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INFORMALIZATION DYNAMICS AND GAINS:
WHY WANT A JOB CONTRACT?

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Abstract

This paper examines the dynamics of informality and the extent to which informal workers (without job contracts) transit to formal employment (with job contracts) and whether this transition has changed over time and in particular during the recent political and economic turmoil in Egypt. It also investigates the potential gains/losses associated with holding a job contract. Using panel data from Egypt, we find that after the Arab Spring Revolution, the probability to work without a contract increased, and conditional on being informally employed, the probability to switch from private informal to private formal employment decreased. We also find that working without contract is associated with pay penalty. This pay penalty has increased significantly over time. Furthermore, using Difference in difference techniques, the results show that moving from employment without contract to one with contract is associated with a substantial wage premium.

JEL Classifications: J24, J46, O17

Keywords: informal sector, wages, labor mobility.

ملخص

تبحث هذه الورقة ديناميات العمل الرسمي ومدى انتقال عمال القطاع غير المنظم (بدون عقود عمل) إلى وظائف رسمية (مع عقود العمل) وإذا كان قد تغير هذا الاتجاه مع مرور الوقت وخاصة أثناء الاضطرابات السياسية والاقتصادية الأخيرة في مصر. كما تتطرق الورقة إلى المكاسب المحتملة / الخسائر المرتبطة بوجود عقد عمل. وباستخدام بيانات المسح التتبعى لمصر، نجد أنه بعد ثورة الربيع العربي ارتفعت نسبة العمل من دون عقد، مشروطة بالتوظيف بشكل غير رسمي، واحتمال التبديل من التوظيف غير الرسمي الخاص الى التوظيف الرسمي الخاص قد انخفض. نجد أيضــاً أن العمل من دون عقد يرتبط بوجود عقوبة على الأجور. وزادت هذه العقوبة على الأجور بشكل كبير مع مرور الوقت. وعلاوة على ذلك، وباستخدام الفرق في تقنيات الفرق، فقد بينت النتائج أن الانتقال من العمل دون عقد الى العمل بعقد يرتبط بوجود علاوة عالية في الأجور.

1. Introduction

Many workers in developing countries have to rely on informal employment to earn their living. Informal work where the worker does not hold a job contract tends to provide little stability and security, at the same time, without a job contract workers do not benefit from social security coverage as well as other rights and benefits such as paid holidays and health insurance among. However, informal employment has been on the rise absorbing new entrants to the labor markets in many countries.

Informality is a prominent feature of many developing countries. We focus in this paper on Egypt where informality, in particular working without a job contract, is a key aspect of the labor market. This paper aims to address a number of important questions related to the dynamics of informal employment defined as working without a job contract. First, previous studies show that labor markets in developing countries tend be segmented (see Field (1975)). We revisit this issue and take a long-term view examining transitions between 1998-2012. We examine whether informal workers transit to formal employment and whether this transition has changed over time and in particular during the recent political and economic turmoil. Secondly, in many developing countries, informal employment usually acts as a buffer during downturns when people are laid off or looking for new jobs.[1] Hence it is vital to understand the impact of the recent slowdown in economic activity experienced after the Arab Spring on informalization. We examine the period before and after the revolution of 2011 in order to understand better the observed changes in informality, and investigate the gains associated with labor transitions from informal work. We finally investigate a novel question that seeks to understand the gains/losses associated with moving from non-contract work to contract jobs. What are the wage returns to that labor market transition? What is the net wage penalty or premium of working in a contracted job as opposed to a non-contracted one?

Our paper contributes to the literature on informal employment in two ways: (1) by examining labor market dynamics during the Arab Spring, (2) by quantifying the potential monetary gains/losses associated with becoming formally employed. Observing the same worker working without contract and then switching to formal employment, we are able to estimate the wages of the movers relative to non-movers who stayed informally. We use difference-in difference techniques to examine the wage gains/losses of movers relative to stayers. Understanding the dynamics of informality, whether workers are able to graduate to a formal job, and what the rewards or costs for such a move are important for policymakers.

Our findings suggest that the prevalence of work without contract has increased over the last two decades. Moreover, the increase in informality between 2006 and 2012 was driven by the highly-educated workers who were stuck in the informal employment, and the low-educated formal workers who lost their job contracts and became informally employed. We also find that working without contract is associated with pay penalty. This pay penalty has increased significantly over time. Furthermore, the results show that moving from employment without contract to one with contract is associated with a substantial wage premium.

The structure of the paper is as follows: Section 2 reviews the previous literature dealing with the dynamics of informality and the wage gap between formal and informal sector. Section 3 examines the labor transition between 1998 and 2012. Section 4 focuses on transition from and to informality during and after the period of the revolution. Section 5 investigates the wage gap between formal and informal employment, and the gains associated with switching from informal to formal employment. Section 6 concludes.

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[1] See Khamis (2012) for a survey on informality.

2. Previous Literature

Several previous studies have examined the issue of labor market transition, although not always focusing just on informal transition. For example, Maloney (1998) offered one of the very early studies of worker transitions between sectors and found little evidence in support of the dualistic labor market view in Mexico. Gong et al. (2004) analyzed mobility in urban Mexico between three labor market states: working in the formal sector, working in the informal sector, and not working. They found that formal jobs were superior to informal jobs and that working in the informal sector was a temporary state for those who could not find a formal sector job and could not afford to stay unemployed. Entry and exit rates for the formal sector were lower than for the informal one.

