urban). Fixed effects for regions, economic sectors, and years are included to control for unobservable factors.

The baseline model is then extended to incorporate the economic and policy variables at the provincial level:

$$Informal_{i,r,s,t} = \Phi\left(\alpha_s + \alpha_r + \alpha_t + \beta X_{i,r,s,t} + \gamma Y_{r,t} + \varepsilon_{i,r,s,t}\right) \qquad (2)$$

where $Y_{r,t}$ is a set of economic and policy variables including average earnings, PCI indices and the PAPI index.

Finally, we consider interaction terms between policy variables and individual characteristics to investigate who benefits most from changes in policies.

$$Informal_{i,r,s,t} = \Phi\left(\alpha_s + \alpha_r + \alpha_t + \beta X_{i,r,s,t} + \gamma Y_{r,t} + \delta X'_{i,r,s,t} * Y_{r,t} + \varepsilon_{i,r,s,t}\right) \qquad (3)$$

where $X'_{i,r,s,t}$ is selected variables on individual characteristics.

IV. Drivers of Informality in Vietnam

A. The Role of Individual and Workplace Characteristics on Informality

Th results of the baseline model (1) presented in Table 4 suggest that less educated, young, male, single workers and those living in rural areas have a higher likelihood of being in informal employment.[19] Among individual characteristics, work experience and education are the most important drivers of informality. Appendix Table 2 provides the calculated marginal effects of coefficients reported in Table 4.[20] The probability of high school graduates working informally is 10 percent lower than those who do not obtain a high-school education. Similarly, having more than 5 years of work experience can reduce the likelihood of being in informal employment by roughly

[19] Although we find that being female lower a worker's possibility to be informally employed, recent data on labor market developments during COVID-19 suggests that women have been affected more than men with the female labor force falling by 4.4 percent q/q in 2020Q2 compared to a 3.5 percent q/q reduction in the male labor force. One explanation is that women usually work in the services sector or run household businesses such as retail shops, restaurants (which are not necessarily unregistered). As both sectors were severely hit by COVID-19, women were more likely to temporarily withdraw from the labor force but quickly rebound after social distancing measurement were lifted (World Bank, 2020).

[20] Although not showed in this paper, estimation of marginal effects for other models can be provided upon request.

20 percent compared to a person with less than one year of work experience. Our results underscore the benefits of investment in education and job training for formal employment. This result is consistent with Demombynes and Testaverde (2018), who find that higher education can also bring returns in terms of higher wage earnings.[21]

In terms of workplace characteristics, working in a formal firm, especially those with foreign investment or having a labor union inside the firms, is a key determinant of informal employment status. Working in formal firms can reduce the likelihood of informality by as much as 60 percent. This result suggest an important role of business formalization in promoting formal jobs. This is supported by findings in Rand and Torm (2012a) who find that firms tend to hire more formal workers after formalization.

B. How can Policies help Reduce Informality?

The results of model (2), which incorporates policy variables, are presented in Table 5. The negative signs of average earnings imply that, all else equal, a higher income, representing an improvement in economic conditions, is associated with a lower probability of being in informal employment. This finding is in line with Loayza et al. (2009), who argue that formal employment opportunities are more widespread in a growing economy than during recessions.

Importantly, our results suggest that structural reforms aimed at improving governance and trasparency can help bring down informality. The coefficient of the weighted PCI index is significantly negative, implying that removing insitutional and strucutral impediments lowers the probability that workers engage in informal employment. In particular, reducing entry barriers and securing property rights can help reduce the likelihood of being in informal employment while business support policies do not have a statistically significant impact in general. Reforms to reduce entry barriers and streghen property rights can assist with higher business formalization, creating job opportunities for formal employment. This finding is supported by Malesky and Taussig (2009), who find that lower entry costs and higher-quality property rights are most significant drivers of enterprise formalization in Vietnam.

We conduct two robustness checks on the potential impact of the policy environment on informal employmenr. First, we drop several individual characteristics which could be potentially endogenous to the economic/policy variables.. The results are shown in Appendix Table 3. The results are robust, and coefficient signs do not change, except for the coefficient on support policies. Second, as average earnings could go up if all low-wage earners are the first to become unemployed during economic downturns, we further the unemployment rate at the provincial level as another control for economic conditions. The results shown in Appendix Table 4 again confirm our findings. In addition, the coefficient of support policies is also significantly positive in this robustness check.

[21] Demombynes and Testaverde (2018) also use the Vietnam LFS over the 2011-2014 period and find that returns to education in terms of wage earning is 10 percent for a high-school education, 43 percent for a college education and 66 percent for a university education.

We next consider the ten disaggregated dimensions of the PCI index (Appendix Table 5), Our findings suggest that all dimensions of entry barriers and property rights are statistically significant and reduce the likelihood of informality. Among the group of business support policies, reducing the amount of time firms waste on bureaucratic compliance after registration (*PCI time costs*) and increasing creativity when implementing central policies to support local private firms (*PCI proactivity*) contributes to a lower likelihood of informality. However, access to business support services and better labor training tend to produce contradictory effects in the propensity to be in formal employment.

