Informal employment in a growing and globalizing low-income country

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Abstract:

We document several facts about workforce transitions from the informal to the formal sector in Vietnam, a fast growing, industrializing, and low-income country. First, younger workers, particularly those who have migrated, are more likely to work in the formal sector and stay there permanently. Second, economy-wide, the decline in the aggregate share of informal employment occurs through changes between and within birth cohorts. Third, younger, better educated, male, and urban workers are more likely to switch to the formal sector than other workers initially in the informal sector. A poorly educated, older, female, rural worker faces little prospect of formalization. Fourth, formalization is associated with occupational upgrading.

Session Title: International Trade and Development

Session chair: Nina Pavcnik

Discussants: Treb Allen, Ann Harrison, Samuel Bazzi

Informal employment in a growing and globalizing low-income country

Brian McCaig and Nina Pavcnik*

Reallocation of resources toward more productive uses is an important contributor to economic growth. A distinct feature of the distribution of firms in low-income countries is the prevalence of small, informal, household-run firms, which employ a large share of the workforce and provide livelihood for the poor, but lag in productivity far behind formal firms (Banerjee and Duflo 2007; Gollin 2008; La Porta and Shleifer 2008, 2014). Most of these firms have little potential to transition to the formal sector or to improve their performance and create jobs after they formalize (de Mel, McKenzie and Woodruff 2010, 2013; La Porta and Shleifer 2008, 2014). Although these firms themselves are unlikely to formalize, the individuals working in them might transition to the formal sector as low-income economies develop (Lucas 1978; Rauch 1991; Gollin 2008). However, evidence on economy-wide transitions of individuals in and out of informality in a low-income setting is scarce, with most studies confined to urban labor markets in middle-income countries (Maloney 2004).

We document several facts about individual transitions from the informal to the formal sector in Vietnam, a fast growing, industrializing, and low-income economy. First, younger workers, particularly those who have migrated, are more likely to work in the formal sector and stay there permanently. Second, economy-wide, the decline in the aggregate share of informal employment occurs through changes between and within birth cohorts. Third, younger, better educated, male, and urban workers are more likely to switch to the formal sector than other

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workers initially in the informal sector. A poorly educated, older, female, rural worker faces little prospect of formalization. Fourth, formalization is associated with occupational upgrading.

We focus on Vietnam over a decade of rapid growth from 1999 to 2009, when GDP per capita increased by 78 percent (Bolt and van Zanden 2013), the labor force grew by 35 percent, and the percentage of the workforce employed in the informal sector dropped from 86 to 79. This drop reflected a relative contraction of employment in agriculture and expansion of manufacturing and services, as well as a drastic drop in the share of informal jobs from 58 to 43 percent within manufacturing. The growth process was accompanied by an expansion of exports and inflows of foreign direct investment as Vietnam integrated into the global economy through the passing of the U.S.-Vietnam Bilateral Trade Agreement and entry into the World Trade Organization (McCaig 2011; McCaig and Pavcnik 2013). Such increased exposure to global markets affects the transition out of informality in a low-income country setting (La Porta and Shleifer 2014; McCaig and Pavcnik 2014).

We analyze data from the 1999 and 2009 Vietnam Population Censuses and the 2002, 2004, 2006, and 2008 Vietnam Household Living Standards Surveys (VHLSSs) and focus on workers ages 20-64. The data is nationally representative, covers all industries (including agriculture), and workers in formal and informal firms. The VHLSSs contain a rotating panel subcomponent that tracks individuals over a period of up to 4 years. We therefore analyze transitions to the formal sector in a nationally representative setting and over a longer time frame than is usually feasible in informality studies (de Mel, McKenzie and Woodruff 2010). Supplementary online material provides further information on data.

An individual works in the informal sector if she is self-employed or working as an employee in the household business sector as opposed to the registered, enterprise sector. In

Vietnam all state, foreign, and collective firms are legally required to register as an enterprise, whereas domestic private firms may legally operate as either an enterprise or a household business. Our definition of informality is thus based on the registration status rather than employment conditions within a firm.[1] Firms in the enterprise sector face different regulations such as formal accounting requirements and compulsory social insurance contributions (see McCaig and Pavcnik 2014). The differences in regulations between the household business and enterprise sectors closely correspond to the notion of the informal and formal sectors commonly used in the literature (see La Porta and Shleifer 2008, 2014).

I. Formalization across and within birth cohorts

Workers of different ages differ in mobility costs (Dix-Carneiro 2014), affecting their ability to transition to the formal sector as the economy grows. Age cohorts can shape the decline in aggregate informality through two channels. If the employment share of informal workers differs across cohorts, aggregate informality declines if cohorts entering the labor market have lower informality than existing and exiting cohorts. Additionally, workers within a given cohort may transition to the formal sector. We examine the role of birth cohorts in the aggregate decline in informality in Table 1A. Panel A of Table 1A reports the share of informal employment by 5-year birth cohorts from the 1999 and 2009 censuses. Cohorts are based on age in 1999.