As for the evidence on the informal-formal wage gap, there are several studies that have examined this issue and find a wage penalty for working in the informal sector. for example, Bargain and Kwenda (2014) examined the wage gap between informal and formal salary workers in South Africa, Brazil and Mexico taking into account taxes and using panel data. Elbadouai et al. (2008) examined whether individuals working in the informal sector in South Africa suffer from a wage penalty and found that nearly 37 % of the observed wage penalty is due to differences in human capital and job characteristics. Controlling for unobservable time-invariant factors further reduces the informal sector wage penalty to just over 18%. Although recent studies use panel data to deal with unobserved individual characteristics, they still suffer from bias due to time varying unobservables as well as for the selectivity of the initial sector of employment.

There are a few studies on informality in Egypt. Wahba (2009) looked at whether the informal sector is a stepping stone or a dead end and finds that informal employment is a stepping-stone for highly educated male workers. However, for uneducated workers and for female workers informal employment could be a dead end. Assaad and Wahba (2015) examine the change in the 2003 labor law. Selwaness and Roushdy (2014) study the hazard rate of acquiring social security coverage. More recently, Tansel and Ozdemir (2014) study labor market dynamics in the Egypt labor market between 2006 and 2012. They develop transition probabilities by gender across different labor market states utilizing Markov transition processes. They conclude that the Egyptian labor market is highly static. Finally, in a very recent paper, closer to our interest, Tansel et al. (2015) examine the wage gap between informal and formal sector workers in Egypt and find a substantial gap in favour of formal sector workers. Our focus here is slightly different as our interest is in lack of job contract and the associated dynamics of transiting from work with no contract to one with contract and the consequential impact of such transition on earnings in particular during political and economic turmoil.

3. Data and Descriptive Statistics

We use data from the Egypt Labor Market Panel Survey (ELMPS) which is a nationally-representative panel dataset that covers the Egyptian labor market and collects detailed information about demographic characteristics of the households and individuals interviewed. The survey was carried out three times in 1998, 2006, and 2012 by the Economic Research Forum (ERF) in cooperation with the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS), the Egyptian government's prime statistical agency. [2]

The ELMPS dataset contains rich information about labor market outcomes over the life cycle using retrospective questions about labor market history. We make use of this retrospective data as well as of the panel aspect. One major advantage of the ELMPS dataset over other data sources that have been used to investigate pay gaps between informal and formal employment is that questions about net wages, as opposed to gross wages, are directly asked to individuals.

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[2] For more details, see Assad and Kraft (2013).

This makes our analyses robust to the impact of taxes which could affect formal but not informal workers, without having to make extra calculations of taxes that may lead to measurement errors. However, wages are only observed in the three waves of the ELMPS and not retrospectively in each wave.

We make use of the unbalanced panel structure of the data to estimate the probability of switching from/to informality and the wage implications of that. In addition, we exploit the retrospective information to study the effect of the Arab Spring in 2011 on the probability to be work without contract and the chance to escape informality. We use lack of job contract as our measure of informality. In our analyses, we focus on non-agriculture employment (NAE) and look particularly at private non-agriculture waged work (PNAW) for estimations of wage differences between informal and formal workers. Given that female labor force participation is subject to huge selectivity, we focus on males only. We limit our analyses to prime age men, aged 20 to 50 years, and use a consistent sample of 17,988 observations for 12,639 individuals for whom we have complete information about employment status, education levels, and individual characteristics. For estimations of wage differentials between formal and informal workers, we limit our analyses to waged private non-agriculture workers. This reduces the sample size substantially, unsurprisingly, to 5,302 observations for 4,405 individuals.

Table A1 in the Appendix shows the descriptive statistics of our sample across the three waves of the survey. The table shows that 33% of the individuals in the overall sample are in private informal employment (have no job contract), 27% work in government/public sector, and only 9% are in the private formal sector (have job contracts). The table further shows that 12% of the sample work irregularly (seasonal or intermitted work), and 41% are in their first job. The table also shows a significant increase in the share of both formal and informal workers, and a decrease in the share of government/public workers between 1998 and 2012. The share of irregular workers jumped from 7% in 1998 to 17% in 2012. Also, the share of people who are in their first job increased from 30% in 1998 to 49% in 2012.

Table A2 documents differences between informal and formal employment. The table focuses on private non-agriculture waged work (PNAW) and provides a comparison in education levels as well as individual and job characteristics between workers who do not have job contract (informal) and those who have job contract (formal workers). The table shows that the share of low educated workers is 48% in informal employment and only 16% in formal jobs. The share of the highly educated is 12% among informal workers vs. 46% in the formal private workers. The table also shows that private formal workers are older, more likely to be married, and more likely to live in urban areas than private informal workers. About 37% of the private informal workers are irregular workers.

Figure 1 shows the change in the share of those employed without contracts (informal employment) over the three waves of the survey. The figure shows an increase in the share of informal workers, those with no job contracts, over time especially between 2006 and 2012. The increase is more pronounced among new entrants to the labor market. We examine below, the extent to which this increase persists once we control for observable characteristics.

4. Informality Dynamics Over Time

4.1 Employment dynamics in the Egyptian labor market

Table 1 shows the matrix of raw transition probabilities for the total sample between 1998 and 2006 (Panel A) and between 2006 and 2012 (Panel B). The elements on the main diagonal of the matrix show the probability that an individual remains in a given state. The table shows that between1998 and 2006, the probability to remain in informal employment (without contract) was about 55%, while about12% moved from informal to formal private employment, and 14% moved from formal to informal sector. However, between 2006 and 2012 more than

66% of informal workers remain informal. Only 8% moved from informality to formal private work, and the share of workers who moved in the opposite direction between the private formal and informal waged employment other hand increased to 26%. These numbers suggest that the overall probability to be informally employed increased over time due to the larger share of workers stuck in informal employment as well as due to the increase in the share of people who move from formal to informal employment.