Finally, using the PAPI index as another proxy for control of corruption also supports the evidence that better control of corruption and more secure property rights lower the likelihood of being in informal employment (Column 11).

C. Who Benefits from Different Types Structural Reforms?

To examine whether different structural reforms have a differential impact on workers, we introduce interaction terms of individual workers characteristics with policy variables in the regressions. Table 6 and Appendix Table 6 report the results of the model (3), where we regress the informality dummy on individual characteristics, policies and interactions between them.

Our findings in the previous sub-section suggest that that the probability of engaging in informal employment is higher for workers who are young, less educated, living in rural areas and employed in non-registered and non-FDI firms. The results of Table 6 and Appendix Table 6 suggest that these groups of workers would benefit from specific reforms:

- *Less educated workers*: compared to more educated workers, workers with low levels of education could disproportionately benefit from reforms to strengthen property rights (e.g., access to land, law and order, corruption control) that encourage greater firm formalization and from support policies (business support, labor training).

- *Informality among the young*: support for labor training has a positive and significant impact on tackling informal employment among the young. Since young workers lack work experience, appropriate training and efforts to reduce skill mismatches can be crucial for helping them find formal jobs.

- *Rural informality*: Our analysis suggests that reforms to reduce entry costs and strengthen property rights can help firms in rural areas formalize, thereby creating greater opportunities for formal employment. In contrast, reforms to improving labor training and business services benefits workers in urban areas more.

- *Informality in the non-FDI sector*: Support policies, such as better access to business services and labor training disproportionately lower informality in the non-FDI sector more than in other types of firms.

V. Conclusion and Policy Implications

This paper uses the Vietnamese Labor Force Survey for the 2015-2018 period to document stylized facts about informal employment in Vietnam and examine the role of individual characteristics and policy in driving informality. We find that the high level of labor informality in the economy is concentrated among many of the sectors that have been hardest-hit by the COVID-19 shock. At first glance, bidirectional flows between the formal and informal employment and statistically significant but moderate formality wage premiums seem to suggest an integrated labor market. However, flows to the formal sector are mainly from the upper-tier of (high-skilled) workers, while the market for lower-tier (low-skilled) workers is segmented. This points to evidence of rationing in formal employment by skill and education level.

An investigation of the policy drivers of informality shows that education and work experience are indeed the two most important individual determinants of the likelihood of being in formal employment. Moreover, workers who are employed in registered firms, especially those having a labor union and working in FDI enterprises, are less likely to be employed informally. These results underscore the importance of investment in education, job training, life-long learning and business formalization for formal employment.

The analysis of policy drivers corroborates this evidence. We find that reforms to facilitate business formalization, such as reducing entry costs for start-ups and securing property rights, along with improvements in labor training and education systems can facilitate formal employment. A more enabling investment climate will also permit formal firms to expand and pay higher wages. At the same time, ongoing upgrading of the workforce through training, particularly in rapidly evolving industries, is critical to developing skills used in the modern sector of the economy and to promoting productivity growth.

Our findings also shed light on need for a comprehensive agenda to tackle informality as the appropriate policies needed for different groups of workers vary. Strengthening property rights appears to be the most effective measure to reduce informal employment for less educated workers who live in rural areas and work in unregistered firms. Young workers, particularly in urban areas, benefit more from labor market reforms, including more active labor market policies. At the same time, reducing entry costs could bolster the formalization of registered firms in rural areas.

Finally, although business formalization, along with education and work experience, is necessary for fostering formality, the existence of a large share of informal employment in formal firms implies that business formalization alone is not sufficient. Future research could provide a more in-depth examination of the role of regulations, social security contributions and minimum wages on informality in Vietnam.

Table 1: Formal-Informal Wage Gaps

	Without controls		Age, education and years of experience controls		Worker fixed effects	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Formal	0.422***	0.511***	0.328***	0.411***	0.0765***	0.0781***
	(0.00121)	(0.00142)	(0.00136)	(0.00145)	(0.00392)	(0.00394)
Informal at formal firms	-0.0449***	0.00466***	0.00816***	0.0595***	0.0117***	0.0139***
	(0.00158)	(0.00163)	(0.00158)	(0.00160)	(0.00417)	(0.00420)
Constant	8.175***	8.078***	7.553***	7.467***	8.569***	8.552***
	(0.00133)	(0.00413)	(0.00600)	(0.00688)	(0.00235)	(0.0150)
Observations	1,030,399	1,030,384	1,030,089	1,030,074	266,276	266,276
R-squared	0.156	0.188	0.232	0.274	0.124	0.102
Education effects	No	No	Yes	Yes	No	No
Age effects	No	No	Yes	Yes	No	No
Experience effects	No	No	Yes	Yes	No	No
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	No	Yes	No	Yes	No	Yes
Worker effects	No	No	No	No	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Vietnam Labor Force Surveys; authors' calculations.

