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Does Mexican Temporary Employment Program Work? Evidence from a Panel Data of Mexican States

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Abstract The effect of temporary employment programs on employment, earnings, and unemployment duration has been the focus of many studies. The gamut of these studies spans the industrialized to transition to developing economies. The evidence so far is mixed. This paper investigates the effect of temporary employment program on unemployment, wage, and unemployment duration using a panel data of Mexican states from 2005 to 2013. This paper is unique in three aspects: (1) This is the first study in the context of Mexican states using a panel data, (2) It is the first paper to use system GMM to control for potential endogeneity of temporary employment program in the labor market outcomes regressions, and (3) it is the first paper to use several detailed measures of employment besides the level of unemployment. The findings suggest that the temporary employment program instead of decreasing unemployment ends up increasing it. However, it increases employment in the critical and sub occupation categories. It has no significant effect on either wages or unemployment duration.

Keywords: Public Works Program, Temporary Employment Program-PET, Mexican Economy, System GMM.

JEL Classifications: C41, E24, J68

1. Introduction

Mexico's PET (Programa de Empleo Temporal or Temporary Employment Program) is a social safety net program managed by the Government of Mexico through three different secretariats, viz., Secretaría de Desarrollo Social (Social Development), Secretaría del Trabajo y Previsión Social (Labour and Social Welfare), and Secretaría de Medio Ambiente y Recursos Naturales (Environment and Natural Resources). It provides men and women aged 16 and older, temporary cash transfers in exchange for participation in public works projects to households in communities that are highly marginalized; suffer high unemployment levels, and/or whose livelihoods have been affected by the impact of natural disasters and other systemic crises. PET aims to reach the poor with labor-intensive public works programs that build infrastructure as well as environmental or sustainable agricultural improvements.

The temporary employment program in Mexico has hardly seen any rigorous impact evaluations hitherto due to cost and technical constraints.[1] The Mexican government is in the process of carrying out a baseline survey to conduct this program's impact evaluation. Whatever impact evaluations have been done so far is internal and is hard to rely upon due to conflict of interest and failing to meet the standards of the World Bank and other multilateral lending agencies. This study is the first of its kind to the best of our knowledge that attempts to evaluate the impact of Mexico's temporary employment program on labor market outcomes using macro level panel data.[2] We rely on a panel data of state level macro aggregates to investigate the efficacy of PET on labor market outcomes because project level data that is appropriate for a rigorous impact evaluation is not available to us.

In this study, we aim to examine the effect of PET on labor market outcomes such as unemployment, income and the duration of unemployment.

Theoretically, the active labor market programs (ALMP) such as the PET act as double- edged swords. On the one hand, it raises the employment in the imperfect labor market; on the other hand, it also raises the reservation wage, which results in the contestability in hiring workers in labor markets irrespective of the market structure, and might reduce employment in the private sector. Whichever effect is stronger will determine the overall impact on employment generation.[3] The second channel through which the ALMP affects the employment is that in the long run, the employers start substituting labor with capital due to increased wages and as a result, the production process becomes more capital intensive; and therefore, less labor-intensive jobs are created. However, the effects of ALMP on the labor market outcomes remain an empirical inquiry.

This study contributes to the existing literature primarily in three ways: (1) This is the first study in the context of Mexican states to evaluate the efficacy of PET using a panel data, (2) It is the first paper to use system GMM to control for potential endogeneity of PET in the labor market outcomes regressions, and (3) it is the first paper to use several detailed measures of employment/unemployment besides the level of unemployment to examine the labor market impacts.

The added advantage of our methodological approach to impact evaluation of the PET program on labor market outcomes relative to the randomized control trials (RCT) approach is that the latter approach mostly relies on small, and due to logistics involved, at times, unrepresentative samples; whereas, the use of macro data, which happens to be the case in this study, provides an external validity to the RCT-based findings. Additionally, the use of macro data permits us to capture the spillover, general equilibrium and/or substitution effects, which are difficult to address in the case of small RCT studies.

2. An Overview of PET

Mexico's PET is a social safety net program managed by the Government of Mexico. It was instituted in 1995. It provides temporary cash transfers in exchange for participation in public works projects to households in communities that are highly marginalized, suffer high unemployment levels, and/or whose livelihoods have been affected by the impact of natural disasters and other systemic crises.

The Ministry of Social Development, Ministry of Agriculture & Rural Development, and Ministry of Environment & Natural Resources are responsible for implementing PET in coordination with state and municipality level agencies.

The PET guarantees cash for work in the affected communities at the rate of 99% of the prevailing minimum wage. A maximum of 132 days of work is available to households above 16 years of age in the affected communities. The work provided is organized around eight thematic areas; viz., Health, Local Infrastructure Improvements, Rural Roads, Environmental Conservation, Citizen Education, Climate Change Adaptation, and Food Bank and Food.

According to a study, between 2000 and 2010, the PET program reached approximately 3.2 million beneficiaries, and since 2003, the program has spent approximately US $420 million (CONEVAL, 2011). The program is solely funded by the Government of Mexico.

3. Literature Review

Most of the impact evaluations with regards to public works programs have been carried out using quasi-experimental techniques, and not by resorting to the randomized control trials (RCTs), which is considered the gold standard in impact evaluation literature. These studies have been conducted in the context of both developed, transition, and developing economies and conclude that the overall impact of Public Works Programs on employment and earnings in the context of developed and transition economies is far from positive, and has no evidence that these programs affect the labor market outcomes in the developing countries despite their widespread use (see, for example, Betcherman et.al, 2004). These studies also suggest that the Public works programs can be an effective tool to provide a safety net for short periods of time, but does not positively influence the long-term labor market outcomes of the participants.