To account for observable characteristics when studying the dynamics of informal employment across the three waves of the survey, we estimate the following Multinomial Logit (MNL) model:

$$\Pr(X_{i,t+n)} = j \mid X_{i,t} = k) = \frac{\exp(Z_i\hat{\beta}_{j|k})}{\sum_{l=0}^{K}\exp(Z_i\hat{\beta}_{l|k})} \tag{1}$$

where X_{it} is the labor market state of individual i at time t. j is the state of origin and k is the destination state. Z_i is a bunch of control variables for individual i such as age, age squared, education, region and father's education. We are interested in mobility from the informal private employment to the other states as well as from the private formal employment to the other states. The MNL model is estimated by the maximum likelihood estimation method. The average marginal effects of the explanatory variables are given by the following expression:

$$\frac{\partial \Pr(X_i=j)}{\partial z_m} = Pr(X_i = j|Z). \ [\beta_m^j - \sum_{l=0}^{K}\beta_m^j Pr(X_i = j|Z)] \tag{2}$$

Table 2 reports the average marginal probability to switch employment status based on the MNL estimations. Panel A shows the probabilities to stay in the same employment sector (i.e., formal/informal), Panel B shows the probabilities to switch from private informal sector, and Panel C shows the probabilities to switch from private formal sector. Column 1 shows the estimations between 1998 and 2006, and Column 2 shows the estimations between 2006 and 2012. The table shows that the probabilities to stay at the same sector are on average higher than the probabilities to switch sectors. The probability to stay in private informal sector increased from 40.8 percentage points between 1998 and 2006 to 55.2 percentage points between 2006 and 2012, while the probability to stay in private formal sector decreased from 59.2 percentage points between 1998 and 2006 to 44.4 between 2006 and 2012.

The table further shows that the probability to switch from private informal to private formal sector decreased from 16 percentage points between 1998 and 2006 to 12.2 percentage points between 2006 and 2012. However, the probability to switch from private formal to private informal sector increased over time from 17.6 percentage points between 1998 and 2006 to 28.2 percentage points between 2006 and 2012.

To study the characteristics of movers across employment types compared to stayers, Table 3 shows the estimates of the linear probability to move from informal to formal sectors (job contract) between 1998 and 2006 (Column 1), and between 2006 and 2012 (Column 2), as well as the linear probability to move from formal to informal sectors over the same time intervals (Columns 3 and 4, respectively). The table shows that moving from informal (no job contract) to formal (job contract) employment was more a characteristic of medium and highly educated workers (compared to the low-educated) between 1998 and 2006. However, over the period 2006-2012, there was no difference in the probability to move from informal to formal sector between the different education levels, whereas the probability to move from formal to informal workers was higher for the low educated. This suggests that the increase in informality between 2006 and 2012 was driven by the highly-educated workers who were stuck in the informal employment, and the low-educated formal workers who lost their job contracts and became informally employed.

4.2 Informal employment and the Arab Spring

An important aspect, which we need to delve further into, is whether the recent political changes have had an impact on the labor market dynamics and in particular on movement out of informality. Economic downturns typically lead to a slowdown in economic activity and an increase in informality. Economies going through recessions are likely to experience a shift from the tradable to the non-tradable sectors, which would strengthen informality (see, for example, Fiess, Fugazza, and Maloney (2010)). In many developing countries, informal employment usually acts as a buffer during downturns when people are laid off or looking for new jobs.[3] Hence, it is vital to understand the impact of the recent slowdown in economic activity experienced after the Arab Spring on the structure of employment. In particular, the extent to which the Arab Spring has affected informalization in Egypt is important.

To investigate the impact of the Revolution on the probability to start informal employment, we use data from the retrospective section, and track individuals back in time to get information about their employment history. Figure 2 shows the probability to start informal employment over time. The figure clearly shows that informal employment has been continuously increasing over time. However, the increase has been much more pronounced after the revolution (i.e., in 2011 and 2012). Table 4 shows comparisons between the probabilities to start an informal occupation two years before (i.e., in 2009 and 2010) and two years after the revolution (i.e., in 2011 and 2012).[4] The table shows that the probability to start private informal employment increased significantly from 58.37% before the revolution to 64.84% after the revolution. While the probability to start private informal employment for first entrants slightly increased from 67.68% before the revolution to 69.33% after the revolution, the increase is not significant. These findings suggest that the revolution was accompanied by a significant increase in informality especially among those who are already in the labor market.

To have a deeper look on the transition pattern across different employment states before and after the revolution, Table 5 shows the matrix of raw transition probabilities between the time period 2009-2010 (before the revolution) and 2011-2012 (after the revolution). The table shows that while about 26% of formal workers before the revolution remained in formal employment, 32% moved to informality. The probability to remain in informal employment was about 37% and only 4 % moved from informal to formal employment. The table also shows a clear pattern of increase in unemployment with about 32% of formal workers and 19% of informal workers before the revolution became unemployed after the revolution.

To estimate the probability to be informally employed (without job contract) after the revolution, we run a linear probability model in which we regress the probability to start informal employment on a dummy variable that takes the value 1 if the observation is taken after the revolution (i.e., in 2011-2012), and 0 before the revolution (i.e., in 2009-2010) controlling for relevant individual characteristics. We also estimate a linear probability model for the probability to move across the different employment states conditional on the initial employment state.