Table 2: Wage Dynamics of Informalization and Formalization

	Informal workers who formalized				Formal workers who informalized			
	gap in initial wages with who stay informal		wage change due to formalization		gap in initial wages with who stay formal		wage change due to informalization	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Formalized	0.134***	0.163***						
	(0.00627)	(0.00612)						
Informalized					-0.0843***	-0.137***		
					(0.00575)	(0.00562)		
Informal status			-0.0972***	-0.0963***			-0.0411***	-0.0423***
			(0.00435)	(0.00436)			(0.00492)	(0.00495)
Constant	7.722***	7.771***	8.655***	8.661***	8.183***	8.099***	8.671***	8.661***
	(0.0171)	(0.0215)	(0.00297)	(0.0590)	(0.0374)	(0.0376)	(0.00335)	(0.0591)
Observations	106,491	106,491	18,120	18,120	102,463	102,463	16,049	16,049
R-squared	0.109	0.166	0.109	0.177	0.055	0.066	0.009	0.018
Education effects	Yes	Yes	No	No	Yes	Yes	No	No
Age effects	Yes	Yes	No	No	Yes	Yes	No	No
Experience effects	Yes	Yes	No	No	Yes	Yes	No	No
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	No	Yes	No	Yes	No	Yes	No	Yes
Worker effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: (a) Regressions in Column (1) and (2) (Column 5 and 6) include workers who are initially informal (formal) and can both switch to the formal (informal) sector or remain informal (formal) afterward. Regressions in Column (3) and (4) (Column 7 and 8) include only switchers from informality (formality) to formality (informality). (b) Formalized denotes a dummy for workers switch from informality to formality. Informalized denotes a dummy for workers switch from formal positions to informal positions. Informal status denotes a dummy which takes value 1 if workers are informally employed.

Source: Vietnam Labor Force Surveys; authors' calculations.

Table 3: Employment by Type of Contract

	Non fixed term contract	From 1 to under 3 year contract	From 3 month to 1 year contract	Under 3 month contract	Exchange contract	Verbal agreement	No contract	Total
Manufacturing								
Textiles	31.6	36.1	8.2	0.6	1.2	19.1	3.2	100.0
Garment	22.4	49.3	9.5	1.8	2.0	12.7	2.3	100.0
Footwear	33.3	51.9	8.0	1.0	0.6	4.0	1.2	100.0
Electronics	22.1	61.8	11.1	2.3	0.8	1.3	0.5	100.0
Furniture	12.3	26.9	2.6	1.5	1.3	47.2	8.2	100.0
Services								
Transport	21.2	22.9	5.4	0.7	3.7	39.4	6.7	100.0
Hotel	29.3	43.5	8.3	2.5	1.6	11.2	3.7	100.0
Restaurant	5.2	10.3	3.4	1.8	0.9	66.2	12.1	100.0
Travel	37.0	48.7	7.1	0.5	1.0	3.0	2.6	100.0
Entertainment	24.8	23.1	5.3	0.8	2.8	33.5	9.6	100.0
Average	23.9	37.4	6.9	1.4	1.6	23.8	5.0	100.0

Note: Highlights show the contract type which has a higher share of employment in each industry.
Source: Vietnam Labor Force Survey 2018; authors' calculations.

Table 4: Likelihood of Being in Informal Employment Depending on Individual Characteristics

VARIABLES	(1)	(2) informality	(3)
underedu (<high school)	0.766***	0.727***	0.618***
	(0.00453)	(0.00459)	(0.00499)
young (15-25 years old)	0.143***	0.151***	0.148***
	(0.00668)	(0.00665)	(0.00668)
female	-0.180***	-0.176***	-0.113***
	(0.00427)	(0.00429)	(0.00457)
spouse	-0.193***	-0.186***	-0.178***
	(0.00557)	(0.00557)	(0.00563)
1-5 years of experience	-0.682***	-0.689***	-0.680***
	(0.00864)	(0.00859)	(0.00862)
more than 5 years of experience	-1.163***	-1.187***	-1.164***
	(0.00906)	(0.00903)	(0.00914)
rural	0.0890***	0.0992***	0.109***
	(0.00437)	(0.00440)	(0.00457)
registered firm	-3.813***	-3.787***	-3.691***
	(0.0374)	(0.0379)	(0.0384)
labor union	-0.625***	-0.955***	-0.800***
	(0.00510)	(0.00634)	(0.00688)
FDI firm	-1.172***	-1.091***	-1.098***
	(0.00998)	(0.00992)	(0.0102)
Constant	4.292***	4.127***	4.403***
	(0.0390)	(0.0395)	(0.0421)
Observations	1,110,530	1,110,530	1,110,515
regional effects	Yes	Yes	Yes
year effects	No	Yes	Yes
industry effects	No	No	Yes
Pseudo R2	0.543	0.551	0.561

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: authors' calculations.

