Informal employment in a growing and globalizing low-income country

Brian McCaig and Nina Pavcnik*

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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 migrants, are more likely to work in the formal sector and stay there permanently. Second, the decline in the aggregate share of informal employment occurs through changes between and within birth cohorts. Third, younger, educated, male, and urban workers are more likely to switch to the formal sector than other workers initially in the informal sector. Poorly educated, older, female, rural workers face little prospect of formalization. Fourth, formalization coincides with occupational upgrading.

*McCaig: Wilfrid Laurier University, Department of Economics, 75 University Avenue West, Waterloo, ON, N2L 3C5, Canada (email: bmccaig@wlu.ca). Pavcnik: Dartmouth College, Department of Economics, 6106 Rockefeller Hall, Hanover, NH 03755, BREAD, CEPR, and NBER, (email: nina.pavcnik@dartmouth.edu). We thank Ann Harrison, Amit Khandelwal, and Dietrich Vollrath for comments. McCaig acknowledges conference funding from Wilfrid Laurier University and SSHRC. This document is an output from a project funded by the UK Department for International Development (DFID) and the Institute for the Study of Labor (IZA) for the benefit of developing countries. The views expressed are not necessarily those of DFID or IZA.

Reallocation of resources toward more productive uses contributes significantly towards 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 livelihoods for the poor, but lag in productivity far behind formal firms (Banerjee and Duflo 2007; Gollin 2008; La Porta and Shleifer 2014). Most of these firms have little potential to transition to the formal sector (de Mel, McKenzie and Woodruff 2010, 2013; La Porta and Shleifer 2014). Nonetheless, the individuals working in them might transition to the formal sector as low-income economies develop (Lucas 1978; 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 middle-income settings (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, 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.

We focus on Vietnam over a decade of rapid growth from 1999 to 2009, when GDP per capita increased by 78 percent, 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 an expansion of manufacturing and services, as well as a drastic drop in the share of informal jobs within manufacturing from 58 to 43 percent.

We analyze data from the 1999 and 2009 Vietnam Population Censuses and the 2002, 2004, 2006, and 2008 Vietnam Household Living Standards Surveys (VHLSSs) focusing on workers ages 20-64. The data is nationally representative, covers all industries (including agriculture), and workers in formal and informal firms. An individual works in the informal sector if they are self-employed or works as an employee in the household business sector as opposed to the registered, enterprise sector. In Vietnam, 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 closely corresponds to the notion of informality used in the literature (see La Porta and Shleifer 2014). The VHLSSs contain a rotating panel subcomponent that tracks individuals over a period of up to four years. We therefore analyze transitions to the formal sector in a nationally representative setting and over a longer time frame than is usually feasible (de Mel, McKenzie and Woodruff 2010). An online supplement provides further information on this data.

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 share of informal workers differs across birth 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 1. Panel A reports the share of informal employment by five-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 informality. Young workers that enter the workforce between 1999 and 2009 (age 10-19 in 1999, then age 20-29 in 2009) are less likely to work informally than older, exiting cohorts (ages 55-59, 60-64 in 1999. The informality among the entering cohorts is about 70 percent (column 2), compared to over 90 percent among the exiting cohorts (column 1). This highlights the importance of young cohorts for declines in informality through workforce shifts across cohorts. In addition, younger cohorts experience greater declines in within-cohort informality than older cohorts. Column 3 of Table 1 shows that reductions in informality are largest for the youngest cohorts and decline with age. Cohorts age 20-24 and 25-29 in 1999 experience an 11.2 and 4.7 percentage point drop in the share of informal employment by 2009, 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 1, young cohorts contribute even more significantly toward reductions in informality within manufacturing than they do economy-wide. In manufacturing, the gap in informality 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 the within-cohort changes in informality are larger for men (see Table A4 in supplement).

When formal manufacturing jobs are spatially concentrated, transitions to the formal sector in a low-income country in part occur through migration (Harris and Todaro 1970). In Vietnam in 1999, five provinces accounted for 63 percent of formal manufacturing employment.

We define migration as moving across provinces within the past five years, using the censuses (see Table A5 in supplement). 4.6 percent of workers in 2009 migrated, 66 percent of them to the five key provinces. Migration significantly increases over the decade of growth, particularly for the youngest cohort, from 5.6 to 11.6 percent. Migration declines with age. Importantly, migrants are much less likely to work informally. For example, in 2009, 72 percent of the workers in the youngest cohort were employed in the informal sector (Table 1) compared to only 32 percent 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 Table A6 in supplement). This analysis suggests that younger workers in part formalize more quickly because they are more likely to migrate.

