Applied Econometrics (MSc.)
Lecture 10
Static Linear Panel Data Models
Application

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January 5, 2015

- Reference: Kerr, A., & Teal, F. 2012. The Determinants of Earnings Inequalities: Panel Data Evidence from South Africa, CSAE Working Paper, WPS/2012-04.
- Data from 2004 shows that black self-employed workers in Kwazulu-Natal province, South Africa earned 6 times lower than black employees in private sector firms
- Those employed in the private sector earned half of what workers in the public sector earn
- What explains these vast differences between the average earnings of the workers in the different sectors?
- Human capital theory: workers' productivities explain their earnings, and sector choices

- Alternative explanations from extensions of the Harris and Todaro (1970) model: institutional features of the labor market prevent formal sector earnings from equalizing the demand and supply of labor in this sector and can generate wage differential between different sectors for otherwise identical workers
- Kerr & Teal (2012) test these alternative explanations using a panel data set from SA
- Possible to control for both observable and unobservable individual heterogeneity that determine earnings
- Also analyze the relative contributions of human capital and two key formal sector institutions, public sector pay policy and trade unions to earnings determination
- Badaoui et al. (2008) explores a similar topic in SA using panel data but focused solely on wage employees in the

- In addition, Badaoui et al., use panel data but don't address two of its major limitations: measurement error and attrition. Also does not consider the endogeneity of movement between sectors
  - Kerr & Teal (2012) address these issues
- In doing so, the authors focus only on Black South Africans. This is mainly for clearly disentangling the impact of the determinants of earnings other than racial difference (which is a hard fact in SA) on labor market outcomes

- Institutional features of labor market in SA which generate inequality in earnings between similar-skill workers in different sectors (**Segmentation**)
- Fields (1975) extension of the Harris and Todaro (1970) model: considers urban, informal, free-entry sector, along with the urban formal sector and rural agriculture, where existence of a minimum wage or union activity in the formal sector created wage differentials between the formal and informal sector and left those in the informal sector worse-off than those in the formal sector
- Alternative explanation (traditional neoclassical framework): productivity of individuals as the primary driver of wages in a competitive labor market
- This emphasis on individual heterogeneity driving both earnings and selection has let to a large part of the

- Quintin (2006) find no evidence that earnings functions in the formal and informal sectors difference in equilibrium using panel data from Argentina
- Badaoui et al. (2008) find no evidence of an earnings premium for formal sector workers in SA once controlling for unobserved individual heterogeneity
- Botelho & Ponczek (2011) find a large premium for formal sector employees in Brazil using OLS. But the effect declined once they use a FE model (controls for unobserved het.)
- Panel data have important advantage when looking at earnings differentials due to ability to control for time-invariant unobserved individual heterogeneity
- But it also brings challenges of addressing measurement error and attrition because these aspects, if not addressed, distort results

- The data comes from KwaZulu-Natal Income Dynamics Study (KIDS), the largest province by population collected in 1993, 1998, and 2004
- Allows the authors to explore the effects of public sector wage setting and unionization on earnings
- See **Table 1** for descriptive statistics on employment type by wave: in 2004, there was a dramatic decline in regular employment (possibly due to non-random attrition from the panel)

Kerr and Teal 2012
Data Cont.

- There is also a large hourly earnings differences between regular, casual and self-employment
- The median wage for public sector workers in unions was 17 times higher than earnings in self-employment in 2004
- There was a large percentage increases for public sector workers mainly due to a rise in the wages of black individuals in the public sector to the level of their white counterparts
- Between 1998 and 2004, real wages remained constant or decreased slightly

- Table 4 shows employment by occupation type: some types of employment are more likely to be associated with certain types of occupations
  - Public sector employees are more likely to be in professional occupations, whilst regular private employees are more likely to be laborers or in production jobs
  - This indicates that human capital and occupational choice explain a part of the difference in earnings
- The data also reveals significant expansion of education between 1993 and 2004 (Table 3)
- Public sector employees have the highest levels of education across the 3 waves while self-employed have the lowest

- Attrition in any panel data is a potential cause of concern as it introduces bias in the parameter estimates
- Although many hhs were tracked and surveyed in the KIDS data, overall there has been a 36% attrition
- Attrition also occurs when members of the household move out making the remaining household members unrepresentative of the previous household
- Kerr & Teal (2012) check for the correlates of household (table 5) and individual attrition (Tables 6). They find that specific covariates explain attrition households and individuals.

- Does the competitive human capital framework explain the large average wage differentials across employment of different levels of formality? They estimate POLS, FE and FD models
- The general model

$$y_{it} = x_{it}'\beta + \alpha_i + u_{it} \quad (1)$$

$$(y_{it} - \overline{y}_i) = (x_{it}' - \overline{x}_i)\beta + (u_{it} - \overline{u}_i) \quad FE \quad (2)$$

$$(y_{it} - y_{it-1}) = (x_{it}' - x_{it-1})\beta + (u_{it} - u_{it-1}) \quad FD \quad (3)$$

- FE results reveal substantial public sector premium in earnings relative to pvt regular employment (table 11)
- Those in unionized public sector employment earn 91% more than those in pvt, non-union employment
- Casual workers earn 27% less and self-employed earn 9% less respectively than pvt sector non-unionized pvt sector workers
- A two and a half fold difference between the highest and lowest paying sectors.
- The differentials within the private sector is reduced after controlling for α_i
- The public sector premium, still prevails
- FD results are similar with FE (a large public sector premium exists in earnings)

Kerr and Teal 2012
Regression Results Cont.

- There is also a small union premium in the private sector (could be that firms hire high quality but fewer labor to combine with higher capital stock)
- The differentials within the private sector is reduced after controlling for α_i
- The public sector premium, still prevails
- FD results are similar with FE (a large public sector premium exists in earnings)
- There is also a small union premium in the private sector (could be that firms hire high quality but fewer labor to combine with higher capital stock)
- The authors also address measurement error and implemented other robustness checks

- The authors investigated whether existing wage differentials are a result of unobservables or due to the effects of labor
- Unobservables play significant role but still earnings differentials exist
- The results are robust to attrition and measurement errors
- There exists a substantial public sector premium in earnings which is driven by those entering into the sector than those leaving it indicating the role of ability
- There is earnings premium for union members in the private sector

- An important effect of union activity is to change the skill composition of the work force
- Simply controlling for a dummy variable for formal sectors would not be enough to understand the role of other institutions affect outcomes in the labor market
- Human capital or institutions are not the only factors that explain the large earnings differences across different types of employment in South Africa
- Human capital explains much of the earnings differentials only in the pvt sector but not the public sector