Most of the evaluations in developed and transition countries suggest that the program participants find it hard to find employment after the program ends (see, for example, Fay, 1996; Dar & Gill, 1998). A 1999 review by the World Bank concluded that the public works programs are only effective in providing a short-term safety net to the targeted individuals and do not help their long-term employment prospects (see, for example, Dar and Tzannatos,1999; Fretwell et al., 1999). Since, 1999, the evidence is more positive, however, the previous conclusions still hold. The effects of such programs on earnings have not been considered by most studies, and the ones that do, do not find any positive effect. The assessment coming out of the industrialized nations are overwhelmingly negative, and from the transition economies, the results are mixed. Two evaluations in the context of Poland suggest that these programs adversely affected the participants' (especially men) exit from unemployment and future employment prospects. One of the consequences of these programs was to stereotype the participants as low productivity workers (see Kluve et. al., 1999 & 2002). Evaluations in Slovakia, Slovenia, Ukraine, and Macedonia found that participation in public works had an immediate positive impact on the post-program transition into employment (see, for example, Lubyova & Van Ours, 1999; Olga, 2000; Terrell & Sorm, 1999; Vodopivec, 1999). However, according to the studies in Slovenia and Ukraine, this positive effect only applied if participants found a job shortly after the program ended. In Slovenia, for example, there was no longer a positive program effect if no job had been found in three months. In Macedonia, the positive employment result was achieved at a very high unit cost. In Romania,

participation in public works had no impact on either wage employment or self-employment (see, for example, Benus & Rodriguez, 2002).

For developing countries, Argentina provides a case study in the form of inconclusive evidence about the employment effectiveness of the public works program. Ravallion et al. (2001) find that this program did provide a safety net to the participants in the form of increased income, however, they were unable to assess its impact on long-term earnings and employment prospects of the participants. The study was based on a randomized controlled trial.

More recently Card et. al. (2015) conduct a meta-analysis of over 200 ALMP and find that the short-term average impact of these programs on the probability of employment is close to zero. However, the effect becomes positive after 2-3 years of the completion of the program.

4. Econometric Strategy

Our objective in this study is to understand how the Mexican temporary employment program affected the labor market outcomes such as employment, earnings, and unemployment duration. The ideal approach to evaluating the impact of such a program on a particular intended outcome is to carry out a randomized control trial (RCT) with clearly specified control and treatment groups and collect data on the relevant indicators for both pre- and post-treatment periods. And then compare the mean outcomes of the two groups to assess if the treatment met its intended objective. These RCTs are expected to become the standard bearers in regard to impact evaluations of publicly funded projects. But, for now, we have to do without them, since the Mexican government did not assess the impact of PET using a rigorous methodology, as is usually advocated by the World Bank these days. [4] In the absence of RCTs, one can still carry out a meaningful analysis by resorting to quasi and non-experimental econometric techniques.

We have access to data from each state on funds received per person in the labor force under PET from the federal government. [5] This data will allow us to ask questions such as, did an increase in federal transfers under PET to the states affect employment, earnings, and duration of unemployment?

Thus, we estimate the following equation to assess the impact of PET on labor market outcomes:

$$y_{it} = \beta_0 + \beta_1 pet_{it} + \beta_2 x_{it} + \theta_i + u_{it} \quad (1)$$

where y_{it} is a measure of unemployment/employment, in the i^{th} state in t^{th} time period. The term pet_{it} is the transfers made by the federal government to the i^{th} state in t^{th} time period under the temporary employment program. The term x_{it} is the matrix of other controls pertaining to the i^{th} state in t^{th} time period. The term θ_i is the unobserved state fixed effect, which is time invariant. The term u_{it} is the idiosyncratic error term. The estimation of this equation using pooled OLS is likely to result in a biased estimate of β_1 due to the possibility of endogeneity bias. The source of this bias may be due to the omitted variables which include both time invariant and time varying variables in equation (1), such as the geographical locations of the state, which is time invariant; and the bureaucratic efficiency, which is likely to vary over time and across states.

It can be argued that due to their geographical locations, some states in Mexico are more prone to natural disasters than the others, and therefore are more likely to suffer from higher unemployment, as productive capacities are adversely affected in the state, making them suitable candidates for receiving larger funding from the federal government under PET for assistance. If that is the case, then we cannot estimate the isolated effect of PET transfers on labor market outcomes, as it is hard to untangle the effect of PET on labor market outcomes from that of the natural disaster, *per se*. Analogously, the bureaucratic efficiency, which is not observed in our data, but which varies over time and across states, can also influence both the amount received from the federal government under the PET program and the labor market outcomes in the state. This also is likely to bias the coefficient of PET transfers in the OLS regression.

The time-invariant sources of the bias θ_i can be eliminated by resorting to the fixed effects model estimation, which differences out the time-invariant variables from equation (1). However, this still might produce a biased estimate due the presence of time-varying variables still present in the error term u_{it}. One solution is to resort to the instrumental variables estimation to deal with endogeneity bias. However, finding an instrumental variable that is correlated with PET transfers but not correlated with the unobserved error term is seldom easy. However, in this situation, we can resort to a dynamic panel specific difference GMM estimation due to Arellano – Bond (1991), but first proposed by Holtz-Eakin, Newey, and Rosen (1988).

