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Lauren Antrobus and Andrew Kerr

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About the Author(s):

Lauren Antrobus: School of Economics, University of Nottingham
Andrew Kerr: DataFirst, University of Cape Town: Andrew.kerr@uct.ac.za

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Abstract

In this paper, we provide the first detailed description of the labour market for taxi drivers in South Africa and investigate the extent to which wages in this market are set competitively. To do this we analyse survey data on both drivers and owners of minibus taxis. We find both direct and indirect indications that this market is not competitive, despite the low skill requirements and bargaining power of taxi drivers in an economy characterised by high unemployment, which would appear to be characteristics of a competitive labour market.

Introduction

Labour market analysts have traditionally used the competitive framework to understand wage determination and employment in the labour market. In attempts to account for widespread empirical contradictions of the competitive model, however, numerous non-competitive models have been proposed. In this paper, we provide the first detailed description of the labour market for taxi drivers in South Africa and investigate the extent to which wages in this market are set competitively.

The minibus taxi sector provides an interesting case study to explore theories of wage determination. Many taxi owners earn large profits by forming powerful associations and maintaining tight control over entry. With low skill requirements and little bargaining power in an economy characterised by high unemployment, the market for taxi drivers would appear to fit the mould of the competitive labour model. We investigate a sample of taxi owners and drivers from across South Africa for evidence that the labour market is not competitive. Two different methods are used. The first is evidence about the payment methods reported by owners and drivers. Secondly, in an approach similar to that of the inter-industry wage differential literature, we explore the extent to which drivers' wages are dependent on the rank at which they operate.

The paper is structured as follows. Section 2 provides a background of the taxi sector as well as a review of theories of wage determination. Section 3 describes and summarises the survey data used. Regression analysis on both drivers and owners' earnings is undertaken in Section 4. The empirical evidence is discussed in relation to the outlined profit-sharing models in Section 5. Finally, conclusions are offered in Section 6.

Literature Review

The minibus taxi industry and minibus taxi drivers

The minibus taxi sector serves 71% of all public transport commuters (Kerr, 2015) and although other forms of public transport may be less expensive, taxis provide a more flexible form of transport (Barrett, 2003; Boudreaux, 2006). With approximately 90% black ownership, the taxi sector also represents a one of the largest concentrations of black-owned capital in South Africa (Barrett, 2003).

Taxi associations set the value of fares on the routes they control. Taxi owner associations also work to stifle entry of potential competitors (Boudreaux, 2006; Dugard, 2001) and with limited official regulation, the associations enforce their own informal property rights over access to routes and ranks (Boudreaux, 2006; Dugard, 2001). Violence is often the method of enforcement, resulting in casualties when wars between rival associations intensify (Barrett, 2003; Boudreaux, 2006).

Driver employment is predominantly informal, with drivers having low levels of job security and little bargaining power against their employers (Barrett, 2003; CASE, 2012). In 2005, the Department of Labour introduced a Sectoral Determination outlining basic conditions of employment in the taxi sector, which specifies criteria such as minimum wages, work hours, overtime, leave, and contracts (Basic Conditions of Employment Act, No. 75 of 1997. Sectoral Determination 11: Taxi Sector, 2005). Despite this, it has seen very little compliance due to a lack of enforcement (CASE, 2012), an issue we explore in our data analysis.

Wages are paid to drivers in a number of ways. These include payment on a fixed percentage basis (with or without a basic wage); keeping the earnings of a specified day; receiving a regular wage

(Barrett, 2003) or drivers paying a fixed rental to owners per week and keeping the rest of the revenue for themselves.

Owners complain that drivers pilfer revenues; an accusation that drivers do not wholly contest, but justify through wages being too low (Barrett, 2003). This suggests that output/revenue is not observable and that driver effort may also not be observable. In principal agent models a lack of observability or effort leads to changes in the way agents are paid, an issue we take up below. Observability of effort or output may be route dependent- on routes with consistent demand owners may have a good idea of what true revenue should be and can pay fixed wages whilst on others owners may not know or conditions may vary over time and fixed rental or profit sharing arrangements may be required.

In light of the kind of labour environment that the minibus taxi industry operates in, we can now consider a number of theories that may help us understand the how contracts and wages are determined in the sector.