Table 6 shows the estimates for the two linear probability models. Columns 1 and 2 show the coefficients for the probability to start informal employment without and with controls, respectively. Columns 3 and 4 show the probability to switch employment from formal to informal sectors without, and with controls, respectively. Columns 5 and 6 show the probability to switch employment from informal to formal sectors without, and with controls, respectively. The table shows that the probability to start informal employment increased by 7.9 percentage points after the revolution. Conditional on being formally employed, the probability to switch

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[3] See Khamis (2012) for a survey on informality.

[4] The Arab Spring revolution in Egypt took place early in 2011 between Jan.25 and Feb.11. Therefore, we assume that the year 2011 is post-revolution.

to informal employment increased by 13.8 percentage points after the revolution. And, conditional on being in informal employment, the probability to move to formal employment decreased by 8.7 percentage points after the revolution.

5. Wages of Workers: With and Without Contracts

5.1 Wage gap

To investigate wage differentials between workers with contracts and those without, we estimate a linear regression of log real hourly wages where we control for individual characteristics and include a dummy variable (Inf_i) for informal (uncontracted) employment.

$$\log W_i = \gamma_0 + \gamma_1 Z_i + \gamma_2 Inf_i + \varepsilon_i \tag{3}$$

We first examine the wage gap between informal and formal employment. Table 7 shows the OLS estimations in the log hourly net wage between informal and formal workers across all waves of the survey (Columns 1 and 2), wave 1998 (Columns 3 and 4), wave 2006 (Columns 5 and 6), and wave 2012 (Columns 7 and 8). The table shows that on average workers without contracts earn about 20 log points less hourly wage than contracted workers. The gap in earnings between those two groups of workers increased over time from 12.2 log points in 1998 to 22.8 log points in 2012.

5.2 Wage gains/losses from moving to contracted job

In order to investigate the wage gain or penalty associated with being employed without contract change over time, we make use of the panel aspect of the data to control for unobserved heterogeneity and use Fixed Effects model.

We estimate the following linear equation of log wages as a function of individual characteristics (Z_{it}), a dummy variable for working without contract (Inf_{it}), a dummy for the wave (1998, 2006, and 2012) and the interaction between working without contract and Wave. The coefficient of interest is π.

$$\log W_{it} = \gamma\theta_0 + \theta_1 Z_{it} + \sigma Inf_{it} + \tau Wave_t + \pi[Inf_{it} * Wave_t] + \varepsilon_{it} \tag{4}$$

Table 8 shows the Fixed Effects estimations of the changes in wage differentials between informal and formal workers overtime. Columns 1 and 2 show the estimates for the whole sample without and with controls, respectively. The table shows that the wage penalty of working without contract (informally) increased significantly over time.

To better capture the individual gains from switching across employment states, we estimate the following equation for individuals who are already in informal employment (without contract) in the initial period:

$$\Delta \log W_i = \gamma_0 + \gamma_2 Move\_f_i + \gamma_3 Z_i + \varepsilon_i \tag{5}$$

Similarly, we estimate the following equation for individuals who are already in formal (contracted) employment in the initial period:

$$\Delta \log W_i = \rho_0 + \rho_2 Move\_inf_i + \rho_3 Z_i + \varepsilon_i \tag{6}$$

Where $\Delta \log W_i$ is the change in wage over two waves, $Move\_f_i$ is a dummy variable that takes the value 1 if the informal (uncontracted) worker moves to formal (contracted) employment across the two waves, and 0 otherwise. $Move\_inf_i$ is a dummy variable that takes the value 1 if the formal (contracted) worker moves to informal (uncontracted) employment across the two waves, and 0 otherwise. Z_i is a bunch of individual characteristics in the initial period, and ε_i is the error term.

Table 9 shows the estimates of equations 5 (Panel A) and 6 (Panel B). Columns 1 and 2 show the estimates between 1998 and 2006 without, and with control variables, respectively. Columns 3 and 4 show the estimates between 2006 and 2012 without and with control

variables, respectively. The table shows that transition from informal (uncontracted) to formal (contracted) employment is associated with a significant pay premium, while transition from formal (contracted) to informal (uncontracted) employment is associated with a significant pay penalty.

5.3 Difference-in-difference approach

Another approach to estimate changes in pay between stayers and movers across the different job contract status is the difference in difference which estimates separate OLS regressions in the baseline and end-line waves for control (stayers) and treated groups (movers), and then calculates the difference in the means of log wage for stayers and movers across the two waves after accounting for the effect of observable control variables.

We estimate the following model:

$$\log W_{i_t} = \alpha_{it} + \beta T_{it} + \partial R_{i_t} + \delta T_{it} R_{it} + \varepsilon_{it} \tag{7}$$

where our outcome of interest log W_{it} is net real hourly wage. T refers to Treatment. We define the treated group as those informal workers (do not have a job contract) who moved to a formal job (T=1) whilst the control group are those employed informally who stayed without job contract (T=0). R stands for round and refers to our two rounds: 2006 (base period) and 2012 (current wave). Our Difference-in-Differences estimate of the effect of acquiring a job contract work is captured by the coefficient δ of the interaction term TR. In essence we are examining the wage change for those who moved versus who remained employed without contract between 2006-2012.

We also estimate the same model but for those employed formally, with a contract, and compare them to those who moved to informal employment without a job contract between 2006 and 2012.

Table 10 shows the diff-in-diff estimates. Similar to Table 9, the table shows that moving from informal (uncontracted) to formal (contracted) employment is associated with wage premium, while moving from formal (contracted) to informal (uncontracted) employment is associated with a significant pay penalty.