The dynamic panel specification is warranted because the labor market outcomes tend to be correlated over time. For example, one would expect the previous period's unemployment rate to be correlated with the next period's unemployment rate. Rather than using the difference GMM estimator, we rely on the system GMM approach, as it uses the levels equation to derive two separate equations in levels and differences. The benefit of this estimator is that it also allows us to obtain additional instruments since the variables in levels in the second equation are instrumented with their own first differences. This has also been shown to increase the efficiency of the estimates (Mileva, 2007). Also, following Roodman (2009) we use only one particular lag of the exogenous variables to create instruments, since if all lags are used, then the estimates are likely to be driven by the number of instruments.

The consistency of system GMM estimator crucially depends on the fulfillment of two conditions. (1) There is no serial correlation among the idiosyncratic error terms. And (2) The validity of the instrumental variables created from the lagged values of the explanatory variables must be confirmed. The fulfillment of the first condition could be ensured by the examination of serial correlation in the error term. This test involves detecting the first and second order serial correlation in the differenced error terms. Typically, first order serial correlation is detected in the differenced error terms, however, detection of the second order serial correlation will invalidate the moment conditions resulting in inconsistent estimates. The second condition could be satisfied by relying on the Sargan test of exogeneity of instruments, which tests the null hypothesis of overall validity of instruments. The instruments are valid only if we fail to reject the null hypothesis. (For an application of the above methodology, see Cardenas & Sharma, 2011; Dutt, 2009, Sharma, 2015; Sharma & Cardenas, 2016).

Thus, we estimate the transformed equation, which is obtained by taking the first differences:

$$\Delta y_{it} = \propto_0 \Delta y_{i,t-1} + \propto_1 \Delta pet_{i,t} + \propto_2 \Delta x_{it} + \Delta u_{it} \quad (2)$$

where Δ represents the first difference.

Analogously, we estimate the effect of PET transfers on wages and unemployment duration using the following equations:

$$\Delta w_{it} = \propto_0 \Delta w_{i,t-1} + \propto_1 \Delta pet_{i,t} + \propto_2 \Delta x_{it} + \Delta u_{it} \quad (3)$$

where w is the median wage in the i^{th} state in t^{th} year.

$$\Delta ud_{it} = \propto_0 \Delta ud_{i,t-1} + \propto_1 \Delta pet_{i,t} + \propto_2 \Delta x_{it} + \Delta u_{it} \quad (4)$$

where ud is the median unemployment duration in the i^{th} state in t^{th} year.

5. Data

The data for this study is sourced from the National Accounts for GDP, Population projections for migration variable, and National Survey of Occupation and Employment (Encuesta Nacional de Ocupación y Empleo). The data, which is measured on an annual basis, covers all 31 Mexican states including Mexico City (erstwhile known as the Federal District of Mexico) and spans from 2005-2013. The data is a balanced panel data. The description of variables and summary statistics are provided in Tables 1 & 2 respectively.

We rely on three measures to assess the effect of PET on labor market outcomes, viz., employment, earnings, and unemployment duration.

For unemployment/employment, we have access to five separate measures. First, we have the overall unemployment rate. The mean overall unemployment rate in all states from 2005 to 2013 was 4.3% with a maximum of 8.47% in Chihuahua in 2009 and a minimum of 1.13% in Guerrero in 2005. The second one is critical employment. The mean of this variable was 11.69% with a maximum of 37.63% in Chiapas in 2005 and a minimum of 2.34% in Baja California in 2006. The third variable is informal1 with a mean of 26.8% with a maximum of 39.64% in Tlaxcala in 2013 and a minimum of 16.6% in Chihuahua in 2005. The fourth employment-related variable is informal2. The mean of this variable was 58.82% with a maximum of 81.81% in Oaxaca in 2009 and a minimum of 37.72 in Baja California Sur in 2006. The final employment-related variable is sub-occupation. The mean of this variable was 8.344%. The maximum of this variable was 24.68% in Tlaxcala in 2009 and the minimum was 1.18% in Baja California in 2007.

We use median hourly wage to proxy earnings in this study. The mean of this variable is 19.46 pesos with a maximum of 32.09 pesos in Baja California Sur in 2013 and a minimum of 8.09 pesos in Chiapas in 2005.

For unemployment duration, we use median unemployment duration in each state. The mean of this variable is 1.1 months across all states with a maximum of 2.43 months in Durango in 2010 and a minimum of 0.61 months in Nayarit in 2008.

The primary variable of interest is the average transfers per person in the labor force from the federal government to the states (PET). The mean value of this variable across all states was 55.18 pesos with the maximum value being 177.3 pesos in Tabasco in 2007 and the minimum being 4.910 pesos in Mexico in 2008.

Table 1 presents the descriptions of each variable used in this study and table two presents the descriptive statistics of these variables.

6. Results

Table 3 presents the estimation results of the overall unemployment rate. Column 2 displays the estimations of pooled ordinary least squares (pooled OLS), column 3 for the fixed effects model, and column 4 for the system GMM estimator. The variable of interest PET transfers is positive and statistically significant in all three model specifications, being significant at 1% level in the latter two specifications, while at 5% in the former specification. This result clearly suggests that an increase in PET transfers from the federal government to the states ended up increasing unemployment.