Theories of wage determination

There are a number of wage theories (both competitive and non-competitive) that seek to explain wage determination. We outline some of the main theories from the literature here, and offer insights into how appropriate we believe they may be in the context of the taxi industry.

Competitive theories of wage determination

In a competitive labour market with perfect information, given an infinite supply of labour, firms are wage takers, implying that firms should pay homogenous employees the same wages, regardless of firm profitability (Blanchflower, et al., 1992). Allowing for human capital an individual's marginal productivity will depend on a number of factors, such as their level of education, ability, and training (Becker, 2008; Spence, 1973). Thus, a worker's wage should reflect their ability and productive capacity, but not employer characteristics (Krueger & Summers, 1988).

Non-competitive theories of wage determination

Efficiency wages

By paying efficiency wages, ie wages above market-clearing levels, firms are supposedly able to increase profits by inducing workers to be more productive or by reducing costs (Teal, 1995), either through attracting better quality workers, reducing shirking, improving morale, reducing labour turnover or improving workers' nutrition. Thus the rent that is shared with employees is created by the wage premium itself (Konings & Walsh, 1994).

Cahuc, et al. (2004) use principal-agent theory (with asymmetric information and unobservable effort but observable output) to describe a shirking model of efficiency wages which offers useful insights into labour dynamics within the taxi sector. To overcome the problem moral hazard and encourage agents not to shirk, Cahuc, et al. (2004) show that firms use the following output-based wage structure, which combines a level of insurance with incentive:

$$W = w + by \quad \text{where } y = e + \varepsilon \quad \text{and } 0 < b < 1$$

Here, the agent's wage W is composed of a fixed level w , as well as a share b of output y . The level of output y depends on the agent's effort e , as well as random variation represented by ε . Since the agent's optimal W is dependent on e rather than w , this aligns the interests of the two parties (Cahuc, et al., 2004). By offering this increase in wages, the cost of job loss increases - which induces better effort and reduces shirking (Krueger & Summers, 1988).

Internal labour markets and tournaments

The model of efficiency wages just described requires output to be observable. This may not be true for some taxi routes. In the tournament model outlined by Cahuc, et al. (2004), a wage increase is the result of a promotion within a firm, rather than a reflection of productive capacity. Employers are able to incentivise workers by promising, and then awarding, a number of promotions based on relative (rather than absolute) performance (Cahuc, et al., 2004; Ehrenberg & Smith, 2015). This then potentially solves the lack of observability of effort and output because workers are incentivised to work harder than their co-workers.

A type of tournament is used by some taxi associations, who promise to promote hardworking drivers who have worked a specified number of years to become owners (Khaya, 2016). This is not a conventional tournament because the driver is being promoted out of the owner's "firm". But if one considers the taxi association as the firm then this practice sits well within conventional tournament models and helps to explain why an owner might pay a fixed wage despite a lack of observability of effort and output.

Taxi rentals and risk sharing

As noted above the driver-owner dynamic in the taxi industry can be thought of as an example of a principal agent problem. But instead of the problem taking place between an employer and an employee we can think of this relationship as being similar to that of the tenant farmer and landlord, since both involve one party making use of the other's capital resources in production.

Under a fixed rent contract, the landlord is guaranteed a fixed payment from the tenant. While this creates strong incentives for the tenant and does not require observability of output, it also concentrates all risk on one party (Chiappori & Salanié, 2002). Sharecropping is an alternative arrangement when production is risky (Chiappori & Salanié, 2002). This type of contract shares the risk between the tenant and the landlord (usually in some fixed ratio), thus both experiencing the rewards and losses that come with uncertainty. In order to be able to credibly enter into such a contract, the level of production needs to be observable. In the empirical section we show that the earnings of some taxi drivers are determined both through a fixed rental system of payment to the owner by the driver and a percentage of takings system that resembles sharecropping and is an alternative to promotions through tournaments when output and effort are unobservable.

Fairness norms

Akerlof (1982) argued that both wages and effort are (at least partially) determined by fairness norms amongst employees and their employer. Norms pertaining to effort are formed around what is considered a "fair day's work", and workers expect to be treated and paid "fairly" in return (Akerlof, 1982). In this way, both wages and effort depend on these fairness norms within the group. Akerlof (1982) explains that "fairness" is usually determined relatively, rather than absolutely. Employees use reference groups to determine whether they feel their wages and treatment are fair. Thus if fairness norms differ across industries, geographic areas, or even employers, we may observe differences in the wages of otherwise similar workers.