Overall, the between and within cohort shifts in informality contribute importantly toward economy-wide formalization. Panel B of Table 1 suggests that workforce shifts between 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 (particularly among women, see Table A4 in supplement).[1] 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.

II. Switchers, sorting and formalization

Section I highlights differences in formalization of the labor force across and within birth cohorts in a low-income country over a decade of fast growth. Using the VHLSS panels, which track individuals over a period of four years, we illustrate how workers actually transition to the

[1] In contrast to the sharp decline in manufacturing, informality within services remained relatively constant (see Table A3 in supplement). Future research could explore possible reasons, including the role of government policies, firm organization, and FDI, for these different trends.

formal sector within birth cohorts. We examine the permanence of switches to the formal sector over a longer time period than is usually possible, and examine whether and how workers sort between the formal and informal sectors in a low-income country.

We first document individual transition patterns for various age cohorts. Table 2 reports the share of workers in each age cohort that always hold an informal job, always hold a formal job, or switch between the two sectors using the three-survey panels covering 2002 to 2008.[2] Most workers are always in either the informal or formal sector. However, workers in younger cohorts are less likely to always be in the informal sector, more likely to always be in the formal sector and more likely to switch sectors. In addition, among the switchers, younger cohorts are more likely to hold a formal job at the end of the period. Younger cohorts also experience greater increases in the share that end up holding a formal job. In contrast, switching workers in older cohorts tend to end up working in an informal job. Younger switchers also more permanently transition to the formal sector: they are more likely to stay in the formal sector two to four years following the switch.

The differences in switching behavior of workers across age cohorts in part reflect disparities in other worker characteristics, such as education. The literature (Maloney 2004; de Mel, McKenzie and Woodruff 2010; La Porta and Shleifer 2014) emphasizes sorting of individuals into the formal and informal sector by education, consistent with theory (Lucas 1978; Rauch 1991). We also find evidence consistent with sorting based on education by relying on the usual cross-sectional analysis: formal workers are more likely better educated, younger, male, non-minorities, and urban than workers in the informal sector (see Table A7 in supplement). 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

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

characteristics of workers that switch from informal to formal sector than to those of workers that remain in the informal sector. We limit the VHLSS panel sample to workers that are initially informal and regress an indicator for whether a worker switches to the formal sector by the end of the panel on a vector of worker characteristics.

The results are reported in Table 3 and support sorting into the formal sector as the workers that switch tend to be more educated, younger, male, non-minorities, and urban. This implies that relative to workers that remain in the informal sector, workers that switch out of informality tend to have more similar observable characteristics to workers already in the formal sector. We find further support for sorting in switching of individuals from the formal to the informal sector (see Table A8 in supplement). 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.[3]

These findings imply that informal workers that are most likely to move to the formal sector in a fast-growing low-income economy possess characteristics that most closely resemble those of workers already in the formal sector. Poorly educated, older, rural, female workers are unlikely to make such transitions. Importantly, even among the workers most likely to switch out of the informal sector (completed upper secondary school, young, urban, and male), actual switching is subject to a large amount of unobserved heterogeneity: the R^2 is 0.06. Thus, many of the workers that were the "most likely switchers" did not switch to formal sector. However, the analysis excludes migrants, who are more likely to formalize (section II). To the extent that

[3] 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, and thus less likely to voluntarily leave the formal sector to the extent that FDI jobs are considered more desirable than other formal jobs.

worker characteristics affect geographic mobility, the above analysis does not capture their influence on switching to the formal sector through migration. In addition, future work should also explore the role of labor demand factors on switching behavior.

V. Formalization and occupational upgrading

The literature suggests that few informal firms transition to the formal sector (de Mel, McKenzie and Woodruff 2013; La Porta and Shleifer 2014), consistent with evidence from Vietnam (McCaig and Pavcnik 2014). Most worker transitions from the informal to the formal sector occur by workers changing jobs. An interesting question then is whether workers engage in different job tasks as they switch to the formal sector.

We group workers from two 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 composition of occupations significantly differs across these worker groups. Elementary occupations account for 85 percent of employment among informal workers, 67 percent among switchers, and 11 percent 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 higher-skilled occupations such as assemblers, machinists and professionals.