Table 4 presents the estimation results for critical employment rate. Column 2 displays the estimations of pooled ordinary least squares (pooled OLS), column 3 for the fixed effects model, and column 4 for the system GMM estimator. The variable of interest PET transfers is positive and statistically significant at 1% level in the first two model specifications and at 5% in the system GMM specification.

Table 5 presents the estimation results of informal1. Under this specification, PET transfers are positively associated with employment in the informal1 sector only under the fixed effects estimation with statistical significance at 10%. In other two specifications, this variable is not statistically significant.

Table 6 presents the results of informal2. Under this specification, PET transfers are positively associated with employment in the informal2 sector only under the fixed effects estimation with statistical significance at 10%.
Table 7 presents the estimation results of sub-occupation. Here the variable PET transfers are positively associated with sub-occupation in all three models but is statistically significant at 5% under fixed effects and at 1% under the system GMM estimation.

Table 8 presents the estimation results of wage regressions. It is evident from all three model specifications that PET has no statistically significant effect on median wage, implying it was not successful in augmenting earnings.

Table 9 presents the estimation results of unemployment duration regressions. The results suggest that PET has no statistically significant effect on median unemployment duration in all three specifications.

The above results do not change when we control for linear time trends in our regressions.

7. Discussion

The overall unemployment increases as a result of increased transfers under PET, which is opposite of what intuition suggests. We can think of at least two channels through which this might be happening. First, as suggested by Basu et.al. (2009) and other scholars that the employment guarantee schemes (EGS) and other social safety nets tend to raise reservation wage. This compels the private sector employers to raise wages. If workers are still not taking up the jobs, then it implies that the rate of wage adjustment in the private sector is not quick enough to induce these workers who are used to and also expect the reservation wages plus a premium attributable to job search cost and relocation cost from rural to urban/employment centers. In this case, the effect on employment is expected to be negative in the short-run.

The second possibility to explain our empirical findings is that in the long run, the employers start substituting labor with capital due to increased wages and as a result, the production process becomes more capital intensive; and therefore, less labor-intensive jobs are created. This is evident in the decline in labor's share of national income in Mexico from 32.5% in 2000 to 25% in 2009 according to the OECD data.[6] Also in our data, we do observe wages to rise over time, and therefore the above hypotheses to explain our empirical findings are not implausible.

Both channels above hinge crucially on an increase in wages. The finding of our paper shows no positive influence on median wage attributable to PET. However, it is possible that the wages might have risen due to PET, especially for the lowest quartiles of the workers, but could not be detected by our measure of wage, which happens to be the median wage. This scenario is more plausible since wages have been rising over time in our data.

Additionally, our findings suggest that the PET increased employment in other measures of employment that better represent the marginalized and vulnerable sections of the society such as the critical employment and sub occupation categories. This implies that those who kept the job were pushed into more vulnerable and challenging employment conditions due to PET.

8. Conclusion

The efficacy of Public works programs has been studied extensively with evidence coming out of developed, transition, and developing economies. These studies have yielded mixed results with regards to its efficacy on employment generation, earnings, and unemployment duration.

Mexico initiated the temporary employment program in 1995 to provide social safety nets to the marginalized sections of the society. Later on, it was expanded to cover some other disadvantaged groups as well. There are hardly any rigorous impact evaluations available to judge the efficacy of this program that uses randomized control trials, or even quasi-experimental econometric studies since there is no appropriate data available to the researchers for this purpose. This study attempts

to fill this gap by utilizing a panel data of Mexican states and should be considered a good first step in the absence of project level impact evaluation, as it provides us with an understanding of PET's impact on the macro level labor market outcomes while also correcting for its endogeneity bias using panel specific system GMM estimator. This study finds that PET transfers did not reduce the overall employment in Mexican states, on the contrary, it has an adverse impact on it. However, when we consider other measures of employment that better represent the marginalized and vulnerable sections of the society such as the critical employment and sub occupation, we find a positive impact. We do not find any evidence to suggest that the PET transfers have any positive influence on earnings or unemployment duration; however, it is possible that these measures might have been influenced, but we do not see the evidence because both measures are captured by the median. It is possible for wages in the lowest quartiles to have gone up due to PET transfers without influencing the median. The same is possible for the median unemployment duration. More can be said about these two variables if more appropriate data becomes available to the researchers in the future. Our results also support the conclusions drawn by some studies in the context of other countries, albeit our methodological approach is different from those studies.

In the light of the findings of this study, we suggest that the Mexican government review PET and make appropriate changes, such that it goes beyond just serving as the temporary social safety net to the affected people and enhance their future employment and earnings prospects by designing programs that augment human capital endowments.

Endnotes

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1. Scott et al (2000) developed a framework for comprehensive assessment of the program. As far as we know, PET has not been evaluated under this methodology, and even if this has been carried out, the results are not known to the public.

2. An evaluation from the Universidad de Colima evaluated PET using a stratified sampling and compared a group of program beneficiaries with a similar group not receiving the program benefits. The study shows that 60% of the program beneficiaries managed to overcome the extreme poverty line. It also reported positive externalities in the construction of rural roads and high participation of women (see Samaniego, 2002).

3. Basu et. al. (2009) discuss these possibilities in the context of employment guarantee schemes.

4. Universidad de Colima study, however, is an exception.

5. These variables were constructed using labor force information from Encuesta Nacional de Ocupación y Empleo (National Survey on Occupation and Employment) and Functional and Programmatic Classification of Federal Government Budget (National Public Accounts).