Young workers make a key contribution toward the aggregate decline in the share of the workforce in the informal sector through the between and within cohort changes. Columns 1 and 2 indicate that the entering cohorts have substantially lower shares of informal employment than older and exiting cohorts. The share of employment in the informal sector among the two

[1] Informal workers are less likely to work for wages. Wage earning informal workers earn lower wages and benefits than observationally equivalent workers in the formal sector. In addition, households headed by an informal worker tend to have lower per capita income than observationally equivalent households headed by a formal worker (McCaig and Pavcnik (2014).

entering cohorts (ages 10-14, 15-19 in 1999) is about 70 percent, significantly lower than among the two exiting cohorts (ages 55-59, 60-64 in 1999) of above 90 percent. This highlights the importance of young cohorts for declines in informality through workforce shifts across cohorts. In addition, younger cohorts reduce informality more than other cohorts through within-cohort declines in the share of employment in the informal sector. Column 3 of Table 1A shows that within cohort drops in informality are largest among the youngest cohorts and decline with age. Cohorts age 20-24 and 25-29 experience an 11.2 and 4.7 percentage point drop in the share of informal employment, respectively, while workers in cohorts over age 40 either observe no change or gain employment in informal sector.

Over the decade, manufacturing employment expanded from 8.9 to 13.7 percent of the workforce, accompanied by a 14.5 percentage point drop in informality in that sector. As noted in Table 1A, young cohorts contribute even more significantly toward reductions in informality within manufacturing than they do economy-wide. In manufacturing, the gap in the informal employment share between entering young cohorts and existing cohorts is more pronounced and younger cohorts experience a greater decline in informality relative to older cohorts over time. Analysis by gender yields similar findings, although the gaps in informality across cohorts are larger for women and within cohort changes are larger for men (see supplemental material).

Overall, the between and within cohort changes in informality contribute importantly toward the economy-wide labor market formalization. Panel B of Table 1A suggests that workforce shifts across cohorts account for 69 percent of the decline in aggregate informality, while within-cohort changes account for 31 percent. The between cohort changes dominate in manufacturing, accounting for 90 percent of the decline in informality (and among women, see supplemental material). These differences in the relative role of between and within cohort shifts

highlight the importance of analysis based on all industries to understand the trends in informality in a low-income industrializing country. In contrast to the case studies in La Porta and Shleifer (2014), where formalization occurs across generations of workers, within-cohort changes reduce informality in Vietnam. Future work could examine the sources of these differences across countries at different levels of development.

When formal manufacturing jobs are spatially concentrated, part of the transitions to the formal sector in a low-income country might occur through migration (Harris and Todaro 1970). In Vietnam in 1999, 5 provinces accounted for almost 50% of manufacturing employment and 85% of employment in foreign direct invested firms. To delve further into the role of migration, we define migration as moving across provinces within the past five years, using the censuses. Table 1B reports the share of workers that migrate and the share of informal employment among these workers by birth cohort. Overall, migration is rare as only 4.6% of workers in 2009 migrate, but 66% of them reside in the five key provinces. Migration significantly increases over the decade of growth, particularly for the youngest cohort, from 5.6% to 11.6%. However, migration (and increase in migration) becomes less prevalent with age. Importantly, as comparison of Tables 1A and 1B for each cohort suggests, migrants are much less likely to work informally. For example, in 2009, 72% of the workers in the entering cohort are employed in the informal sector, as compared to only 32% of migrants in this cohort. Migration among the young and lower informality among the migrants are even more prevalent for manufacturing workers and women (see supplemental material). This analysis suggests that younger workers might in part formalize more quickly because they are more likely to migrate.

II. Switchers, sorting and formalization

The analysis above highlights differences across and within birth cohorts in transitions to formality in a low-income country over a decade of fast growth. Using the VHLSS panels, which track individuals over a period of 4 years, we illustrate how individuals actually transition to the formal sector within birth cohorts. In particular, we examine how transient or permanent switching to the formal sector is, over a longer time period than in existing studies of middle-income countries (Maloney 2004), and use panel data to examine whether and how workers sort between the formal and informal sectors in a low-income country.

We begin by documenting individual transition patterns for various age cohorts. Most workers are always in either the informal or formal sector, although workers in younger cohorts are more likely to always be in the formal sector and more likely to switch sectors. Table 2 reports the share of individuals in each age cohort that always hold an informal job, always hold a formal job, or switch between the two sectors using the 3-survey panels.[2] The share of individuals that always work in the informal sector is lowest for the 20-29 cohort, while these workers are more likely to always hold a formal job and to switch between the two sectors. Switchers in younger cohorts are more likely to hold a formal job at the end of the period than switchers from older cohorts. The youngest cohort also experiences the greatest increase in the share having a formal sector job at the end of the panel. In contrast, switching workers in older cohorts tend to end up working in an informal job at the end of the panel. Younger workers that switch also exhibit more permanent transitions to the formal sector: they are more likely to stay in the formal sector in the two to four year period following the switch. The evidence from Vietnam suggests less switching than in urban middle-income settings (such as Maloney 2004),

[2] This data excludes migrants, so Table 2 likely underestimates the transitions to the formal sector among the young.

with differences potentially reflecting different levels of development and/or different composition of industries.[3]

Existing literature (La Porta and Shleifer 2008, 2014; Maloney 2004) emphasizes sorting of individuals into the formal and informal sector, consistent with the theory in Rauch (1991). We also document evidence consistent with sorting based on education using the usual cross-sectional analysis from the literature.[4] However, we provide further evidence on sorting in transitions out of informality with panel-level data. If workers sort, the characteristics of workers in the formal sector are expected to be closer to the characteristics of workers that switch from informal to formal sector than to those of workers that remain in the informal sector. We examine this by limiting the VHLSS panel sample to workers that are initially employed in the informal sector and by regressing the indicator for whether an individual works in the formal sector at the end period of the panel on age cohort indicators (25-29, 30-39, 40-49, 50-64 (20-24 is the excluded category)), a female indicator, education indicators (completed primary, completed lower secondary, completed upper secondary, with did not complete primary as the excluded category), an indicator for whether the individual lives in an urban area, and occupation, province, and year fixed effects.