Importantly, switchers upgrade occupations. They tend to switch out of elementary toward skilled and professional occupations. The share of elementary occupations declines for all workers, but this decline is largest among the switchers. Switchers increase employment in skilled occupations (e.g. skilled handicraftsman and manual workers, skilled service workers), as

well as in the assemblers, machinists and professional occupations, all occupations associated with higher pay than elementary occupations. This analysis follows the same individuals over time, so occupation upgrading does not reflect changes in underlying workforce composition. Similar analysis of workers that move provides further support for occupation upgrading (see Table A9 in supplement).

Wage-earning informal workers receive lower wages and benefits than observationally equivalent formal workers, and households headed by an informal worker have lower per capita income than observationally equivalent households with a formal head (McCaig and Pavcnik 2014). The analysis of occupational upgrading sheds further light on changes in working conditions associated with formalization in a low-income country. While many workers switch to lower-skilled manufacturing jobs in the formal sector, these jobs offer higher-skilled occupations and higher compensation than jobs previously held by these workers in agriculture and in informal manufacturing.

VI. Concluding Remarks

Our study highlights how one can use census and panel-level data to document facts about workforce transitions from the informal to the formal sector in a fast-growing, industrializing, low-income country over a longer time horizon. At an aggregate level, the transition to the formal sector in Vietnam appears faster than in other countries (La Porta and Shleifer 2014). Economic growth in Vietnam was accompanied by an expansion of exports and inflows of foreign direct investment, propelled by the U.S.-Vietnam Bilateral Trade Agreement and Vietnam's 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). Despite

declines in informality, a high share of workers continues to work in the informal sector. Future work could further examine the effects of policies, including industrial policy and preferences for SMEs, for the transition to formality.

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TABLE 1 – INFORMALITY ACROSS AND WITHIN AGE COHORTS

		Economy-wide			Manufacturing		
Panel A: Share of informal workers in age cohorts							
Year of birth	Age in 1999	1999	2009	Change	1999	2009	Change
1985-89	Age 10 to 14		0.716			0.287	
1980-84	Age 15 to 19		0.687			0.325	
1975-79	Age 20 to 24	0.873	0.761	-0.112	0.569	0.440	-0.129
1970-74	Age 25 to 29	0.864	0.816	-0.047	0.585	0.527	-0.059
1965-69	Age 30 to 34	0.868	0.843	-0.025	0.590	0.586	-0.004
1960-64	Age 35 to 39	0.850	0.835	-0.014	0.561	0.610	0.049
1955-59	Age 40 to 44	0.838	0.849	0.011	0.545	0.669	0.123
1950-54	Age 45 to 49	0.844	0.906	0.061	0.587	0.762	0.175
1945-49	Age 50 to 54	0.872	0.956	0.083	0.605	0.858	0.253
1940-44	Age 55 to 59	0.924			0.723		
1935-39	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

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

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	Informal at end	Informal at start 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 TO THE FORMAL SECTOR

Age 25-29	-0.035***
	(0.003)
Age 30-39	-0.058***
	(0.002)
Age 40-49	-0.065***
	(0.002)
Age 50-64	-0.069***
	(0.002)
Female	-0.020***
	(0.001)
Ethnic minority	-0.008***
	(0.002)
Primary education	0.007***
	(0.002)
Lower secondary	0.018***
	(0.002)
Upper Secondary	0.072***
	(0.002)
Urban	0.010***
	(0.002)
Observations	99,491
R-squared	0.055

Notes: The sample is all 2-survey panel individuals that worked in both surveys and were 20-64 years old and informal at the start of the panel. The regression also includes occupation, province, industry, and survey-year fixed effects.

*** Significant at the 1 percent level

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4 - Occupational Composition And Changes By Informality Status

	Mean Earnings	Always informal		Switchers		Always formal	
	2002	Start	Change	Start	Change	Start	Change
Elementary occupations	682	0.845	-0.040	0.668	-0.110	0.112	-0.021
Skilled workers	1,146	0.138	0.038	0.191	0.044	0.168	0.007
Technicians and associate professionals	1,452	0.002	0.000	0.040	0.009	0.251	-0.020
Clerks	1,711	0.000	0.000	0.021	0.006	0.105	-0.022
Armed forces	1,787	0.001	-0.001	0.005	-0.003	0.027	-0.005
Plant and machine operators and assemblers	1,917	0.013	0.002	0.033	0.015	0.069	-0.003
Legislators, senior officials and managers; professionals	1,979	0.001	0.000	0.043	0.039	0.268	0.064

Notes: For each group of workers, the table reports the share of employment in an occupation at the start of the sample and subsequent change in this share. Skilled workers occupation includes service workers and shop and market sales workers; skilled agricultural and fishery workers; and craft and related trades workers. Mean monthly compensation is in 000 Dong in January 2008 prices.