6. http://stats.oecd.org/Index.aspx?queryname=345&querytype=view

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Table 1: Variable Description

Variable	Description
pop	State total population
age	Median years of age of the labor force
schooling	Median years of schooling of the labor force (employed and unemployed)
hrwork	Median weekly hours worked by the employed
wage	Median hourly wage of the employed
partrate	Participation rate = (labor force /population 14 years and older)
unemployment	Number of unemployed / labor force
critemploy	Proportion of employed population working less than 35 hours a week for "market reasons" plus the proportion of employed people working more than 48 hours a week and making between 1 and 2 minimum wages or working more than 35 hours a week making less than a minimum wage.
informal1	Percentage of employed population working in an economic unit operating from household resources, but not akin to small enterprise, so that the activity has no independent situation of the household.
informal2	Proportion of employed population comprising the sum, without double counting, of the employed people who are occupationally vulnerable by the nature of the economic unit for which they are working, altogether with those other occupied individuals whose relation or employment status is not recognized by their jobs. Thus, this rate includes besides the component working in economic units unregistered or informal similar to other occupied as domestics paid without social security , self-employed workers in subsistence agriculture, workers paid and unpaid workers and subordinates who work without the protection of social security and whose services are used by economic units registered. This rate is calculated by taking as reference (denominator) to the total working population.
subocupation	Percentage of employed people with the need and availability to offer more working hours
nismi	Net interstate migration rate per 100 inhabitants
econdepen	(People less than 14 years old plus people not in the labor force / Labor force)
gdp	State real GDP
primary	State real GDP of the primary (agricultural and mining) sector
secondary	State GDP of the secondary (industrial) sector
tertiary	State GDP of the tertiary (services) sector
oil	State GDP related to oil mining
gov	State GDP related to government services
rural	State percentage of rural population
realremitpc	Median Real Remittances per capita
laborforce	Number of employed plus number of unemployed
petlabfor	Median PET transfers per person in the labor force received by a state
recession	Dummy for recession years of 2008 and 2009
unemdur	Median unemployment duration

Table 2: Summary Statistics

Variables	(1) N	(2) mean	(3) sd	(4) min	(5) max
population	297	6.835e+06	1.900e+07	546,825	1.184e+08
age	297	35.99	1.090	33.75	39.25
schooling	297	8.810	0.884	6	12
hrwork	297	27.34	11.26	13.12	48
wage	297	19.47	4.069	8.090	32.09
partrate	297	58.99	3.002	52.82	69.41
unemployment	297	4.337	1.569	1.130	8.470
critemploy	297	11.69	5.810	2.340	37.63
informal1	297	26.80	5.447	16.60	39.64
informal2	297	58.82	11.76	37.72	81.81
subocupation	297	8.344	4.217	1.180	24.68
econdepen	297	1.345	0.167	0.940	1.780
laborforce	297	2.921e+06	8.129e+06	238,509	5.205e+07
realremit	297	720.2	2,019	13.41	14,086
realremitpc	297	109.0	63.83	23.02	319.1
gdp	297	726,156	2.033e+06	58,586	1.312e+07
primary	297	23,219	64,466	964.9	407,528
secondary	297	263,293	735,115	15,830	4.553e+06
oil	297	57,301	192,553	0	1.028e+06
tertiary	297	439,644	1.249e+06	34,499	8.186e+06
gov	297	28,182	80,150	3,652	489,531
nismi	297	0.152	0.553	-1.013	2.160
rural	297	33.44	18.38	1.238	75.86
petlabfor	288	55.18	31.06	4.910	177.3
recession	297	0.222	0.416	0	1
unemdur	297	1.1079	0.3563	0.613	2.432

Table 3: Dependent variable: Unemployment rate

Variables	(1) OLS	(2) Fixed Effect	(3) System GMM
population	-1.48e-06**	2.96e-06	-1.28e-06
	(6.99e-07)	(2.44e-06)	(2.28e-06)
age	-0.187	0.381**	0.220
	(0.176)	(0.163)	(0.133)
schooling	0.465**	0.129	0.163
	(0.190)	(0.114)	(0.168)
hrwork	-0.0168	-0.00680	0.0111
	(0.0111)	(0.00518)	(0.00739)
wage	0.133*	0.134*	0.131
	(0.0669)	(0.0658)	(0.0858)
partrate	-0.282	0.0505	0.000277
	(0.230)	(0.110)	(0.132)
econdepen	0.0588	-0.438	3.070
	(4.760)	(3.273)	(3.317)
laborforce	4.44e-06**	-1.21e-06	4.97e-06
	(1.76e-06)	(3.16e-06)	(3.51e-06)
realremitpc	-0.00283	-0.00324	-0.00371
	(0.00243)	(0.00353)	(0.00414)
gdp	-3.39e-05**	-3.68e-05***	-2.62e-05***
	(1.56e-05)	(7.41e-06)	(7.16e-06)
primary	-		
secondary	3.09e-05*	4.11e-05***	2.60e-05***
	(1.54e-05)	(8.26e-06)	(8.52e-06)
tertiary	3.60e-05**		
	(1.53e-05)		
gov	-0.000131	0.000347***	0.000209
	(7.84e-05)	(0.000111)	(0.000145)
nismi	-0.494	-4.190***	-2.976**
	(0.448)	(1.149)	(1.501)
rural	-0.0242*	-0.0233*	-0.0107
	(0.0122)	(0.0117)	(0.0106)
petlabfor	0.0105**	0.0115***	0.0136***
	(0.00385)	(0.00388)	(0.00362)
recession	0.434**	0.399***	0.766***
	(0.195)	(0.140)	(0.141)
primary		4.55e-06	-8.86e-05
		(3.97e-05)	(5.42e-05)
tertiary		-	
L.unemployment			0.496***
			(0.0765)
Constant	22.51	-19.76	
	(26.30)	(13.14)	
Observations	279	279	217
R-squared	0.547	0.656	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1,
Arellano-Bond test for AR(2) in first differences: z = 0.66 Pr > z = 0.507
Difference (null H = exogenous): chi2(2) = 3.55 Prob > chi2 = 0.169