Estimating the effect of the revolution on the informality pay gap is rather difficult because we do not have retrospective information about wages. Therefore, we can't compare changes in wages before and after the revolution. One possible alternative is to compare the current wages of informal workers if they have started the informality status before or after the revolution. Table 11 shows an OLS regression for the current wage (i.e., in 2012) on a dummy variable for the revolution (i.e., 2011-2012 compared to 2009-2010) and a dummy variable for starting informality status, and an interaction between the two to capture the change in real pay gap over time. The Table shows that although the revolution negatively affected wages, and that informal (uncontracted) workers earn on average less than formal (contracted) workers, there is no significant difference in the informality penalty before and after the revolution.

6. Conclusion

This paper focuses on the dynamics of informality in Egypt and asks whether the extent of transition from jobs without contracts has changed over time and in particular during the period of political turmoil, as well as attempting to quantify the earnings implications of switching from jobs without contracts to ones with contracts.

Our findings suggest that the incidence of working without job contract has increased over time; the probability to be informally employed increased due to the larger share of workers stuck in informal employment as well as due to the increase in the share of people who moved from formal to informal employment. In particular, the increase in informality between 2006

and 2012 was driven by the highly educated workers who remained in informal employment, and the low-educated formal workers who lost their job contracts and became informally employed.

Furthermore, the evidence seems to suggest that the Arab Spring has affected informalization even more. The probability to start an informal employment (job without contract) increased after the revolution. Conditional on being formally employed, the probability to switch to informal employment increased after the revolution, whilst conditional on being in informal employment, the probability to move to formal employment decreased after the revolution.

Our results also highlight that workers who transit from work without contract to one with contract attract a significant pay premium, while transition from formal to informal employment is associated with a significant pay penalty. This underscores why employment with a job contract is sought after by workers and hence workers queue for formal jobs.

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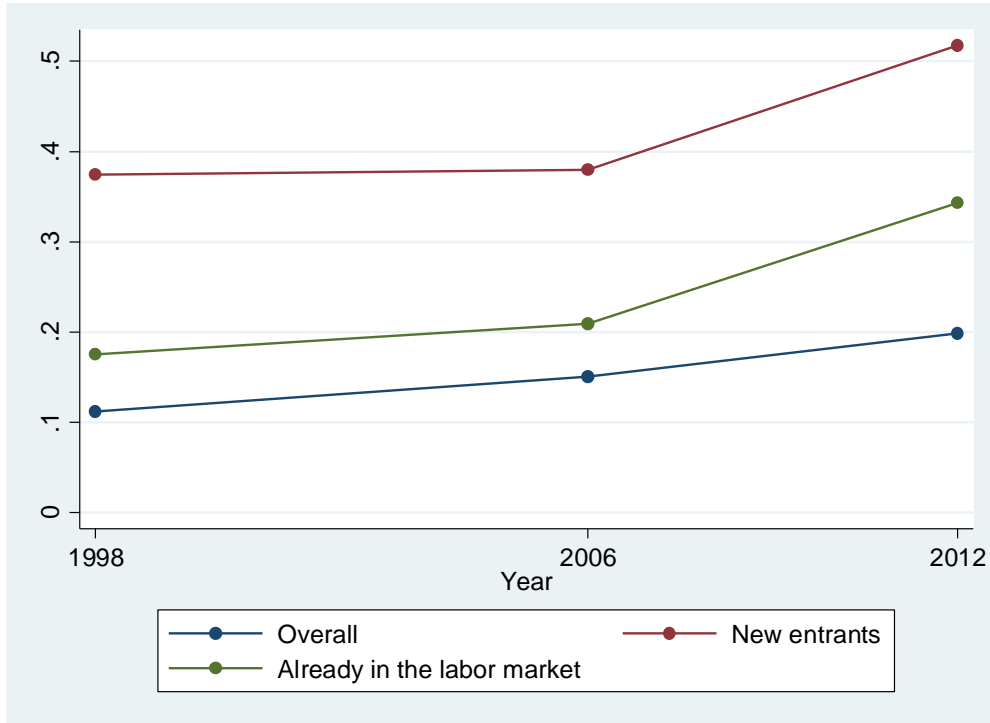**Figure 1: Share of Informal Private Employment Over Time**

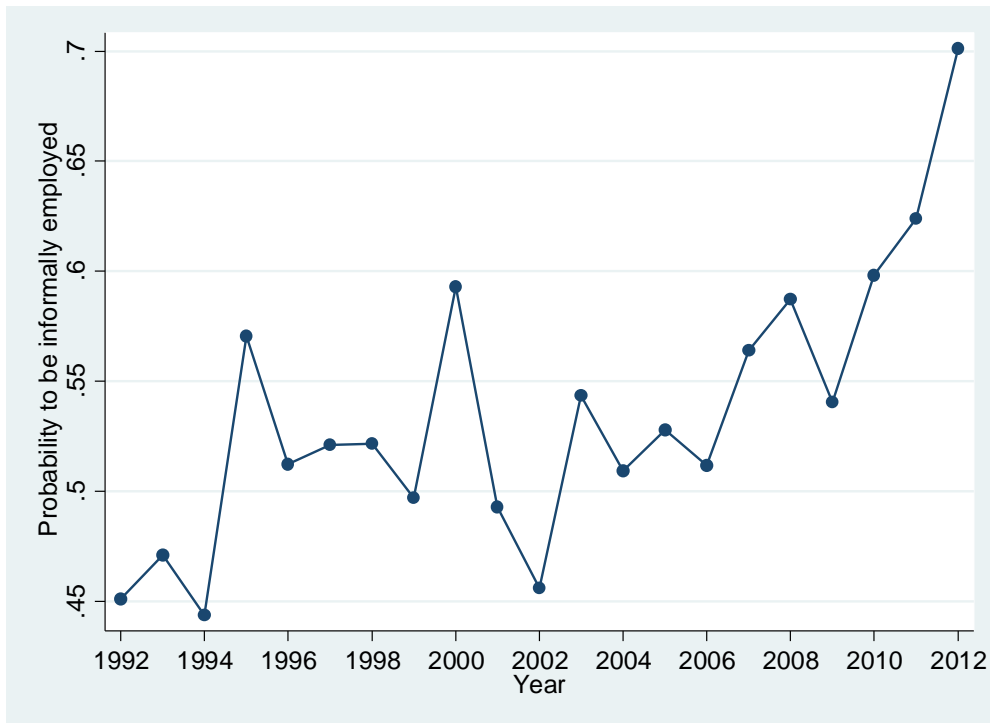**Figure 2: Probability to Start Informal Employment Over Time**