Table 5: Likelihood of Being in Informal Employment Depending on Individual Characteristics: Role of Policy Variables

	(1)	(2)	(3)	(4)
VARIABLES	informality			
underedu (<high school)	0.611***	0.613***	0.614***	0.611***
	(0.00500)	(0.00501)	(0.00500)	(0.00501)
young (15-25 years old)	0.146***	0.146***	0.147***	0.146***
	(0.00669)	(0.00669)	(0.00669)	(0.00669)
female	-0.114***	-0.114***	-0.114***	-0.114***
	(0.00458)	(0.00458)	(0.00458)	(0.00458)
spouse	-0.180***	-0.181***	-0.180***	-0.180***
	(0.00564)	(0.00564)	(0.00564)	(0.00564)
1-5 years of experience	-0.682***	-0.681***	-0.682***	-0.682***
	(0.00861)	(0.00862)	(0.00862)	(0.00861)
more than 5 years of experience	-1.167***	-1.166***	-1.168***	-1.166***
	(0.00914)	(0.00914)	(0.00914)	(0.00914)
rural	0.0854***	0.0863***	0.0836***	0.0877***
	(0.00466)	(0.00466)	(0.00465)	(0.00466)
registered firm	-3.694***	-3.694***	-3.694***	-3.694***
	(0.0384)	(0.0384)	(0.0384)	(0.0384)
union	-0.800***	-0.800***	-0.801***	-0.800***
	(0.00689)	(0.00690)	(0.00689)	(0.00689)
FDI firm	-1.101***	-1.100***	-1.094***	-1.101***
	(0.0102)	(0.0102)	(0.0103)	(0.0102)
average earnings	-0.0617***	-0.0738***	-0.0840***	-0.0705***
	(0.00360)	(0.00353)	(0.00357)	(0.00415)
Weighted PCI	-0.00467***			
	(0.000872)			
entry barriers		-0.00319***		
		(0.000521)		
property rights			-0.00520***	
			(0.000472)	
support policy				0.00104
				(0.000809)
Constant	4.965***	4.960***	5.070***	4.676***
	(0.0629)	(0.0595)	(0.0539)	(0.0573)
Observations	1,110,515	1,110,515	1,110,515	1,110,515
regional FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
industry FE	Yes	Yes	Yes	Yes
Pseudo R2	0.561	0.561	0.561	0.561

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Negative and positive coefficients of policy variables are highlighted in orange and green, respectively.

Source: authors' calculations.

Table 6: Likelihood of Being in Informal Employment: Model with Interaction Terms

Policy variables	(1) Weighted PCI	(2) Entry barriers	(3) Property rights	(4) Support Policies
underedu (<high school)	1.702***	-0.267***	0.969***	0.512***
	(0.0805)	(0.0575)	(0.0374)	(0.0695)
young (15-25 years old)	0.106	0.0889	-0.0349	-0.244***
	(0.0996)	(0.0718)	(0.0453)	(0.0864)
female	-0.113***	-0.113***	-0.113***	-0.114***
	(0.00458)	(0.00458)	(0.00458)	(0.00458)
spouse	-0.180***	-0.180***	-0.180***	-0.180***
	(0.00563)	(0.00564)	(0.00564)	(0.00564)
1-5 years of experience	-0.683***	-0.683***	-0.683***	-0.682***
	(0.00861)	(0.00861)	(0.00862)	(0.00862)
more than 5 years of experience	-1.169***	-1.168***	-1.169***	-1.167***
	(0.00913)	(0.00914)	(0.00915)	(0.00914)
rural	-0.148*	0.216***	0.314***	-0.452***
	(0.0802)	(0.0569)	(0.0365)	(0.0682)
registered firm	-6.132***	-2.105***	-4.294***	-3.471***
	(0.653)	(0.535)	(0.350)	(0.684)
labor union	-0.826***	-0.824***	-0.803***	-0.801***
	(0.00698)	(0.00701)	(0.00694)	(0.00689)
FDI firm	-4.082***	0.672***	-0.927***	-0.452***
	(0.187)	(0.127)	(0.0837)	(0.143)
average earnings	-0.0636***	-0.0688***	-0.0735***	-0.0675***
	(0.00360)	(0.00342)	(0.00360)	(0.00338)
policy_variable	-0.0400***	-0.00326	-0.0174***	-0.0156**
	(0.0104)	(0.00748)	(0.00612)	(0.00764)
underedu* policy_variable	-0.0177***	0.00695***	-0.00189***	-0.0146***
	(0.00130)	(0.000865)	(0.000652)	(0.000998)
young*policy_variable	0.000643	0.00368***	0.00210***	-0.00146
	(0.00161)	(0.00106)	(0.000801)	(0.00122)
rural*policy_variable	0.00381***	-0.00921***	-0.00570***	0.00903***
	(0.00131)	(0.000853)	(0.000643)	(0.00101)
registered_firm*policy_variable	0.0395***	0.00210	0.0156**	0.0173**
	(0.0105)	(0.00749)	(0.00612)	(0.00763)
FDI_firm*policy_variable	0.0482***	-0.0223***	-0.00355**	0.0480***
	(0.00301)	(0.00200)	(0.00148)	(0.00235)
Constant	7.154***	4.957***	5.730***	5.746***
	(0.651)	(0.484)	(0.345)	(0.488)
Observations	1,110,515	1,110,515	1,110,515	1,110,515
regional FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
industry FE	Yes	Yes	Yes	Yes
Pseudo R2	0.561	0.561	0.561	0.562