Table 4: Dependent variable: Critical Employment

Variables	(1) OLS	(2) Fixed Effect	(3) System GMM
population	2.25e-06	2.52e-06	2.80e-06
	(1.85e-06)	(3.62e-06)	(3.14e-06)
age	0.411	0.727***	0.229
	(0.380)	(0.210)	(0.186)
schooling	-1.509	-0.0366	0.108
	(0.897)	(0.217)	(0.234)
hrwork	-0.0131	0.0387***	0.0379***
	(0.0260)	(0.0127)	(0.0111)
wage	-0.804***	-0.711***	-0.326***
	(0.140)	(0.122)	(0.119)
partrate	0.542**	0.331	-0.170
	(0.251)	(0.211)	(0.185)
econdepen	10.27*	-2.895	-12.78***
	(5.845)	(5.870)	(4.785)
laborforce	-5.13e-07	-4.86e-06	-5.01e-06
	(4.16e-06)	(5.12e-06)	(4.81e-06)
realremitpc	-0.0260***	-0.0262***	-0.0215***
	(0.00739)	(0.00882)	(0.00575)
gdp	-2.12e-05	4.03e-06	-1.58e-05
	(3.55e-05)	(8.27e-06)	(9.75e-06)
primary	-		
secondary	2.12e-05	-7.27e-06	1.78e-05
	(3.62e-05)	(9.62e-06)	(1.16e-05)
tertiary	1.61e-05		
	(3.80e-05)		
gov	-0.000594**	0.000317*	0.000475**
	(0.000244)	(0.000168)	(0.000198)
nismi	-0.457	-5.124***	-7.052***
	(0.674)	(1.422)	(2.078)
rural	0.0145	0.0235*	0.0431***
	(0.0270)	(0.0137)	(0.0138)
petlabfor	0.0360***	0.0181***	0.0112**
	(0.00805)	(0.00578)	(0.00492)
recession	-0.634*	-0.318	-0.129
	(0.322)	(0.205)	(0.221)
primary		-0.000124	-9.47e-05
		(7.95e-05)	(7.38e-05)
tertiary		-	
L.critemploy			0.157**
			(0.0788)
Constant	-18.40	-18.71	
	(35.31)	(23.48)	
Observations	279	279	217
R-squared	0.857	0.599	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Arellano-Bond test for AR(2) in first differences: z = -1.29 Pr > z = 0.196
Difference (null H = exogenous): chi2(2) = 11.68 Prob > chi2 = 0.07

Table 5: Dependent Variable: Informal1

Variables	(1) OLS	(2) Fixed Effect	(3) System GMM
population	-6.30e-06	3.39e-06	3.93e-06
	(4.73e-06)	(4.97e-06)	(3.56e-06)
age	0.885	0.632**	0.435**
	(0.629)	(0.248)	(0.214)
schooling	0.791	0.0460	0.0397
	(0.722)	(0.242)	(0.264)
hrwork	-0.164***	-0.0295**	-0.0171
	(0.0326)	(0.0139)	(0.0115)
wage	-0.657***	-0.0451	-0.0501
	(0.216)	(0.127)	(0.135)
partrate	0.662	0.626**	0.388*
	(0.601)	(0.237)	(0.210)
econdepen	9.954	3.292	1.445
	(16.66)	(6.411)	(5.218)
laborforce	1.87e-05	-5.52e-06	-5.01e-06
	(1.16e-05)	(6.74e-06)	(5.46e-06)
realremitpc	0.0146	-0.0119*	-0.00828
	(0.0139)	(0.00623)	(0.00652)
gdp	-0.000120*	-2.59e-07	-4.18e-06
	(6.10e-05)	(9.53e-06)	(1.11e-05)
primary	-		
secondary	0.000119*	-9.49e-06	-2.86e-06
	(5.96e-05)	(1.10e-05)	(1.32e-05)
tertiary	0.000114*		
	(6.19e-05)		
gov	-0.000257	-9.79e-05	-2.69e-06
	(0.000194)	(0.000276)	(0.000226)
nismi	0.237	0.306	-1.155
	(1.376)	(1.783)	(2.150)
rural	0.0715*	-2.02e-05	-0.00748
	(0.0389)	(0.0201)	(0.0151)
petlabfor	-0.0185	0.0100*	0.00706
	(0.0152)	(0.00549)	(0.00549)
recession	-1.812***	-0.193	0.147
	(0.488)	(0.231)	(0.210)
primary		-0.000176***	-0.000241***
		(5.19e-05)	(8.49e-05)
tertiary		-	
L.informal1			0.295***
			(0.0848)
Constant	-49.67	-34.28	
	(75.86)	(26.84)	
Observations	279	279	217
R-squared	0.673	0.328	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Arellano-Bond test for AR(2) in first differences: z = 0.02 Pr > z = 0.985
Difference (null H = exogenous): chi2(2) = 4.74 Prob > chi2 = 0.094