Table 1: Transition Matrices 1998-2012

A. Transition matrix between 1998 and 2006

				Employment status 2006				
Employment status 1998	**Formal private**	**informal**	**self-empl**	**Public**	**unpaid**	**unemployed**	**OLF**	**Total**
private formal	**65.10**	14.09	6.04	12.08	0.00	2.01	0.67	100
private informal	12.24	**54.49**	13.88	12.86	0.61	2.86	3.06	100
self-employed	1.42	16.31	**66.67**	7.09	0.00	1.42	7.09	100
Public	3.09	2.13	0.87	**89.57**	0.00	0.29	4.06	100
unpaid family worker	2.63	34.21	28.95	7.89	**21.05**	2.63	2.63	100
Unemployed	9.89	40.11	15.93	17.58	1.10	**10.99**	4.40	100
OLF	14.03	27.53	9.87	27.01	2.86	10.65	**8.05**	100
Total	10.91	21.69	10.66	47.81	0.99	2.01	3.47	100

B. Transition matrix between 2006 and 2012

				Employment status 2012				
Employment status 2006	**Formal private**	**informal**	**self-empl**	**public**	**unpaid**	**unemployed**	**OLF**	**Total**
private formal	**43.87**	26.43	4.36	19.89	0.00	4.36	1.09	100
private informal	7.54	**66.03**	9.83	10.21	0.19	3.63	2.58	100
self-employed	3.50	37.76	**44.41**	8.39	0.35	3.85	1.75	100
Public	4.44	3.21	0.76	**89.89**	0.00	0.47	1.23	100
unpaid family worker	11.11	53.97	11.11	11.11	**7.94**	1.59	3.17	100
Unemployed	15.35	43.98	6.64	19.09	2.90	**10.37**	1.66	100
OLF	14.57	43.46	8.40	15.56	1.23	9.63	**7.16**	100
Total	11.53	35.96	8.97	36.65	0.58	3.89	2.42	100

Table 2: Average Marginal Probability to Switch Employment Status Across the Waves (Based on Multinomial Logit Analysis)

A. Probability to stay in:

	between 1998 and 2006	between 2006 and 2012	P value
private informal	0.408***	0.552***	0.000
private formal	0.592***	0.444***	0.000

B. Probability to switch from private informal employment to

	between 1998 and 2006	between 2006 and 2012	P value
private formal	0.160***	0.122***	0.000
self-employed	0.128***	0.090***	0.000
government/public enterprise	0.208***	0.156***	0.000
unpaid family worker	0.008	0.001	0.023
Unemployed	0.048***	0.054***	0.874
OLF	0.047***	0.030***	0.065

C. Probability to switch from private formal employment to:

	between 1998 and 2006	between 2006 and 2012	P value
private informal	0.176***	0.282***	0.000
self-employed	0.008***	0.042 ***	0.007
government/public enterprise	0.012***	0.162***	0.000
unpaid family worker	0.000	0.000	0.753
Unemployed	0.003	0.054***	0.000
OLF	0.001	0.018***	0.000

Note: The coefficients are calculated by dividing the average marginal effects in Equation 2 by the number of years between the two waves of data. Control variables are age, age square, marital status, urban vs. rural area, household size, education, and father's education. Standard errors clustered on individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Determinants of Moving Across Formal and Informal Employment Over Time

VARIABLES	Informal to formal		Formal to Informal	
	(1)	(2)	(3)	(4)
	Between 98 and 2006	Between 2006 and 2012	Between 98 and 2006	Between 2006 and 2012
Urban	-0.066*	-0.034	0.068	0.010
	(0.035)	(0.043)	(0.085)	(0.067)
Age	0.039**	-0.010	-0.027	-0.016
	(0.018)	(0.024)	(0.034)	(0.038)
Age square	-0.001**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)
Married	0.038	-0.033	0.205**	0.036
	(0.042)	(0.049)	(0.085)	(0.085)
Household size	0.007	-0.009	0.027**	0.014
	(0.006)	(0.008)	(0.013)	(0.012)
Intermediate education	0.132***	-0.059	0.059	-0.173**
	(0.037)	(0.048)	(0.048)	(0.084)
High education	0.235***	-0.004	0.055	-0.400***
	(0.090)	(0.093)	(0.091)	(0.104)
Father educated	0.100**	0.015	0.088	-0.088
	(0.046)	(0.053)	(0.064)	(0.062)
Constant	-0.189	0.263	0.418	0.829
	(0.335)	(0.425)	(0.600)	(0.676)
Observations	539	204	189	267
R-squared	0.220	0.264	0.178	0.180

Note: The explanatory covariates are from the baseline wave. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Reference group: no and low education.