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Negative and positive coefficients of policy variables are highlighted in orange and green, respectively.

Source: authors' calculations.

Appendix Table 1: Worker Mobility between Formal and Informal Employment

	Formal wage employment	Formal self-employment	Informal wage employment	Informal self-employment	Total
			2018Q2		
2018Q1					
Formal wage employment	95.8	0.2	3.7	0.2	100.0
Formal self-employment	0.6	79.9	1.9	17.5	100.0
Informal wage employment	6.3	0.7	89.7	3.3	100.0
Informal self-employment	0.3	7.9	4.2	87.6	100.0
Total	35.5	11.0	26.7	26.8	100.0
			2018Q3		
2018Q2					
Formal wage employment	95.7	0.2	3.8	0.3	100.0
Formal self-employment	0.8	80.9	2.0	16.3	100.0
Informal wage employment	6.9	0.8	89.0	3.3	100.0
Informal self-employment	0.4	7.0	3.4	89.1	100.0
Total	35.1	11.2	26.3	27.4	100.0
			2018Q4		
2018Q3					
Formal wage employment	95.6	0.3	3.9	0.3	100.0
Formal self-employment	1.1	76.7	2.5	19.6	100.0
Informal wage employment	7.2	0.9	88.5	3.4	100.0
Informal self-employment	0.6	7.1	3.9	88.4	100.0
Total	35.6	10.7	26.5	27.2	100.0

Note: The table only account for workers who are both working in non-farm employment for two continous quarters.
Source: authors' calculations.

Appendix Table 2: Marginal Effect of Likelihood of Being in Informal Employment Depending on Individual Characteristics

VARIABLES	(1)	(2)	(3)
	informality		
underedu (<high school)	0.135***	0.125***	0.104***
	(0.000721)	(0.000728)	(0.000801)
young (15-25 years old)	0.0251***	0.0260***	0.0249***
	(0.00117)	(0.00115)	(0.00113)
female	-0.0317***	-0.0303***	-0.0191***
	(0.000747)	(0.000737)	(0.000769)
spouse	-0.0340***	-0.0321***	-0.0301***
	(0.000976)	(0.000959)	(0.000947)
1-5 years of experience	-0.120***	-0.119***	-0.115***
	(0.00149)	(0.00145)	(0.00142)
more than 5 years of experience	-0.205***	-0.205***	-0.196***
	(0.00151)	(0.00147)	(0.00146)
rural	0.0157***	0.0171***	0.0183***
	(0.000769)	(0.000760)	(0.000771)
registered firm	-0.671***	-0.654***	-0.622***
	(0.00641)	(0.00636)	(0.00631)
labor union	-0.110***	-0.165***	-0.135***
	(0.000861)	(0.00103)	(0.00111)
FDI firm	-0.206***	-0.188***	-0.185***
	(0.00165)	(0.00162)	(0.00164)
Observations	1,110,530	1,110,530	1,110,515
marginal effect	Yes	Yes	Yes
regional effects	Yes	Yes	Yes
year effects	No	Yes	Yes
industry effects	No	No	Yes
Pseudo R2	0.543	0.551	0.561

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: authors' calculations.

Appendix Table 3: Likelihood of Being in Informal Employment Depending on Individual Characteristics: Role of Policy Variables (robustness check)

	(1)	(2)	(3)	(4)
VARIABLES		informality		
underedu (<high school)	0.847***	0.851***	0.854***	0.849***
	(0.00374)	(0.00374)	(0.00375)	(0.00374)
young (15-25 years old)	0.119***	0.120***	0.123***	0.120***
	(0.00537)	(0.00537)	(0.00537)	(0.00537)
female	-0.114***	-0.114***	-0.113***	-0.114***
	(0.00361)	(0.00361)	(0.00361)	(0.00361)
spouse	-0.189***	-0.189***	-0.189***	-0.188***
	(0.00451)	(0.00451)	(0.00451)	(0.00451)
average earnings	-0.0569***	-0.0867***	-0.116***	-0.0763***
	(0.00266)	(0.00264)	(0.00269)	(0.00312)
Weighted PCI	-0.0132***			
	(0.000698)			
entry barriers		-0.00689***		
		(0.000410)		
property rights			-0.0132***	
			(0.000371)	
support policy				0.00108*
				(0.000642)
Constant	0.765***	0.594***	0.963***	0.0354
	(0.0394)	(0.0350)	(0.0291)	(0.0330)
Observations	1,110,515	1,110,515	1,110,515	1,110,515
regional FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
industry FE	Yes	Yes	Yes	Yes
Pseudo R2	0.265	0.265	0.266	0.265

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Negative and positive coefficients of policy variables are highlighted in orange and green, respectively.