Table 6: Dependent Variable: Informal2

Variables	(1) OLS	(2) Fixed Effect	(3) System GMM
population	4.72e-07	5.37e-06	-6.50e-07
	(4.80e-06)	(3.46e-06)	(5.09e-06)
age	1.820**	0.601**	0.107
	(0.791)	(0.249)	(0.234)
schooling	-1.399	0.0461	-0.237
	(1.165)	(0.198)	(0.286)
hrwork	-0.196***	-0.00408	-0.0143
	(0.0432)	(0.0119)	(0.0184)
wage	-1.026***	-0.316**	-0.254
	(0.342)	(0.142)	(0.175)
partrate	1.528*	0.237	-0.486**
	(0.830)	(0.230)	(0.234)
econdepen	17.34	-7.912	-10.15*
	(19.37)	(6.319)	(5.973)
laborforce	9.09e-06	-7.94e-06	2.75e-06
	(1.16e-05)	(4.90e-06)	(7.37e-06)
realremitpc	0.0263*	-0.0151**	-0.0145*
	(0.0139)	(0.00664)	(0.00758)
gdp	-3.46e-05	-1.00e-05	-1.22e-05
	(0.000102)	(1.40e-05)	(1.31e-05)
primary	-		
secondary	3.53e-05	5.74e-07	3.79e-06
	(0.000103)	(1.50e-05)	(1.60e-05)
tertiary	1.13e-05		
	(9.88e-05)		
gov	-0.00101***	-0.000146	-0.000131
	(0.000321)	(0.000260)	(0.000243)
nismi	-1.808	-3.707*	-3.048
	(2.301)	(2.033)	(3.182)
rural	0.174**	-0.00450	-0.0109
	(0.0727)	(0.0194)	(0.0177)
petlabfor	0.0323	0.0138*	0.00166
	(0.0235)	(0.00738)	(0.00609)
recession	-2.629***	0.127	0.573**
	(0.710)	(0.264)	(0.240)
primary		-8.50e-05	-8.85e-05
		(7.08e-05)	(9.69e-05)
tertiary		-	
L.informal2			0.443***
			(0.110)
Constant	-91.12	40.89	
	(96.26)	(25.00)	
Observations	279	279	217
R-squared	0.850	0.320	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Arellano-Bond test for AR(2) in first differences: z = -0.19 Pr > z = 0.850
Difference (null H = exogenous): chi2(2) = 3.88 Prob > chi2 = 0.143

Table 7: Dependent Variable: Sub Occupation

Variables	(1) OLS	(2) Fixed Effect	(3) System GMM
population	-3.34e-06	4.05e-06	-4.19e-06
	(4.59e-06)	(6.12e-06)	(4.64e-06)
age	0.766	1.167*	0.691**
	(0.659)	(0.609)	(0.273)
schooling	1.071	0.588	0.599
	(0.751)	(0.508)	(0.367)
hrwork	-0.0543	0.0186	0.00673
	(0.0353)	(0.0162)	(0.0148)
wage	-0.0152	0.168	0.0113
	(0.241)	(0.155)	(0.175)
partrate	0.824	0.705**	0.294
	(0.682)	(0.301)	(0.276)
econdepen	17.10	2.313	5.249
	(15.66)	(7.005)	(6.810)
laborforce	1.07e-05	-3.78e-06	7.37e-06
	(1.10e-05)	(8.97e-06)	(7.16e-06)
realremitpc	-0.00348	0.00469	-0.00313
	(0.0115)	(0.0154)	(0.00863)
gdp	7.26e-06	-3.87e-05**	-3.13e-05**
	(5.22e-05)	(1.82e-05)	(1.44e-05)
primary	-		
secondary	-1.17e-05	4.16e-05**	3.26e-05*
	(5.17e-05)	(2.02e-05)	(1.71e-05)
tertiary	5.84e-06		
	(5.16e-05)		
gov	-0.000669	0.000199	0.000523*
	(0.000477)	(0.000276)	(0.000300)
nismi	0.488	-2.575	-6.594**
	(1.549)	(2.548)	(2.961)
rural	0.0486	-0.0182	-0.0202
	(0.0564)	(0.0185)	(0.0215)
petlabfor	0.0189	0.0246**	0.0305***
	(0.0178)	(0.0104)	(0.00736)
recession	-0.540	0.320	0.965***
	(0.558)	(0.296)	(0.284)
primary		-9.08e-05	-2.87e-06
		(0.000104)	(0.000111)
tertiary		-	
L.subocupation			0.469***
			(0.0765)
Constant	-99.15	-90.35**	
	(80.80)	(43.52)	
Observations	279	279	217
R-squared	0.225	0.357	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Arellano-Bond test for AR(2) in first differences: z = 0.22 Pr > z = 0.829
Difference (null H = exogenous): chi2(2) =5.36 Prob > chi2 = 0.069