Table 4: Share of Workers in Private Non-Agriculture Before and After the Revolution (Retrospective Information)

Job status	Before the revolution (2009-2010)	After the revolution (2011-2012)	P value
Private informal	58.37%	64.84%	**
Observations	860	438	
Private informal first entrants	67.68%	69.33%	N.S
Observations	287	79	

Table 5: Transition Matrix Before and After the Revolution

Before revolution (2009-2010)	After revolution (2011-2012)							
	Form.	informal	self-	Public	unpaid	unemployed	OLF	Total
private formal	**26.32**	31.58	5.26	0.00	0.00	31.58	5.26	100
private informal	4.29	**37.14**	5.71	5.71	2.86	25.71	18.57	100
self-employed	20.00	20.00	**0.00**	0.00	0.00	60.00	0.00	100
public	0.00	27.27	0.00	**36.36**	0.00	18.18	18.18	100
unpaid family worker	0.00	20.00	0.00	20.00	**0.00**	0.00	60.00	100
unemployed	11.63	62.79	9.30	13.95	2.33	**0.00**	0.00	100
OLF	4.17	58.33	8.33	16.67	8.33	4.17	**0.00**	100
Total	8.47	44.07	6.21	10.73	2.82	16.95	10.73	100

Table 6: Linear Probability to Start Informal Employment After the Revolution

Variables	Informal employment		Switch to informal employment (from formal)		Switch to formal employment (from informal)	
	(1)	(2)	(3)	(4)	(5)	(6)
1 if after revolution (ref. 2009-2010)	0.071**	0.079**	0.122*	0.138**	-0.095**	-0.087**
	(0.035)	(0.031)	(0.067)	(0.062)	(0.040)	(0.038)
Controls	No	Yes	No	Yes	No	Yes
Constant	0.585***	1.168***	0.337***	-0.577	0.453***	-0.480
	(0.021)	(0.301)	(0.041)	(0.730)	(0.026)	(0.419)
Observations	1,298	1,298	224	224	629	629
R-squared	0.005	0.186	0.015	0.203	0.009	0.107

Notes: Controls include age, age square, marital status, urban vs. rural area, household size, education, and father's education. Standard errors clustered on individual level in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table 7: OLS Wage Regressions

	Log wage							
	Overall		1998		2006		2012	
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
No Contract	-0.375***	-0.182***	-0.307***	-0.122**	-0.348***	-0.169***	-0.423***	-0.228***
	(0.020)	(0.022)	(0.047)	(0.050)	(0.036)	(0.033)	(0.046)	(0.035)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Constant	1.643***	1.027***	1.503***	1.350***	1.611***	1.142***	1.736***	1.265***
	(0.017)	(0.188)	(0.039)	(0.406)	(0.032)	(0.293)	(0.041)	(0.315)
Observations	5,302	5,302	866	866	2,115	2,115	2,321	2,321
R-squared	0.061	0.184	0.047	0.217	0.057	0.202	0.069	0.191

Notes: Controls include age, age square, marital status, urban vs. rural area, household size, education, father's education, a dummy variable for being new entrant in the labor market, and occupational dummies. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8: Fixed Effects Estimations of Changes in Informal Wage Gap Over Time

	Log wage	
Variables	(1)	(2)
No contract	0.072	0.168
	(0.108)	(0.111)
2006 wave	0.490***	0.271
	(0.085)	(0.182)
2012 wave	0.733***	0.311
	(0.096)	(0.294)
No contract*2006 wave	-0.262**	-0.278**
	(0.108)	(0.112)
No contract *2012 wave	-0.429***	-0.476***
	(0.120)	(0.123)
Controls	No	Yes
Constant	1.024***	-0.531
	(0.086)	(0.653)
Observations	5,302	5,302
R-squared	0.102	0.148
Number of id	4,405	4,405

Notes: Controls include age, age square, marital status, urban vs. rural area, household size, education, father's education, a dummy variable for being new entrant in the labor market, and occupational dummies. 1998 is the reference group. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9: Individual Gains/Losses from Changing Job Contract Status

	Change in log wage			
	Between 1998 and 2006		Between 2006 and 2012	
Variables	(1)	(2)	(3)	(4)
A. Moving from no contract to contract				
Moved to contract	0.251***	0.197**	0.274***	0.233***
	(0.082)	(0.083)	(0.061)	(0.063)
Controls	No	Yes	No	Yes
Constant	0.203***	0.591	0.138***	0.884***
	(0.034)	(0.481)	(0.021)	(0.317)
Observations	627	627	1,536	1,535
R-squared	0.015	0.076	0.013	0.025
B. Moving from contract to no contract				
	Between 1998 and 2006		Between 2006 and 2012	
Variables	(1)	(2)	(3)	(4)
Moved to no contract	-0.254*	-0.269*	-0.279***	-0.326***
	(0.142)	(0.144)	(0.088)	(0.092)
Controls	No	Yes	No	Yes
Constant	0.502***	1.900**	0.228***	0.739
	(0.058)	(0.920)	(0.051)	(0.848)
Observations	234	234	528	528
R-squared	0.014	0.064	0.019	0.053