Online Appendix

Supplementary material

for

Informal employment in a growing and globalizing low-income country

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(for online publication only)

This document contains further details about the data and 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 focuses on being self-employed or working for a household business or farm as opposed to working in the registered, enterprise sector.[1] In Vietnam, 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

[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.

than employment conditions within a firm.[2] 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 informality used in the literature (see La Porta and Shleifer 2014).

We focus on workers ages 20-64 at the time of the census. By age 20 most individuals in Vietnam have finished school as only 0.4 and 2 percent of 20 year olds in 1999 and 2009 respectively were still attending school based on census estimates. 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.

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.[3] 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 focused on jobs worked during the past 12 months and collected

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

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. As is the case with the census data, 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.[4]

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.

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 four 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 35 percent 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 an expansion of manufacturing and services, as well as a drastic drop in the share of informal jobs from 58 to 43 percent within

[4] 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).

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 employment accounted for by FDI firms jumps from 5 to 22 percent.

The bottom panel of Table A3 provides these same statistics for the five provinces in Vietnam that are the most integrated internationally as a result of port infrastructure and pre-existing manufacturing industry structure (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 five key provinces account for almost 50 percent of Vietnam's manufacturing jobs and 85 percent of FDI jobs in 1999.

Supplementary material for section II

Table A4 provides supplementary material on the role of birth cohorts in the aggregate decline in informality shown in Table 1 in the main text. Table A4 examines the role of birth cohorts in the decline in aggregate share of informal employment by gender. Overall, men and women exhibit similar informality rates, but this masks gender differences in informality within birth cohorts. The share of informal employment is lower among younger women than among younger men, but higher among older women than older men. Within manufacturing, women are less likely to work in the informal sector than women, and this mainly reflects lower share of informal employment among younger women relative to younger men.

The analysis in Table A4 confirms the economy-wide and manufacturing trends highlighted 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 Table A4 reports the decomposition of the aggregate decline in informality into the between and within cohort change and confirms the gender differences in the relative contribution of the two channels. Within cohort changes contributed 53 percent toward the economy-wide decline in the share of informal employment for men. In contrast, within cohort changes contribute only 7 percent 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 among women. As is the case with the pooled sample, workforce shifts between cohorts play a more important role in declines in informal employment in manufacturing, particularly among women. This likely reflects the large young cohort of women that enters the labor force with very low rates of informality.

Table A5 reports the share of workers that migrate and the share of informal employment among these workers by birth cohort. Overall, 4.6 percent of workers in 2009 migrate, but 66 percent of them reside in the five key provinces. Migration significantly increases over the decade of growth, particularly for the youngest cohort, from 5.6 percent to 11.6 percent. However, migration is less prevalent with age. Importantly, within each cohort, migrants are much less likely to work informally. For example, in 2009, 72 percent of the workers in the youngest cohort are employed in the informal sector (Table 1), as compared to only 32 percent of migrants in this cohort (Table A5).

Table A6 reports the migration analysis by gender. This analysis confirms the trends in the economy-wide and manufacturing samples and does not suggest large differences in migration rates between men and women that work. However, women migrants are less likely to work in the informal sector than men, driven by substantially lower informality rates among young migrant women in manufacturing.

Supplementary material for section III

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, an ethnic minority 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, industry, province, and year fixed effects. Table A7 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.

We complement the analysis of sorting based on switchers from informal to formal sector from the main text (Table 3) by examining 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 the dependent variable. The results reported in column 1 of Table A8 suggest that switching to the informal sector is more predictable (R^2 of 0.27) than switching to the formal sector (see Table 3 in main text) and supports sorting by education, age, and residence. Less educated, older, 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]

Supplementary material for section IV

Table A9 provides further support for occupation upgrading by focusing on workers that move. The sample is based on workers from the household surveys that left the household and reported leaving for work reasons. This information is available in the 2006 and 2008 VHLSSs. Recall from section I that migration is associated with a higher degree of formalization. The occupational structure after the move shifted away from elementary occupations toward skilled occupations (especially skilled handicrafts and manual occupations), assemblers, machinists, staff, and professionals relative to the start of the sample.