Testing for non-competitive labour markets

At first glance the market for taxi drivers seems competitive- regulations are absent, skill requirements are low and unemployment is high. However unobservability of effort or output may mean the market is not competitive in the classical sense. One of the most used and enduring tests of whether labour markets are competitive is testing whether there are substantial differences in pay across industries. Studies that have taken this route include Dickens & Katz (1987), Krueger & Summers (1988), Hildreth

& Oswald (1997) and Katz and Summers (1989) (as cited in Blanchflower, et al. (1992)). Moll (1993) fails to find evidence of efficiency wages in the South African labour market.

In the empirical analysis below we use the inter-industry differential approach to test whether the labour market for taxi drivers is competitive. We argue, following the inter-industry wage differentials literature, that earnings differences across ranks suggest that the labour market for taxi drivers may not be competitive and that there is some form of profit sharing between owners and drivers. To preview our main result, this may be driven by the efficiency wage models we outlined above but we cannot rule out that fairness norms may explain why, in a market that seems to have many aspects consistent with the assumptions of a competitive market, taxi drivers earnings vary across the ranks at which they are based.

Data and descriptive statistics

To investigate and describe the labour market for taxi drivers, we use data from the Community Agency for Social Enquiry (CASE) collected in 2012. Data were collected through surveying both employers and employees of the taxi sector across four provinces (Gauteng, Limpopo, Kwa-Zulu Natal and the Western Cape), covering urban, peri-urban and more rural areas (Community Agency for Social Enquiry (CASE), 2012). The intended sample size of 660 was ultimately reduced to 570 (520 employees and 50 employers), due to access difficulties caused by some taxi associations. The data are not a probability sample so our analysis is not representative of all taxi drivers in South Africa, but instead is limited to the sample.

Of the drivers interviewed, 122 were from Gauteng, 130 from Kwa-Zulu Natal, 62 from Limpopo and 133 from the Western Cape. Overall, 62% (168 of 447) of drivers were from metropolitan (metro) areas. Only five of the interviewed drivers were female. Fifty owners were also interviewed across the same four provinces – 7 from Gauteng, 14 from Kwa-Zulu Natal, 10 from Limpopo and 19 from the Western Cape. Eight of these owners are excluded from analysis due to their working as drivers themselves, which may confound our analysis.

Driver experience ranged from less than a year (9 observations) to 39 years, with a mean of 8 years and a slightly smaller median of 6 years, as shown in Table 1.

Table 1: Drivers' years of experience

Province	Median	Mean	Std Dev	n
Full sample	6.00	8.04	6.59	434
Gauteng	7.00	9.29	7.22	118
KwaZulu-Natal	6.50	8.39	6.55	126
Limpopo	6.00	8.04	7.08	61
Western Cape	5.00	6.56	5.46	129

Owners were asked both the number of years they had been an owner, as well as their total number of years working in the industry. Provincially, years of experience in the industry followed a similar pattern for both drivers and owners. As shown in Table 2, owners operating in Gauteng, Kwa-Zulu Natal and Limpopo typically had longer experience (both in the industry and as an owner) than those in the Western Cape. It is also interesting that owners in the Western Cape have less than a year

difference, on average, between total industry experience and experience as an owner - implying their experience as drivers is significantly shorter than elsewhere. Owners were asked directly whether they had previously worked as a driver. Those who had made up 63% of the full sample, 83% of owners in Gauteng, 77% in Kwa-Zulu Natal, and 50% in both Limpopo and the Western Cape, suggesting the tournament theory discussed above is of relevance for how many current owners became owners.

Table 2: Owners' years of experience

Province	Total industry experience				Owner experience			
	Median	Mean	Std Dev	n	Median	Mean	Std Dev	n
Full sample	13.00	14.00	8.96	42	7.00	9.17	7.22	42
Gauteng	22.50	19.50	10.67	6	7.50	12.17	11.87	6
KwaZulu-Natal	19.00	19.77	7.73	13	9.00	11.23	8.35	13
Limpopo	13.50	14.38	6.72	8	11.00	10.75	3.92	8
Western Cape	6.00	6.60	4.22	15	5.00	5.33	3.18	15

Total experience includes time spent working in any occupation in the taxi industry.