Notes: Controls include age, age square, marital status, urban vs. rural area, household size, education, father's education, a dummy variable for being new entrant in the labor market, and occupational dummies. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 10: Difference in Difference Estimates for Changing Job Contract Status

A. Moving from no contract to contract

1998			2006			DIFF-IN-DIFF
Remained uncontracted	Moved to contract	Diff 1998	Remained uncontracted	Moved to contract	Diff 2006	
1.248***	1.243***	-0.005	1.475***	1.659***	0.184***	0.190*
(0.028)	(0.055)	(0.060)	(0.031)	(0.110)	(0.116)	(0.101)

2006			2012			
Remained uncontracted	Moved to contract	Diff 2006	Remained uncontracted	Moved to contract	Diff 2012	
0.747***	0.623**	-0.125*	0.797**	0.928***	0.131	0.255**
(0.244)	(0.264)	(0.091)	(0.253)	(0.250)	(0.078)	(0.125)

B. Moving from contract to no contract

1998			2006			DIFF-IN-DIFF
Remained contracted	Moved to no contract	Diff 1998	Remained contracted	Moved to no contract	Diff 2006	
1.554***	1.199***	-0.355***	2.077***	1.434 ***	-0.643***	-0.288*
(0.059)	(0.098)	(0.115)	(0.095)	(0.098)	(0.119)	(0.169)

2006			2012			
Remained contracted	Moved to no contract	Diff 2006	Remained contracted	Moved to no contract	Diff 2012	
0.611	0.528	-0.083	0.750	0.378	-0.372***	-0.290**
(0.597)	(0.591)	(0.077)	(0.590)	(0.594)	(0.103)	(0.126)

Notes: Controls include age, age square, marital status, urban vs. rural area, household size, education, father's education, a dummy variable for being new entrant in the labor market, and occupational dummies. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 11: OLS Regression for the Diff in Current Wage Between those Who Started Informality After Revolution and those Who Started Before

Variables	Log wage	
	(1)	(2)
1 if after revolution (ref. 2009-2010)	-0.187***	-0.152**
	(0.071)	(0.067)
1 if started informal employment	-0.328***	-0.144**
	(0.061)	(0.061)
After revolution*Informal empl.	0.085	0.035
	(0.102)	(0.096)
Controls	No	Yes
Constant	1.558***	1.790***
	(0.040)	(0.558)
Observations	820	820
R-squared	0.056	0.219

Notes: Controls include age, age square, marital status, urban vs. rural area, household size, education, father's education, a dummy variable for being new entrant in the labor market, and occupational dummies. Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix A

Table A1: Employment Status and Background Characteristics of Males Over Time

	Total		1998		2006		2012		2012- 1998
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	P value
Job status:									
Private formal	0.09	0.29	0.06	0.24	0.10	0.30	0.10	0.30	0.000
Private informal	0.33	0.47	0.24	0.43	0.30	0.46	0.40	0.49	0.000
Self-employed	0.08	0.27	0.07	0.25	0.09	0.28	0.08	0.27	0.029
Public sector	0.27	0.45	0.36	0.48	0.27	0.45	0.22	0.42	0.000
Unpaid family worker	0.02	0.13	0.02	0.14	0.02	0.14	0.01	0.11	0.005
Unemployed	0.07	0.25	0.08	0.27	0.07	0.25	0.06	0.24	0.000
OLF	0.14	0.35	0.17	0.37	0.15	0.36	0.13	0.33	0.000
Education level:									
Low	0.33	0.47	0.41	0.49	0.34	0.47	0.29	0.45	0.000
Intermediate	0.41	0.49	0.34	0.47	0.41	0.49	0.44	0.50	0.000
High	0.26	0.44	0.25	0.43	0.25	0.43	0.27	0.44	0.037
Individual characteristics:									
Age	32.06	8.60	32.66	9.22	31.93	8.67	31.86	8.18	0.000
Married	0.59	0.49	0.55	0.50	0.58	0.49	0.63	0.48	0.000
Household size	5.08	2.35	5.82	2.69	5.15	2.40	4.62	1.96	0.000
Urban	0.61	0.49	0.71	0.46	0.61	0.49	0.55	0.50	0.000
Educated father	0.33	0.47	0.27	0.44	0.32	0.47	0.38	0.48	0.000
Job characteristics:									
Irregular job	0.12	0.32	0.07	0.26	0.07	0.26	0.17	0.38	0.000
First job	0.41	0.49	0.30	0.46	0.38	0.48	0.49	0.50	0.000
Log real hourly wage	1.47	0.70	1.31	0.61	1.48	0.73	1.54	0.69	0.000
Number of observations	17,988		3,939		6,542		7,507		

Table A2: Background Characteristics between Informal and Formal Private Waged Workers (1998-2012)

	No Job Contract		Job Contract		
Variables	Mean	SD	Mean	SD	P Value
Education level:					
Low education	0.48	0.50	0.16	0.37	0.000
Intermediate education	0.40	0.49	0.38	0.48	0.079
High education	0.12	0.33	0.46	0.50	0.000
Individual characteristics:					
Age	30.64	7.34	32.76	7.06	0.000
Married	0.59	0.49	0.69	0.46	0.000
Household size	5.06	2.49	4.32	1.98	0.000
Urban neighbourhood	0.56	0.50	0.73	0.44	0.000
Father educated	0.22	0.41	0.51	0.50	0.000
Job characteristics:					
Irregular employment	0.37	0.48	0.00	0.00	0.000
First job	0.49	0.50	0.42	0.49	0.000
Log real hourly wage	1.36	0.62	1.65	0.76	0.000
Number of observations	5,900		1,644		