The results are reported in column 1 of Table 3. The R^2 of the regression is less than .05, indicating a large degree of unexplained individual heterogeneity in switching from the informal to the formal sector. Nonetheless, the regression results support sorting into the formal sector based on observable worker characteristics as the workers that switch tend to be more educated, younger, male, and urban. This implies that relative to workers that remain in the informal

[3] For example, urban areas in middle-income countries have a higher share of manufacturing than low-income countries and switching is more prevalent in manufacturing than economy-wide (see Table 2).
[4] Workers in the formal sector tend to be better educated, younger, male, and urban than workers in the informal sector (see supplementary online material).

sector, workers that switch out of informality tend to have more similar observable characteristics to workers already working in the formal sector.

We further examine sorting in switching of individuals from the formal to the informal sector. We confine the sample to all workers in the panel that initially work in the formal sector and use an indicator for whether a worker works in the informal sector at the end of the panel as a dependent variable. The results reported in column 2 of Table 3 suggest that switching to the informal sector is more predictable, with observable worker characteristics accounting for 22% of the variation in switching. The evidence supports sorting by education, age, and residence as less educated, older workers, and rural workers are more likely to switch to the informal sector. Relative to workers that remain in the formal sector, workers that switch to the informal sector tend to have more similar education, age, and residence to workers already working in the informal sector. However, women are less likely to switch to the informal sector, even though women are more likely to work in the informal sector.[5]

One implication of these findings is that workers that are most likely to successfully transition to the formal sector in a fast growing low-income economy are informal workers that possess the characteristics that most closely resemble those of workers already in the formal sector. Poorly educated elderly rural female workers unlikely make such transitions.

V. Formalization and occupational upgrading

The literature suggests that few informal firms transition to the formal sector (de Mel, McKenzie and Woodruff 2010, 2013; La Porta and Shleifer 2008, 2014), consistent with evidence from Vietnam during this period (McCaig and Pavcnik 2014). As such, most worker transitions from the informal to the formal sector are associated with workers changing jobs. An

[5] This might be related to the type of jobs women and men hold in the formal sector. Women are more likely employed in FDI manufacturing than men, thus less likely to voluntarily leave the formal sector to the extent that FDI jobs are considered more desirable than other formal jobs.

interesting question then is whether workers engage in different job tasks as they switch to the formal sector.

We group workers from 2 three-round panels of the VHLSSs into workers that are always in the informal sector, always in the formal sector, and switchers. For each of the groups, we report the share of employment in each occupation category at the beginning of the period and the change over the period in Table 4. The occupations are in ascending order of mean monthly compensation. The table highlights large differences in the composition of occupations across the three groups of workers, with the concentration of employment in elementary occupations falling with formalization. Elementary occupations account for 85% of employment among informal workers, 67% among switchers, and 11% among formal workers. Switchers and formal workers have similar shares of employment in skilled occupations, but formal workers have notably higher shares of employment among occupations such as assemblers and machinists and professionals.

Importantly, the table suggests that switchers upgrade occupations. They tend to switch out of elementary toward skilled and professional occupations. The share of elementary occupations declines in all three groups, but this decline is larger among the switchers than other workers. Switchers increase employment in skilled occupations (e.g. skilled handicraftsman and manual workers, skilled service workers), assemblers and machinists, and professional occupations, all occupations associated with higher education and pay than elementary occupations. This analysis follows the same individuals over time, so occupation upgrading does not reflect changes in underlying workforce composition.

We find further support for occupation upgrading for workers that migrate, also presented in Table 4. Recall from section one that migration is associated with a higher degree of

formalization. The occupational structure after the move is shifted away from elementary occupations toward skilled occupations (especially skilled handicrafts and manual occupations), assemblers and machinists, staff, and professionals relative to prior to the move.

VI. Concluding Remarks

We document several facts about workforce transitions from the informal to the formal sector in a fast growing, industrializing, and low-income country. First, younger cohorts, particularly individuals who have moved, are more likely to work in the formal sector and stay there more permanently. Second, economy-wide, the decline in the aggregate share of informal employment comes from changes both between and within cohorts. Third, younger, better educated, male, and urban workers are more likely to switch to the formal sector than other workers initially in the informal sector. A poorly educated, older, female rural worker faces little prospect of formalization. Fourth, formalization is associated with occupational upgrading.

The analysis also suggests that the findings for Vietnam do not necessarily mimic the findings from existing case studies in the literature (La Porta and Schleifer 2008, 2014; Maloney 2004). Future research could systematically examine the sources of these differences in transitions to formality for a range of countries at different levels of development. Our study highlights how one can rely on the analysis of publicly available census data and panel-level data to delve into the details of worker transition to the formal sector in low-income countries over a longer time period.

References

Banerjee, Abhijit V., and Esther Duflo. 2007. "The Economic Lives of the Poor." *Journal of Economic Perspectives* 21(1): 141-167.