The CASE survey suggests that the labour market for taxi drivers is very informal, with very little evidence that government regulation affects this market. When asked whether they had some form of contract with the taxi owner or association, 125 of the 447 drivers indicated that they did but only six of these were written contracts. One driver indicated being a member of a trade union, which he refused to name. In comparison, 46 (of 48) owners indicated that they were a member of an employer organisation- which is most likely a taxi association.

Drivers were asked to report the times they started and ended work during the last seven days. These responses were then used to calculate each driver's weekly work hours, as well as the number of days they had worked in the past week. The majority of drivers worked the full week, with a mean number of days worked of 6.5, and a median of 7. Drivers worked an average of thirteen to fourteen hours each day, even on Sundays.

These results mean that working hour regulations are almost always violated, with most drivers working nearly twice as long as the maximum weekly limit of 48 hours defined by the Sectoral Determination (Basic Conditions of Employment Act, No. 75 of 1997. Sectoral Determination 11: Taxi Sector, 2005, p. 26). Of the 447 drivers who report daily work hours, 445 exceed the specified maximum daily limit (Basic Conditions of Employment Act, No. 75 of 1997. Sectoral Determination 11: Taxi Sector, 2005) – yet 80% of drivers indicated that they did not work overtime. 96% of drivers and 90% of owners indicated that annual leave was not given. Only 16% of drivers reported being allowed to take sick leave, and 68% of owners indicated that sick leave was unpaid.

Drivers were asked about both their take-home pay over the last seven days (after deductions), as well as their average monthly income from the taxi sector (before deductions). Since some routes are likely to be more profitable than others, and entry is restricted by taxi owner associations that control specific routes, it is unfortunate that there is no information on routes in the data. However, both owners and drivers report their rank, which gives some indication of where they operate - even though some routes share common ranks. Table 3 presents drivers' weekly and monthly incomes for both the full sample and by rank.

A total of 369 (83%) of drivers reported their take-home pay over the last seven days. This weekly wage measure ranged from R20 to R3200, with a mean of R794 and median of R600. Mean weekly wages vary significantly both between ranks as well as within ranks. Limpopo drivers reported high weekly wages, making up three of the top four average weekly wage values (along with Cape Town Station.) The average monthly income of drivers ranged from R20 to R12000, reported by 39 (87%) drivers in the sample. The mean monthly income was R2545, with a median of R2400.

Table 3: Drivers' wages by rank

Rank	Weekly				Monthly			
	Median	Mean	Std Dev	n	Median	Mean	Std Dev	n
Full sample	600	793.82	494.91	369	2400	2544.59	1248.22	390
GP: Faraday	700	718.47	251.48	59	2800	2869.49	1007.09	59
GP: Baragwanath	500	541.30	251.87	54	2000	2198.49	1076.38	53
GP: Soweto (other)	650	650.00	70.71	2	3200	3200.00	1131.37	2
Limpopo: Jane Furse	1070	1204.17	796.16	12	2550	2548.00	1117.06	20
Limpopo: Vleisboom	2100	1976.00	875.72	5	3500	3802.86	1426.20	7
Limpopo: Thohoyandou	1500	1594.74	422.26	19	1600	1641.18	368.55	34
KZN: NMR Pine Street	600	705.77	395.56	26	2400	2565.38	694.52	26
KZN: Endongeni	500	896.15	799.11	26	2000	1716.00	673.10	25
KZN: Durban	500	569.52	181.95	21	2000	2278.10	727.79	21
KZN: Ulundi	700	754.19	435.07	31	2550	2529.29	851.06	28
WC: Cape Town Station	1200	1204.67	406.66	30	4000	4526.67	1705.76	30
WC: Thembalethu/George	500	554.59	238.93	37	2000	2153.51	648.73	37
WC: Knysna	600	564.29	92.88	14	2400	2257.14	371.51	14
WC: Khayelitsha	785	814.55	242.83	22	2450	2561.36	367.08	22

In order to account for the influence of hours worked on wages, an hourly wage is estimated. This is calculated using data on drivers' take-home pay and work hours over the last seven days, and is presented in Table 4. Again, wages at the three Limpopo ranks are notably higher than elsewhere. Even in the hourly wage measure, there is significant intra-rank variation in wages.