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

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: Descriptive statistics for 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 for 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
Ethnic minority	0.127	0.144	0.050
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 broad industry groups

	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		0.766			0.355			0.661			0.235	
Age 15 to 19		0.709			0.356			0.663			0.297	
Age 20 to 24	0.898	0.761	-0.137	0.655	0.462	-0.193	0.848	0.760	-0.088	0.511	0.419	-0.092
Age 25 to 29	0.873	0.808	-0.064	0.639	0.543	-0.095	0.854	0.826	-0.028	0.528	0.509	-0.019
Age 30 to 34	0.869	0.828	-0.041	0.626	0.593	-0.033	0.866	0.858	-0.008	0.544	0.577	0.033
Age 35 to 39	0.842	0.811	-0.031	0.576	0.590	0.014	0.858	0.861	0.003	0.540	0.637	0.097
Age 40 to 44	0.823	0.808	-0.015	0.575	0.622	0.047	0.854	0.890	0.036	0.500	0.733	0.233
Age 45 to 49	0.831	0.846	0.015	0.604	0.691	0.087	0.858	0.968	0.110	0.561	0.862	0.302
Age 50 to 54	0.843	0.926	0.083	0.617	0.798	0.181	0.903	0.985	0.082	0.583	0.931	0.348
Age 55 to 59	0.874			0.680			0.977			0.847		
Age 60 to 64	0.948			0.818			0.990			0.984		
Total	0.862	0.787	-0.075	0.623	0.469	-0.154	0.866	0.793	-0.072	0.531	0.401	-0.130
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
Decomposition	-0.040	-0.035	-0.075	-0.044	-0.110	-0.154	-0.005	-0.068	-0.072	0.014	-0.144	-0.130

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
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

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

Table A6: Informality across and within birth age cohorts among recent migrants by gender

	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		0.799		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	0.620	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	0.824	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	0.850	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 A7: Probability of working in the informal sector

	All	Manufacturing	Key Provinces
	(1)	(2)	(3)
Age 25-29	0.006***	0.060***	0.016***
	(0.001)	(0.006)	(0.006)
Age 30-39	0.031***	0.161***	0.069***
	(0.001)	(0.005)	(0.005)
Age 40-49	0.036***	0.214***	0.085***
	(0.001)	(0.006)	(0.005)
Age 50-64	0.048***	0.276***	0.118***
	(0.001)	(0.007)	(0.006)
Female	0.002**	-0.024***	-0.008**
	(0.001)	(0.004)	(0.003)
Ethnic minority	0.002	0.008	0.007
	(0.001)	(0.012)	(0.016)
Primary	-0.000	-0.023***	-0.022***
education	(0.001)	(0.006)	(0.005)
Lower	-0.018***	-0.079***	-0.063***
secondary	(0.001)	(0.007)	(0.006)
Upper	-0.076***	-0.182***	-0.134***
Secondary	(0.001)	(0.007)	(0.006)
Urban	-0.021***	-0.040***	-0.022***
	(0.001)	(0.004)	(0.004)
Observations	442,591	50,139	49,052
R-squared	0.629	0.352	0.567

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, industry, and occupation fixed effects. The key provinces are Ho Chi Minh City, Ha Noi, Hai Phong, Dong Nai, and Binh Duong.

Table A8: Switching to informal sector

Age 25-29	-0.020**
	(0.009)
Age 30-39	-0.025***
	(0.008)
Age 40-49	-0.031***
	(0.009)
Age 50-64	0.053***
	(0.011)
Female	-0.013**
	(0.006)
Ethnic minority	0.008
	(0.012)
Primary education	-0.094***
	(0.014)
Lower secondary	-0.174***
	(0.014)
Upper Secondary	-0.264***
	(0.014)
Urban	-0.041***
	(0.006)
Observations	19,098
R-squared	0.266

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 and formal at the start of the panel. The regression also includes occupation, province, industry, and survey-year fixed effects.

Table A9: Occupational composition and changes among movers

	Movers	
	Start	Change
Elementary occupations	0.634	-0.256
Skilled workers	0.249	0.182
Technicians and associate professionals	0.029	0.009
Clerks	0.018	0.005
Armed forces	0.006	0.007
Plant and machine operators and assemblers	0.037	0.028
Legislators, senior officials and managers; professionals	0.028	0.026

Notes: The table reports the share of employment in an occupation at the start of the sample and subsequent change in this share. Skilled workers occupation 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.