Bolt, Jutta and Jan Luiten van Zanden. 2013. "The First Update of the Maddison Project: Re-estimating Growth Before 1820." Maddison Project Working Paper 4.

de Mel, Suresh, David McKenzie, and Christopher Woodruff. 2010. “Who are the Microenterprise Owners? Evidence from Sri Lanka on Tokman versus De Soto.” In *International Differences in Entrepreneurship*, edited by Josh Lerner and Antoinette Schoar, 63-87. Chicago: University of Chicago Press.

de Mel, Suresh, David McKenzie, and Christopher Woodruff. 2013. "The Demand for, and Consequences of, Formalization among Informal Firms in Sri Lanka." *American Economic Journal: Applied Economics* 5(2): 122-50.

Dix-Carneiro, Rafael. 2014. “Trade Liberalization and Labor Market Dynamics.” *Econometrica* 82(3): 825-885.

Gollin, Douglas. 2008. “Nobody’s Business But My Own: Self-Employment and Small Enterprise in Economic Development.” *Journal of Monetary Economics* 55(2): 219-233.

Harris, John R., and Michael P. Todaro. 1970. “Migration, Unemployment, and Development: A Two Sector Analysis.” *American Economic Review* 60(1): 126-142.

La Porta, Rafael, and Andrei Shleifer. 2008. “The Unofficial Economy and Economic Development.” Brookings Paper on Economic Activity, Economic Studies Program, The Brooking Institution, 39(2): 275-363.

La Porta, Rafael, and Andrei Shleifer. 2014. “Informality and Development.” *Journal of Economic Perspectives* 28(3): 109-126.

Lucas, Robert E. Jr. 1978. “On the Size Distribution of Business Firms.” *The Bell Journal of Economics* 9(2): 508-523.

Maloney, William. 2004. “Informality Revisited.” *World Development* 32(7): 1159-1178.

McCaig, Brian. 2011. “Exporting Out of Poverty: Provincial Poverty in Vietnam and U.S. Market Access.” *Journal of International Economics* 85(1): 102-113.

McCaig, Brian, and Nina Pavcnik. 2013. “Moving Out of Agriculture: Structural Change in Vietnam.” NBER Working Paper No. 19616.

McCaig, Brian, and Nina Pavcnik. 2014. “Export Markets and Labor Allocation in a Low-Income Country.” NBER Working Paper No. 20455.

Minnesota Population Center. 2014. *Integrated Public Use Microdata Series, International: Version 6.3* [Machine-readable database]. Minneapolis: University of Minnesota.

Rauch, James R. 1991. “Modelling the Informal Sector Formally.” *Journal of Development Economics* 35(1): 33-47.

Table 1A: Informality across and within age cohorts

	Economy-wide			Manufacturing		
Panel A: Share of informal workers in age cohorts						
Cohort age in 1999	1999	2009	Change	1999	2009	Change
Age 10 to 14		0.716			0.287	
Age 15 to 19		0.687			0.325	
Age 20 to 24	0.873	0.761	-0.112	0.569	0.440	-0.129
Age 25 to 29	0.864	0.816	-0.047	0.585	0.527	-0.059
Age 30 to 34	0.868	0.843	-0.025	0.590	0.586	-0.004
Age 35 to 39	0.850	0.835	-0.014	0.561	0.610	0.049
Age 40 to 44	0.838	0.849	0.011	0.545	0.669	0.123
Age 45 to 49	0.844	0.906	0.061	0.587	0.762	0.175
Age 50 to 54	0.872	0.956	0.083	0.605	0.858	0.253
Age 55 to 59	0.924			0.723		
Age 60 to 64	0.967			0.866		
Total	0.864	0.790	-0.074	0.580	0.435	-0.145

Panel B: Decomposition of aggregate informality change 2009-1999

	Within cohorts	Between cohorts	Total change	Within cohorts	Between cohorts	Total change
Decomposition	-0.023	-0.051	-0.074	-0.014	-0.131	-0.145

Table 1B: Informality across and within birth age cohorts among recent migrants

	Economy-wide				Manufacturing			
	Share of workers within cohort that migrated		Share of migrants in the informal sector		Share of workers within cohort that migrated		Share of migrants in the informal sector	
Cohort age in 1999	1999	2009	1999	2009	1999	2009	1999	2009
Age 10 to 14		0.116		0.317		0.288		0.106
Age 15 to 19		0.084		0.356		0.200		0.130
Age 20 to 24	0.056	0.044	0.604	0.473	0.165	0.118	0.324	0.192
Age 25 to 29	0.043	0.028	0.662	0.562	0.106	0.078	0.394	0.223
Age 30 to 34	0.028	0.019	0.750	0.630	0.063	0.056	0.472	0.250
Age 35 to 39	0.022	0.015	0.781	0.670	0.044	0.042	0.604	0.290
Age 40 to 44	0.020	0.012	0.775	0.720	0.035	0.029	0.543	0.348
Age 45 to 49	0.017	0.010	0.798	0.787	0.033	0.027	0.617	0.412
Age 50 to 54	0.015	0.007	0.834	0.819	0.020	0.017	0.516	0.435
Age 55 to 59	0.013		0.841		0.029		0.651	
Age 60 to 64	0.008		0.937		0.025		0.883	
Total	0.031	0.046	0.695	0.418	0.091	0.154	0.397	0.143

Table 2: Aggregate switching between informal and formal sectors

	Share of workers			Share of switchers		
Age of workers at start of panel	Always informal	Always formal	Switchers	Informal at start of period	Informal at end of period	Informal at start of period and permanently move to formal
20 to 29	0.698	0.151	0.151	0.652	0.443	0.217
30 to 39	0.795	0.111	0.094	0.572	0.533	0.174
40 to 49	0.785	0.130	0.085	0.528	0.597	0.136
50 to 64	0.868	0.057	0.075	0.444	0.640	0.140
All	0.784	0.116	0.099	0.569	0.536	0.173
Manufacturing	0.606	0.182	0.211	0.570	0.467	0.187

Notes: The sample of manufacturing workers is defined based on working in manufacturing at either the start or the end of the period. A worker is defined as permanently moving to the formal sector if they were initially working in the informal sector and subsequently working in the formal sector in the surveys 2 and 4 years later.