Based on the reported monthly wage, 45% of drivers earn less the specified minimum wage.¹ This falls to 33% when using the weekly wage measurement. However, factoring in the long hours that drivers work by using the calculated hourly wage, 77% of drivers earn below the hourly minimum wage. 99% of drivers indicated that deductions (for benefits such as health care, pension, or unemployment insurance fund) were never taken off their salary.

¹ At the time of the survey, the Sectoral Determination specified a minimum wage on a monthly (R2304.46), weekly (R531.84) or hourly (R11.08) basis (Basic Conditions of Employment Act, No. 75 of 1997. Amendments of Sectoral Determination 11: Taxi Sector, 2012).

Table 4: Drivers' estimated hourly wages by rank

Rank	Median	Mean	Std Dev	n
Full sample	7.36	9.54	8.08	366
GP: Faraday	8.33	8.58	2.98	59
GP: Baragwanath	7.12	7.21	3.82	54
GP: Soweto (other)	6.99	6.99	1.49	2
Limpopo: Jane Furse	13.41	16.41	11.60	12
Limpopo: Vleisboom	24.00	23.60	12.01	5
Limpopo: Thohoyandou	17.86	19.23	5.31	19
KZN: NMR Pine Street	5.71	6.89	3.97	25
KZN: Endongeni	5.43	9.70	8.73	26
KZN: Durban	4.76	5.24	1.69	21
KZN: Ulundi	9.46	10.03	6.25	31
WC: Cape Town Station	11.29	15.99	18.96	28
WC: Thembalethu/George	6.67	7.54	4.00	37
WC: Knysna	6.15	6.05	1.18	14
WC: Khayelitsha	7.38	8.05	2.88	22

Wage payment methods

As highlighted by the various models described above, the method of wage payments may shed light on whether the labour market is competitive. Different levels of observability of effort or output may result in different optimal wage payment methods.

The majority of drivers (76%) reported receiving a fixed wage (either weekly or monthly). The next most common method of payment was as a share of daily earnings (15%), followed by a weekly commission (5%), both representing a direct form of profit sharing. Since these are both forms of commission, we combine these observations into one commission category. Only 3% of drivers reported that they keep their fares and pay a fixed rental for the use of the taxi, and the remaining drivers were paid either per day or per hour (less than 1% each).

One interpretation of the results is that a lack of observability of effort or output is not a problem since most drivers are paid a fixed wage and only a very small fraction report paying a fixed rental to the owner. However it should be remembered that tournaments can still result in fixed wages being paid even when effort or output is not observed.

Payment of a fixed wage was the most common form of payment in all provinces, ranging from 99% in Gauteng to 50% in the Western Cape. This difference is interesting, and suggests that optimal pay methods may indeed vary across routes. Commission-based payment was only reported in the Western Cape and Kwa-Zulu Natal, accounting for 44% and 22% of payments respectively. Table 5 gives a breakdown of payment method by rank.

Table 5: Drivers' method of payment by rank

Rank	Fixed wage	Per hour	Per day	Fixed rental	Commission
Full sample	336 75.85%	3 0.68%	3 0.68%	12 2.71%	89 20.09%
GP: Faraday	59 100.00%				
GP: Baragwanath	54 98.18%	1 1.82%			
GP: Soweto (other)	2 100.00%				
Limpopo: Jane Furse	15 75.00%		1 5.00%	3 15.00%	1 5.00%
Limpopo: Vleisboom	5 71.43%		1 14.29%	1 14.29%	
Limpopo: Thohoyandou	34 100.00%				
KZN: NMR Pine Street	26 96.30%	3.70%			
KZN: Endongeni	29 93.55%	1 3.23%	1 3.23%		
KZN: Durban	23 100.00%				
KZN: Ulundi	17 36.96%				29 63.04%
WC: Cape Town Station	7 17.95%			7 17.95%	25 64.10%
WC: Thembaletu/George	35 87.50%			1 2.50%	4 10.00%
WC: Knysna	14 100.00%				
WC: Khayelitsha	3 9.68%				28 90.32%

Fixed wages can be monthly or weekly. Fixed rental refers to paying a fixed price for the taxi per day, and keeping fares.