Table 8: Dependent Variable: Unemployment Duration

Variables	(1) OLS	(2) Fixed Effect	(3) System GMM
population	-2.16e-07	1.45e-07	-4.60e-08
	(2.94e-07)	(4.53e-07)	(4.30e-07)
age	-0.0240	-0.0235	-0.0340
	(0.0320)	(0.0317)	(0.0271)
schooling	-0.0374	0.0232	-0.0622*
	(0.0366)	(0.0435)	(0.0333)
hrwork	-0.00113	-0.000700	-0.000285
	(0.00199)	(0.00140)	(0.00158)
wage	-0.0139	0.0152	0.00847
	(0.0134)	(0.0156)	(0.0167)
partrate	-0.0432	-0.00630	-0.0328
	(0.0293)	(0.0214)	(0.0267)
unemployment	0.0934***	0.0806***	0.0810***
	(0.0273)	(0.0217)	(0.0210)
critemploy	-0.0142	0.0123	0.000989
	(0.0110)	(0.00841)	(0.0118)
informal1	0.00316	0.0163	0.0204
	(0.00946)	(0.0115)	(0.0146)
informal2	0.00409	-0.00964	-0.00939
	(0.00872)	(0.00942)	(0.0131)
subocupation	-0.00907	-0.0130	-0.0232***
	(0.00933)	(0.00831)	(0.00887)
econdepen	-0.0173	1.255**	0.306
	(0.752)	(0.519)	(0.670)
laborforce	8.28e-07	6.08e-07	7.32e-07
	(6.54e-07)	(6.88e-07)	(6.67e-07)
realremitpc	-0.000443	-0.00269***	-0.00239***
	(0.000657)	(0.000877)	(0.000861)
gdp	-1.66e-06	-1.83e-06*	-1.41e-06
	(6.64e-06)	(1.01e-06)	(1.48e-06)
primary	-		
secondary	1.56e-06	1.47e-06	1.38e-06
	(6.61e-06)	(1.28e-06)	(1.75e-06)
tertiary	5.96e-07		
	(6.64e-06)		
gov	-1.83e-05	-3.33e-06	-3.13e-06
	(2.44e-05)	(2.17e-05)	(2.80e-05)
nismi	0.0556	-0.311	-0.459
	(0.0921)	(0.208)	(0.283)
rural	-0.00279	0.000898	-0.000591
	(0.00226)	(0.00171)	(0.00197)
petlabfor	0.000420	0.000370	0.000536
	(0.000821)	(0.000618)	(0.000713)
recession	-0.0810**	-0.0788***	-0.0300
	(0.0320)	(0.0262)	(0.0299)
primary		2.07e-05**	6.57e-07
		(9.91e-06)	(1.06e-05)
tertiary		-	
L.unemdur			0.172**
			(0.0733)
Constant	4.763	-0.971	
	(3.370)	(2.542)	
Observations	279	279	217
R-squared	0.539	0.562	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Arellano-Bond test for AR(2) in first differences: z = -1.46 Pr > z = 0.145
Difference (null H = exogenous): chi2(2) =1.97 Prob > chi2 = 0.374

Table 9: Dependent Variable: Wage

Variables	(1) OLS	(2) System GMM	(3) System GMM
population	-1.26e-06	7.63e-06***	3.84e-06*
	(1.11e-06)	(2.77e-06)	(2.05e-06)
age	0.322	0.499***	0.252**
	(0.253)	(0.151)	(0.101)
schooling	-0.297	0.0238	0.0300
	(0.282)	(0.134)	(0.131)
hrwork	-0.0420***	-0.00835	0.00841
	(0.0123)	(0.00595)	(0.00765)
partrate	0.0185	-0.0330	0.148
	(0.287)	(0.117)	(0.103)
unemployment	0.275**	0.224**	-0.0851
	(0.117)	(0.0829)	(0.0812)
critemploy	-0.326***	-0.288***	-0.136***
	(0.0699)	(0.0483)	(0.0504)
informal1	-0.152***	0.101	0.0253
	(0.0535)	(0.0632)	(0.0548)
informal2	0.0532	-0.163**	-0.0579
	(0.0441)	(0.0696)	(0.0534)
subocupation	0.0358	0.0611**	-0.00586
	(0.0447)	(0.0297)	(0.0388)
econdepen	-1.234	-13.82***	-5.223*
	(6.469)	(2.631)	(2.651)
laborforce	1.52e-06	-1.44e-05***	-7.02e-06**
	(2.87e-06)	(4.42e-06)	(2.91e-06)
realremitpc	-0.00413	-0.00970**	-0.00677**
	(0.00510)	(0.00397)	(0.00331)
gdp	5.07e-05*	3.37e-05***	8.70e-06
	(2.87e-05)	(7.37e-06)	(5.84e-06)
primary	-		
secondary	-5.22e-05*	-4.24e-05***	-1.29e-05*
	(2.85e-05)	(7.81e-06)	(7.13e-06)
tertiary	-4.30e-05		
	(2.89e-05)		
gov	0.000127	-0.000183	6.76e-05
	(0.000110)	(0.000110)	(0.000106)
nismi	2.311***	1.383	-0.807
	(0.789)	(1.187)	(1.270)
rural	-0.0359**	0.00172	0.00183
	(0.0135)	(0.00911)	(0.00801)
petlabfor	0.00894	0.00256	0.000191
	(0.00748)	(0.00414)	(0.00271)
recession	-0.139	-0.0595	-0.209*
	(0.205)	(0.122)	(0.110)
primary		-2.49e-05	-8.54e-05**
		(4.76e-05)	(4.23e-05)
tertiary		-	
L.wage			0.602***
			(0.0675)
Constant	15.02	23.43*	
	(32.64)	(12.13)	
Observations	279	279	217
R-squared	0.902	0.893	
Number of stateid		31	31

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Arellano-Bond test for AR(2) in first differences: z = 0.45 Pr > z = 0.652
Difference (null H = exogenous): chi2(2) = 0.17 Prob > chi2 = 0.920