Table 3: Switching sectors

Sample:	Initially informal	Initially formal
Dependent variable:	Switch to formal	Switch to informal
Age 25-29	-0.036***	-0.012
	(0.003)	(0.010)
Age 30-39	-0.060***	-0.004
	(0.002)	(0.008)
Age 40-49	-0.066***	-0.009
	(0.002)	(0.009)
Age 50-64	-0.072***	0.065***
	(0.002)	(0.011)
Female	-0.023***	-0.033***
	(0.001)	(0.005)
Primary education	0.008***	-0.124***
	(0.002)	(0.014)
Lower secondary	0.019***	-0.220***
	(0.002)	(0.014)
Upper Secondary	0.071***	-0.324***
	(0.002)	(0.014)
Urban	0.011***	-0.073***
	(0.002)	(0.006)
Observations	99,492	19,098
R-squared	0.047	0.219

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The sample is all 2-survey panel individuals that worked in both surveys and were 20-64 years old at the start of the panel. Column 1 (2) includes individuals that were initially in informal sector (formal sector). The regressions also include occupation, province, and survey-year fixed effects.

Table 4: Occupational Composition and Changes by Informality and Migration Status

	Always informal		Switchers		Always formal		Movers	
	start	change	start	change	start	change	start	change
Elementary occupations	0.845	-0.040	0.668	-0.110	0.112	-0.021	0.634	-0.256
Skilled workers	0.138	0.038	0.191	0.044	0.168	0.007	0.249	0.182
Technicians and associate professionals	0.002	0.000	0.040	0.009	0.251	-0.020	0.029	0.009
Clerks	0.000	0.000	0.021	0.006	0.105	-0.022	0.018	0.005
Armed forces	0.001	-0.001	0.005	-0.003	0.027	-0.005	0.006	0.007
Plant and machine operators and assemblers	0.013	0.002	0.033	0.015	0.069	-0.003	0.037	0.028
Legislators, senior officials and managers; professionals	0.001	0.000	0.043	0.039	0.268	0.064	0.028	0.026

Notes: For each group of workers, the table reports the share of employment in a given occupation at the start of the sample and subsequent change in this share. Skilled workers includes service workers and shop and market sales workers; skilled agricultural and fishery workers; and craft and related trades workers. The information on occupations of workers that left the household is only available in the 2006 and 2008 VHLSSs. Mean monthly compensation is from the 2002 VHLSS.

Supplementary material

for

Informal employment in a growing and globalizing low-income country

By Brian McCaig and Nina Pavcnik

(for online publication only)

This document contains further details about the analysis discussed in the paper. The first part provides additional data description. The second part briefly summarizes additional tables and results.

Data Description

Census data

We use data from the 1999 and 2009 Vietnamese population censuses made available through IPUMS-International (Minnesota Population Center 2014). These datasets are a 3 and 15 percent sample drawn from the full population in 1999 and 2009 respectively. The censuses collected information on demographics, education, current province of residence, province of residence five years ago, and employment. The reference period for employment is the past 12 months for the 1999 census and the previous week for the 2009 census. The employment modules collected information on the industry of affiliation (based on an adaptation of 3-digit ISIC), occupation (based on ISCO-88), and ownership category (self-employed, working for other households, state-owned economic sector, collective economic sector, private economic sector, foreign-invested sector). Our analysis of working in the informal sector using the census data focuses on being self-employed or working for a household business or farm as opposed to working in the registered, enterprise sector.[1]

We focus on workers ages 20-64 at the time of the census. Table A1 displays summary statistics for the two censuses pooled together. All estimates are weighted. We present three samples: all workers, informal workers, and formal workers.

[1] The 1999 census estimates suggest a large share of agricultural workers in collectives. This is inconsistent with estimates from other datasets from a similar time period (e.g., 2002 VHLSS) as well as the 2009 census. Thus, to be consistent across data source we classify all such workers as informal.

Household survey data

We use four nationally representative household surveys, the 2002, 2004, 2006, and 2008 Vietnam Household Living Standards surveys (VHLSSs), which were conducted by the General Statistics Office (GSO) of Vietnam. Our datasets include approximately 74,000 households in 2002 and 46,000 households in 2004, 2006, and 2008.[2] A valuable feature of the surveys is the inclusion of a rotating panel such that we have three two-survey panels that each feature around 21,000 to 22,000 households and two three-survey panels that each feature around 10,000 households.

The surveys collected information on demographics, education, and employment. The employment modules focus on jobs worked during the past 12 months and collect information on the industry of affiliation (based on an adaptation of 2-digit ISIC), occupation (based on ISCO-88), ownership category (self-employed, working for other households, state-owned economic sector, collective economic sector, private economic sector, foreign-invested sector), hours worked during the past 12 months, number of years doing the job (not available in the 2002 VHLSS), and wages and other benefits. We focus our analysis on the most time consuming job. Our analysis of working in the informal sector focuses on being self-employed or working for a household business or farm as opposed to working in the registered, enterprise sector.[3]

We focus on workers ages 20-64 including individuals that may be working part time. Table A2 displays summary statistics for the four surveys pooled together. We present three samples: all workers, informal workers, and formal workers.