Source: authors' calculations.

Appendix Table 4: Likelihood of Being in Informal Employment Depending on Individual Characteristics: Role of Policy Variables (robustness check)

VARIABLES	(1)	(2)	(3)	(4)
	informality			
underedu (<high school)	0.612***	0.613***	0.614***	0.612***
	(0.00500)	(0.00501)	(0.00500)	(0.00501)
young (15-25 years old)	0.146***	0.146***	0.147***	0.146***
	(0.00669)	(0.00669)	(0.00669)	(0.00669)
female	-0.114***	-0.114***	-0.114***	-0.114***
	(0.00458)	(0.00458)	(0.00458)	(0.00458)
spouse	-0.181***	-0.181***	-0.181***	-0.181***
	(0.00564)	(0.00564)	(0.00564)	(0.00564)
1-5 years of experience	-0.682***	-0.682***	-0.682***	-0.682***
	(0.00862)	(0.00862)	(0.00862)	(0.00862)
more than 5 years of experience	-1.167***	-1.167***	-1.168***	-1.167***
	(0.00914)	(0.00915)	(0.00915)	(0.00914)
rural	0.0826***	0.0832***	0.0820***	0.0838***
	(0.00468)	(0.00468)	(0.00468)	(0.00468)
registered firm	-3.694***	-3.694***	-3.694***	-3.694***
	(0.0384)	(0.0384)	(0.0384)	(0.0384)
union	-0.800***	-0.800***	-0.801***	-0.801***
	(0.00689)	(0.00690)	(0.00689)	(0.00689)
FDI firm	-1.101***	-1.100***	-1.095***	-1.101***
	(0.0102)	(0.0102)	(0.0103)	(0.0102)
average earnings	-0.0596***	-0.0691***	-0.0805***	-0.0678***
	(0.00361)	(0.00362)	(0.00373)	(0.00413)
unemployment rate	-0.0159***	-0.0155***	-0.00866***	-0.0193***
	(0.00329)	(0.00315)	(0.00329)	(0.00319)
Weighted PCI	-0.00333***			
	(0.000925)			
entry barriers		-0.00270***		
		(0.000526)		
property rights			-0.00477***	
			(0.000497)	
support policy				0.00167**
				(0.000828)
Constant	4.902***	4.929***	5.045***	4.655***
	(0.0646)	(0.0597)	(0.0546)	(0.0577)
Observations	1,110,515	1,110,515	1,110,515	1,110,515
regional FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
industry FE	Yes	Yes	Yes	Yes
Pseudo R2	0.561	0.561	0.561	0.561

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Negative and positive coefficients of policy variables are highlighted in orange and green, respectively.

Source: authors' calculations.

Appendix Table 5: Likelihood of being in Informal Employment – Using PCI Sub-indices