[2] For additional information on the surveys please refer to Phung Duc Tung and Nguyen Phong (n.d.) and General Statistics Office (2008).

[3] Self-employment includes self-employment in a private enterprise. The 2002 VHLSS does not separately identify self-employment in a private enterprise from self-employment in a household business, although the latter surveys do. Thus, to be consistent across surveys we group all self-employed individuals in the informal sector. Self-employment in the private sector is only 0.7 percent of total self-employment in 2004 (McCaig and Pavcnik 2014).

Supplementary Results

Supplementary Material for Introduction

Table A3 summarizes aggregate statistics about Vietnam's labor force in 1999 and 2009. The table summarizes the total labor force by 4 broad sectors of the economy and the contribution of each sector to total employment. In addition, the table reports the share of informal employment and the share of employment in FDI firms. Over the decade, Vietnam experienced a 37% increase in the workforce. At the same time, the percentage of the Vietnamese workforce employed in the informal sector dropped from 86 to 79. This drop reflects a relative contraction of employment in agriculture and expansion of manufacturing and services, as well as a drastic drop in the share of informal jobs from 58 to 43 percent within manufacturing. In contrast, the share of informal employment within agriculture and services remains relatively stable. The table also illustrates the large expansion of FDI in manufacturing. While the economy-wide percentage of employment in FDI firms increases from 0.5 to 3.4, it remains low. All sectors experience an increase in FDI presence. However, FDI presence increases most in manufacturing, where FDI firms jump from 5 to 22% of employment over the decade.

The bottom panel of Table A3 provides these same statistics for 5 provinces in Vietnam, which are the most integrated internationally as a result of port infrastructre and pre-existing manufacturing industry structure. These include Ho Chi Minh City, Ha Noi, Hai Phong, Dong Nai, and Binh Duong. The table highlights the higher employment share of manufacturing in these provinces, lower informality rate, and higher incidence of FDI employment. For example, these 5 key provinces account for almost 50% of Vietnam's manufacturing jobs and 85% of FDI jobs in 1999.

Supplementary material for section 2

Table A4 provides supplementary material on the role of birth cohorts in the aggregate decline in informality shown in Table 1A in the main text. Table A4 examines the role of birth cohorts in the decline in aggregate share of informal employment by gender. The analysis based on gender confirms the trends highlighted for the overall sample and manufacturing in the main text. However, there are some interesting differences across gender. In particular, the differences in informality across cohorts are larger for women than for men. However, the within cohort declines in informality are larger for men than for women. Panel B of the table, which reports the decomposition of the aggregate decline in informality into the between and within cohort change confirms the gender differences in the relative contribution of the two channels. Within cohort changes contributed 53% toward the economy-wide decline in the share of informal employment for men. In contrast, within cohort changes contribute only 6% toward the economy-wide decline in the share of informal employment for women, with workforce shifts across cohorts accounting for the vast majority of the informality decline. As is the case with the pooled sample, workforce shifts between cohorts play a relatively more important role in aggregate declines in informal employment in manufacturing and this is especially the case for women. This likely reflects the large entering young cohort of women, with very low rates of informality.

Table A5 shows migration analysis from Table 1B in the main text by gender. This analysis confirms the trends highlighted for the overall sample and manufacturing sample in the text. However, the table also suggests that migration plays a more important role among younger women than men, especially among women employed in manufacturing.

Supplementary material for section 3

This section briefly summarizes the evidence consistent with sorting of individuals into the formal and informal sectors. It examines worker characteristics that are associated with a greater probability of working in the informal sector using cross-sectional data, a common approach in the literature. In particular, we regress the indicator for whether an individual works in the informal sector on age cohort indicators (25-29, 30-39, 40-49, 50-64 (20-24 is the excluded category)), a female indicator, education indicators (complete primary, complete lower secondary, complete upper secondary (no completed schooling is the excluded category)), an indicator for whether the individual lives in urban area, and occupation, province, and year fixed effects. Table A6 reports the results in column 1. We find evidence of sorting of workers into the formal and informal sector based on education. Workers in the formal sector tend to be better educated than otherwise observationally equivalent workers in the informal sector. They are also more likely to be younger, male, and to reside in urban areas than workers in the informal sector. The analysis that focuses on manufacturing (column 2) and the five key provinces (column 3) yields similar conclusions. The one exception is the role of gender. Within manufacturing, women are less likely to work in the informal sector relative to observationally equivalent men. In the five key provinces, women are also less likely to work in the informal sector than men, likely due to high concentration of manufacturing in these areas.

Supplementary material for section 4

Table A7 provides supplementary information about the occupation groups discussed in section 4 of the main text. For each occupation, the table reports the economy-wide average monthly compensation, average education of workers, and the share of economy-wide labor force employed in 2002. The occupations are listed in ascending order of monthly pay. The median worker in Vietnam is employed in an elementary occupation. In addition, the

occupations that workers switch to in the formal sector, such as assemblers and machine operators and skilled workers, tend to be some of the highest paid occupation groups. The analysis suggests that relative demand for labor in Vietnam is moving out of low-paid toward higher-paid occupations and that the formal sector and FDI sector in particular provide these new occupation opportunities, which would not be available in the informal sector.