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	PCI entry barriers		PCI property rights			PCI support policies					PAPI
underedu (<high school)	0.612***	0.613***	0.613***	0.614***	0.612***	0.611***	0.612***	0.613***	0.612***	0.612***	0.611***
	(0.00500)	(0.00501)	(0.00501)	(0.00501)	(0.00500)	(0.00500)	(0.00500)	(0.00500)	(0.00500)	(0.00501)	(0.00502)
young (15-25 years old)	0.146***	0.146***	0.146***	0.147***	0.146***	0.146***	0.146***	0.147***	0.146***	0.147***	0.145***
	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00669)	(0.00671)
female	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.113***
	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00460)
spouse	-0.180***	-0.181***	-0.180***	-0.181***	-0.180***	-0.180***	-0.180***	-0.180***	-0.180***	-0.180***	-0.181***
	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00566)
1-5 years of experience	-0.682***	-0.681***	-0.682***	-0.682***	-0.682***	-0.682***	-0.682***	-0.682***	-0.682***	-0.681***	-0.682***
	(0.00862)	(0.00862)	(0.00862)	(0.00862)	(0.00862)	(0.00861)	(0.00861)	(0.00862)	(0.00862)	(0.00862)	(0.00864)
more than 5 years of experience	-1.166***	-1.166***	-1.167***	-1.167***	-1.167***	-1.166***	-1.166***	-1.168***	-1.167***	-1.166***	-1.166***
	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00917)
rural	0.0870***	0.0867***	0.0856***	0.0840***	0.0859***	0.0872***	0.0869***	0.0842***	0.0872***	0.0883***	0.0913***
	(0.00466)	(0.00466)	(0.00464)	(0.00466)	(0.00466)	(0.00465)	(0.00465)	(0.00465)	(0.00466)	(0.00467)	(0.00468)
registered firm	-3.694***	-3.694***	-3.694***	-3.694***	-3.694***	-3.694***	-3.694***	-3.694***	-3.694***	-3.694***	-3.695***
	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0384)	(0.0385)
union	-0.800***	-0.800***	-0.799***	-0.802***	-0.800***	-0.800***	-0.800***	-0.800***	-0.800***	-0.801***	-0.801***
	(0.00690)	(0.00689)	(0.00690)	(0.00689)	(0.00690)	(0.00689)	(0.00689)	(0.00690)	(0.00689)	(0.00689)	(0.00695)
FDI firm	-1.101***	-1.100***	-1.098***	-1.095***	-1.097***	-1.101***	-1.100***	-1.096***	-1.099***	-1.101***	-1.099***
	(0.0102)	(0.0102)	(0.0103)	(0.0102)	(0.0102)	(0.0102)	(0.0102)	(0.0102)	(0.0103)	(0.0102)	(0.0103)
average earnings	-0.0688***	-0.0735***	-0.0759***	-0.0802***	-0.0748***	-0.0674***	-0.0678***	-0.0770***	-0.0731***	-0.0792***	-0.0817***
	(0.00343)	(0.00351)	(0.00360)	(0.00353)	(0.00341)	(0.00339)	(0.00339)	(0.00340)	(0.00412)	(0.00409)	(0.00362)
PCI Entry Costs	-0.0124***										
	(0.00473)										
PCI Policy Bias		-0.0209***									
		(0.00340)									
PCI Land Access			-0.0220***								
			(0.00428)								
PCI Informal Charge				-0.0441***							
				(0.00375)							
PCI Law Order					-0.0242***						
					(0.00356)						
PCI Transparency						-0.00353					
						(0.00560)					
PCI Time Costs							-0.00810**				
							(0.00375)				
PCI Proactivity								-0.0379***			
								(0.00334)			
PCI Business Support									0.0104**		
									(0.00460)		
PCI Labor Policy										0.0214***	
										(0.00423)	
PAPI Corruption Control											-0.0550***
											(0.00502)
Constant	4.830***	4.851***	4.882***	4.995***	4.895***	4.744***	4.773***	4.936***	4.691***	4.648***	5.102***
	(0.0614)	(0.0496)	(0.0536)	(0.0502)	(0.0504)	(0.0562)	(0.0506)	(0.0481)	(0.0474)	(0.0472)	(0.0567)
Observations	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,102,351
regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.561

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Negative and positive coefficients of policy variables are highlighted in orange and green, respectively.

Source: authors' calculations.

Appendix Table 6: Likelihood of Being in Informal Employment – Model with Interaction Terms Using PCI Sub-indices

	Entry barriers		Property rights			Support policies					PAPI
Policy variables	(1) PCI Entry Costs	(2) PCI Policy Bias	(3) PCI Land Access	(4) PCI Informal Charge	(5) PCI Law Order	(6) PCI Transparency	(7) PCI Time Costs	(8) PCI Proactivity	(9) PCI Business Support	(10) PCI Labor Policy	(11) PAPI Corruption Control
underedu (<high school)	-0.267***	0.637***	0.969***	0.581***	0.694***	0.512***	0.286***	0.906***	1.121***	0.985***	1.066***
	(0.0575)	(0.0270)	(0.0374)	(0.0309)	(0.0330)	(0.0695)	(0.0419)	(0.0285)	(0.0359)	(0.0330)	(0.0429)
young (15-25 years old)	0.0889	0.0374	-0.0349	0.105***	0.0289	-0.244***	0.191***	0.0986***	0.0434	0.443***	-0.0714
	(0.0718)	(0.0336)	(0.0453)	(0.0387)	(0.0408)	(0.0864)	(0.0522)	(0.0349)	(0.0441)	(0.0401)	(0.0524)
female	-0.113***	-0.113***	-0.113***	-0.114***	-0.114***	-0.114***	-0.114***	-0.114***	-0.113***	-0.113***	-0.113***
	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00458)	(0.00460)
spouse	-0.180***	-0.181***	-0.180***	-0.181***	-0.180***	-0.180***	-0.181***	-0.180***	-0.179***	-0.181***	-0.181***
	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00564)	(0.00563)	(0.00564)	(0.00566)
1-5 years of experience	-0.683***	-0.682***	-0.683***	-0.682***	-0.682***	-0.682***	-0.681***	-0.683***	-0.685***	-0.683***	-0.683***
	(0.00861)	(0.00862)	(0.00862)	(0.00862)	(0.00862)	(0.00862)	(0.00861)	(0.00862)	(0.00861)	(0.00862)	(0.00864)
more than 5 years of experience	-1.168***	-1.167***	-1.169***	-1.168***	-1.168***	-1.167***	-1.165***	-1.169***	-1.170***	-1.169***	-1.167***
	(0.00914)	(0.00914)	(0.00915)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00914)	(0.00915)	(0.00916)
rural	0.216***	0.354***	0.314***	0.356***	0.252***	-0.452***	0.475***	0.204***	-0.0356	-0.309***	0.332***
	(0.0569)	(0.0265)	(0.0365)	(0.0305)	(0.0330)	(0.0682)	(0.0410)	(0.0282)	(0.0362)	(0.0321)	(0.0425)
registered firm	-2.105***	-4.202***	-4.294***	-4.430***	-4.377***	-3.471***	-4.251***	-4.501***	-4.207***	-3.867***	-4.615***
	(0.535)	(0.219)	(0.350)	(0.287)	(0.284)	(0.684)	(0.392)	(0.255)	(0.279)	(0.285)	(0.345)
labor union	-0.824***	-0.798***	-0.803***	-0.799***	-0.800***	-0.801***	-0.795***	-0.809***	-0.829***	-0.811***	-0.807***
	(0.00701)	(0.00691)	(0.00694)	(0.00692)	(0.00691)	(0.00689)	(0.00690)	(0.00695)	(0.00699)	(0.00691)	(0.00698)
FDI firm	0.672***	-0.921***	-0.927***	-0.942***	-0.951***	-0.452***	-0.298***	-1.393***	-2.450***	-2.790***	-1.203***
	(0.127)	(0.0647)	(0.0837)	(0.0717)	(0.0754)	(0.143)	(0.0990)	(0.0643)	(0.0795)	(0.0810)	(0.0771)
average earnings	-0.0688***	-0.0709***	-0.0735***	-0.0806***	-0.0733***	-0.0675***	-0.0689***	-0.0757***	-0.0747***	-0.0762***	-0.0797***
	(0.00342)	(0.00353)	(0.00360)	(0.00353)	(0.00342)	(0.00338)	(0.00340)	(0.00340)	(0.00413)	(0.00409)	(0.00361)
policy_variable	0.159**	-0.0961**	-0.0878	-0.160***	-0.129***	-0.0276	-0.0767	-0.167***	-0.0580	-0.0144	-0.165***
	(0.0680)	(0.0428)	(0.0589)	(0.0522)	(0.0499)	(0.108)	(0.0586)	(0.0481)	(0.0433)	(0.0425)	(0.0570)
underedu* policy_variable	0.111***	-0.00506	-0.0593***	0.00597	-0.0146**	0.0161	0.0487***	-0.0572***	-0.0808***	-0.0570***	-0.0761***
	(0.00717)	(0.00524)	(0.00613)	(0.00558)	(0.00571)	(0.0111)	(0.00618)	(0.00543)	(0.00572)	(0.00507)	(0.00705)
young*policy_variable	0.00729	0.0217***	0.0301***	0.00761	0.0206***	0.0623***	-0.00675	0.00927	0.0166**	-0.0455***	0.0360***
	(0.00895)	(0.00650)	(0.00741)	(0.00696)	(0.00707)	(0.0138)	(0.00766)	(0.00664)	(0.00702)	(0.00615)	(0.00862)
rural*policy_variable	-0.0162**	-0.0536***	-0.0381***	-0.0504***	-0.0293***	0.0859***	-0.0579***	-0.0233***	0.0196***	0.0612***	-0.0401***
	(0.00708)	(0.00513)	(0.00595)	(0.00549)	(0.00569)	(0.0109)	(0.00605)	(0.00539)	(0.00584)	(0.00501)	(0.00695)
registered_firm*policy_variable	-0.202***	0.105**	0.104*	0.140***	0.125**	-0.0355	0.0845	0.162***	0.0803*	0.0260	0.158***
	(0.0681)	(0.0428)	(0.0589)	(0.0523)	(0.0499)	(0.109)	(0.0588)	(0.0483)	(0.0432)	(0.0425)	(0.0571)
FDI*policy_variable	-0.224***	-0.0362***	-0.0279**	-0.0283**	-0.0260**	-0.103***	-0.119***	0.0570***	0.219***	0.256***	0.0179
	(0.0161)	(0.0129)	(0.0137)	(0.0129)	(0.0131)	(0.0228)	(0.0147)	(0.0120)	(0.0127)	(0.0120)	(0.0127)
Constant	3.477***	5.204***	5.247***	5.607***	5.462***	4.895***	5.224***	5.568***	5.134***	4.864***	5.734***
	(0.536)	(0.220)	(0.351)	(0.287)	(0.285)	(0.682)	(0.392)	(0.255)	(0.280)	(0.285)	(0.345)
Observations	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,110,515	1,102,351
marginal effect	No	No	No	No	No	No	No	No	No	No	No
regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R2	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.561	0.562	0.561

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Negative and positive coefficients of policy variables are highlighted in orange and green, respectively.

Source: authors' calculations.

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