References

General Statistics Office. 2008. "Operational Handbook: Vietnam Household Living Standard Survey 2008," Ha Noi.

Phung Duc Tung, and Nguyen Phong. (n.d.) "Vietnam Household Living Standards Survey (VHLSS), 2002 and 2004: Basic Information."

Table A1: Decriptive statistics from census data

	All workers	Informal sector workers	Formal sector workers
Age group			
Age 20-24	0.166	0.163	0.176
Age 25-29	0.179	0.168	0.225
Age 30-39	0.304	0.299	0.328
Age 40-49	0.210	0.214	0.192
Age 50-64	0.141	0.156	0.079
Census year			
1999	0.322	0.342	0.233
2009	0.435	0.424	0.486
Female	0.489	0.492	0.477
Urban	0.243	0.169	0.562
Migrated during past 5 years	0.030	0.019	0.079
Industry			
Agriculture, forestry, hunting, and fisheries	0.445	0.541	0.027
Mining	0.005	0.002	0.014
Manufacturing	0.088	0.052	0.243
Services	0.220	0.170	0.435
Weighted number of workers	97,129,923	78,877,720	18,252,203
Number of observations	8,889,813	7,200,671	1,689,142

Notes: Authors' calculations based on the 1999 and 2009 Vietnamese population censuses.

Table A2: Descriptive statistics from household survey data

	All workers	Informal sector workers	Formal sector workers
Age group			
Age 20-24	0.133	0.123	0.176
Age 25-29	0.126	0.112	0.182
Age 30-39	0.280	0.284	0.262
Age 40-49	0.278	0.282	0.263
Age 50-64	0.184	0.199	0.117
Survey			
2002	0.234	0.241	0.203
2004	0.240	0.240	0.237
2006	0.242	0.242	0.243
2008	0.284	0.276	0.316
Highest level of completed education			
No completed education	0.198	0.235	0.037
Primary education	0.281	0.318	0.119
Lower secondary education	0.303	0.323	0.221
Upper secondary education	0.218	0.125	0.623
Female	0.501	0.516	0.437
Urban	0.248	0.186	0.513
Occupation			
Armed forces	0.004	0.000	0.020
Legislators, senior officials and managers; professionals	0.046	0.003	0.233
Technicians and associate professionals	0.037	0.003	0.182
Clerks	0.016	0.001	0.080
Skilled workers	0.177	0.163	0.236
Plant and machine operators and assemblers	0.029	0.018	0.073
Elementary occupations	0.692	0.811	0.176
Weighted number of workers	152,461,517	123,863,155	28,598,363
Number of observations	442,643	366,794	75,849

Notes: Authors' calculations based on the VHLSS.

Table A3: Summary of workforce across sectors

	Number of workers (000s)		Sectoral share of workforce		Share of workers within the sector in the informal sector		Share of workers within the sector in foreign-invested firms	
	1999	2009	1999	2009	1999	2009	1999	2009
				Panel A: All workers				
Agriculture	21,202	21,984	0.679	0.520	0.987	0.990	0.000	0.000
Mining	170	275	0.005	0.007	0.409	0.433	0.003	0.012
Manufacturing	2,769	5,777	0.089	0.137	0.580	0.435	0.050	0.220
Services	7,083	14,240	0.227	0.337	0.617	0.633	0.003	0.011
Total	31,223	42,276	1.000	1.000	0.864	0.790	0.005	0.034
				Panel B: Key provinces				
Agriculture	2,277	1,902	0.381	0.202	0.976	0.974	0.001	0.002
Mining	16	22	0.003	0.002	0.269	0.390	0.015	0.049
Manufacturing	1,301	2,741	0.218	0.291	0.437	0.293	0.090	0.336
Services	2,384	4,754	0.399	0.505	0.602	0.577	0.007	0.025
Total	5,979	9,419	1.000	1.000	0.708	0.574	0.023	0.111

Notes: Authors' calculations from the 1999 and 2009 Censuses. The key provinces include Ho Chi Minh City, Ha Noi, Hai Phong, Dong Nai, and Binh Duong.

Table A4: Informality across and within birth age cohorts by gender

	Men						Women					
	Economy-wide			Manufacturing			Economy-wide			Manufacturing		
Panel A: Share of informal workers in age cohorts												
Cohort age in 1999	1999	2009	Change	1999	2009	Change	1999	2009	Change	1999	2009	Change
Age 10 to 14		0.765			0.355			0.660			0.234	
Age 15 to 19		0.707			0.355			0.662			0.297	
Age 20 to 24	0.897	0.760	-0.137	0.655	0.461	-0.193	0.847	0.759	-0.088	0.511	0.418	-0.093
Age 25 to 29	0.872	0.807	-0.065	0.638	0.543	-0.096	0.853	0.825	-0.028	0.527	0.508	-0.019
Age 30 to 34	0.869	0.827	-0.041	0.625	0.592	-0.033	0.865	0.857	-0.008	0.544	0.576	0.033
Age 35 to 39	0.842	0.810	-0.032	0.576	0.589	0.013	0.857	0.860	0.003	0.540	0.636	0.096
Age 40 to 44	0.823	0.807	-0.015	0.575	0.622	0.047	0.853	0.889	0.036	0.500	0.732	0.232
Age 45 to 49	0.831	0.846	0.015	0.603	0.690	0.087	0.857	0.967	0.110	0.561	0.862	0.301
Age 50 to 54	0.843	0.925	0.082	0.616	0.797	0.181	0.902	0.984	0.082	0.583	0.929	0.346
Age 55 to 59	0.873			0.680			0.976			0.847		
Age 60 to 64	0.947			0.818			0.989			0.984		
Total	0.862	0.786	-0.076	0.623	0.469	-0.154	0.865	0.792	-0.073	0.531	0.400	-0.131
Panel B: Decomposition of aggregate informality change 2009-1999												
	Within cohorts	Between cohorts	Total change	Within cohorts	Between cohorts	Total change	Within cohorts	Between cohorts	Total change	Within cohorts	Between cohorts	Total change
Decompositio	-0.040	-0.035	-0.076	-0.045	-0.110	-0.154	-0.005	-0.068	-0.073	0.014	-0.145	-0.131

Notes: Authors' calculations based on workers ages 20-64 from the 1999 and 2009 Censuses.

Table A5: Informality across and within birth age cohorts among recent migrants

	Economy-wide				Manufacturing			
	Share of workers within cohort that migrated		Share of migrants in the informal sector		Share of workers within cohort that migrated		Share of migrants in the informal sector	
Cohort age in 1999	1999	2009	1999	2009	1999	2009	1999	2009
PANEL A: MEN								
Age 10 to 14		0.096		0.326		0.276		0.144
Age 15 to 19		0.084		0.356		0.208		0.153
Age 20 to 24	0.053	0.049	0.678	0.472	0.149	0.127	0.436	0.219
Age 25 to 29	0.048	0.031	0.691	0.552	0.104	0.080	0.479	0.249
Age 30 to 34	0.032	0.021	0.745	0.605	0.061	0.054	0.487	0.289
Age 35 to 39	0.026	0.016	0.753	0.624	0.050	0.039	0.629	0.299
Age 40 to 44	0.024	0.013	0.748	0.647	0.031	0.027	0.532	0.325
Age 45 to 49	0.019	0.010	0.763	0.723	0.029	0.029	0.573	0.416
Age 50 to 54	0.019	0.009	0.814	0.735	0.013	0.022	0.604	0.321
Age 55 to 59	0.016		0.798		0.035		0.606	
Age 60 to 64	0.010		0.941		0.022		0.811	
Total	0.034	0.045	0.720	0.424	0.079	0.146	0.485	0.178
PANEL B: WOMEN								
Age 10 to 14		0.138		0.309		0.297		0.079
Age 15 to 19		0.085		0.357		0.193		0.109
Age 20 to 24	0.058	0.039	0.537	0.475	0.176	0.110	0.261	0.161
Age 25 to 29	0.038	0.025	0.619	0.576	0.107	0.076	0.304	0.192
Age 30 to 34	0.024	0.018	0.757	0.662	0.065	0.059	0.454	0.207
Age 35 to 39	0.018	0.014	0.825	0.727	0.036	0.046	0.557	0.279
Age 40 to 44	0.017	0.011	0.816	0.806	0.041	0.032	0.556	0.375
Age 45 to 49	0.015	0.009	0.849	0.860	0.040	0.024	0.667	0.405
Age 50 to 54	0.011	0.006	0.869	0.939	0.031	0.010	0.446	0.741
Age 55 to 59	0.009		0.927		0.013		1.000	
Age 60 to 64	0.006		0.929		0.034		1.000	
Total	0.028	0.047	0.663	0.411	0.104	0.163	0.322	0.113

Notes: Authors' calculations based on workers ages 20-64 from the 1999 and 2009 censuses.

Table A6: Probability of working in the informal sector

	All	Manufacturing	Key Provinces
	(1)	(2)	(3)
Age 25-29	0.015***	0.069***	0.039***
	(0.002)	(0.006)	(0.006)
Age 30-39	0.049***	0.186***	0.118***
	(0.001)	(0.005)	(0.006)
Age 40-49	0.057***	0.244***	0.142***
	(0.001)	(0.006)	(0.006)
Age 50-64	0.074***	0.313***	0.184***
	(0.001)	(0.007)	(0.006)
Female	0.003***	-0.045***	-0.011***
	(0.001)	(0.004)	(0.003)
Primary education	-0.004***	-0.029***	-0.028***
	(0.001)	(0.007)	(0.006)
Lower secondary	-0.032***	-0.094***	-0.083***
	(0.001)	(0.007)	(0.006)
Upper Secondary	-0.107***	-0.212***	-0.174***
	(0.002)	(0.007)	(0.007)
Urban	-0.033***	-0.041***	-0.016***
	(0.001)	(0.004)	(0.004)
Observations	442,643	50,139	49,053
R-squared	0.536	0.302	0.431

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Notes: The sample is all workers age 20 to 64 at the time of the survey. All regressions include year, province, and occupation fixed effects. The key provinces are Ho Chi Minh City, Ha Noi, Hai Phong, Dong Nai, and Binh Duong.

Table A7: Occupational structure, compensation, and education, 2002

Occupation	Share of workforce	Mean real monthly compensation	Mean grade
Elementary occupations	0.726	682	6.5
Skilled workers	0.162	1146	8.0
Technicians and associate professionals	0.033	1452	11.4
Clerks	0.015	1711	11.2
Armed forces	0.005	1787	10.5
Plant and machine operators and assemblers	0.024	1917	9.3
Legislators, senior officials and managers; professionals	0.036	1979	11.5

Notes: Statistics are weighted. Compensation is reported in Janaury 2008 Vietnamese dong (000s).