As presented in Table 6, hourly wages are on average highest (approximately R14 per hour) when drivers earn per day, on commission, or pay a fixed taxi rental. These hourly earnings are significantly higher than those of drivers earning a fixed wage (approximately R8.70 per hour). These results are consistent across the monthly wage measure too, where fixed wage workers earn the least on average. It is possible that areas of differing profitability use different payment schemes, for example routes where driver effort is not as easily observed may require fixed rental contracts and thus also allow for higher earnings.

Table 6: Drivers' wages by method of payment

Rank	Hourly				Monthly			
	Median	Mean	Std Dev	n	Median	Mean	Std Dev	n
Full sample	7.36	9.54	8.08	366	2400	2544.59	1248.22	390
Fixed wage	6.84	8.71	6.02	294	2000	2351.46	1129.88	316
Per hour	6.79	6.79	0.10	2	2850	2850.00	494.97	2
Per day	14.14	14.14	6.94	2	3700	3700.00	141.42	2
Fixed rental	12.82	14.10	8.60	11	4850	4683.33	1975.23	12
Commission	8.57	12.86	14.19	57	2800	3103.97	1132.29	58

Fixed wages can be monthly or weekly. Fixed rental refers to paying a fixed price for the taxi per day, and then keeping fares.

Owner rents

In this section we explore whether the efforts of taxi associations to control entry and charge high prices result in large profits for owners and thus whether there are any rents to share with drivers. Owners reported their net income (after expenses) from taxi operations for the month prior to the survey. These figures ranged dramatically, from R120² to R48000, with a mean of R10352 and a median of R6000.

To account for larger operations presumably earning larger absolute profits, owners' monthly per taxi income is calculated. These values range from R11 to R16000, with a mean of R4087 and median of R3333, and are presented in Table 6. The ordering of owners' per taxi income is somewhat similar to that of drivers' hourly wages – with the highest average per taxi monthly income in Limpopo (R16000), followed by Cape Town Station (R8861).

² We find a monthly income of R120 unrealistic and this particular owner does not report a rank and so is excluded from much of the analysis in this paper.

Table 7: Owners' per taxi monthly income by rank

Rank	Median	Mean	Std Dev	n	Drivers' average hourly wage
Full sample	3333.33	4087.20	3557.54	41	9.54
GP: Faraday				0	8.58
GP: Baragwanath	2000.00	2571.43	2199.26	3	7.21
GP: Soweto (other)				0	6.99
Limpopo: Jane Furse	4816.67	4816.67	3559.10	2	16.41
Limpopo: Vleisboom	16000.00	16000.00		1	23.60
Limpopo: Thohoyandou	2750.00	2925.00	1867.93	4	19.23
KZN: NMR Pine Street				0	6.89
KZN: Endongeni				0	9.70
KZN: Durban	2000.00	2666.67	2449.49	4	5.24
KZN: Ulundi	1625.00	1888.89	1079.69	6	10.03
WC: Cape Town Station	8500.00	8861.11	2952.24	6	15.99
WC: Thembalethu/George				0	7.54
WC: Knysna				0	6.05
WC: Khayelitsha	4250.00	3450.00	2139.31	4	8.05

The mean monthly per taxi income for owners of R4087 may seem only marginally higher than drivers' mean weekly wage of R794 multiplied by 4.3 (approximately R3414 per month). However, it is important to note that drivers are working 14 hours a day on average, whereas the income for owners is largely a return on capital. If the average value of a taxi was R150 000 this would imply an average rate of return on capital of 33% per year for owners, an extremely high return that suggests that associations are successfully able to prevent entry and raise prices.

Furthermore, most owners own more than one taxi. The number of taxis owned ranged from 1 to 14, with a mean of 3. Ownership includes both vehicles paid in full as well as those in the process of being paid off. 37 owners reported owning at least one taxi, 16 of whom were also paying off at least one vehicle. 5 owners only had vehicles that were currently being paid off.

Regression analysis

While the reported payment methods are evidence of profit sharing and suggest that the taxi driver market is not competitive, we now use a more rigorous inter-industry differentials approach to investigate whether or not the labour market is indeed competitive. To do this we run Ordinary Least Squares (OLS) regressions, controlling for human capital, personal characteristics and payment method.

Empirical inter-industry wage differentials have attracted much attention because they violate competitive theory predictions that employees should earn equal wages regardless of industry profitability, once individual characteristics are controlled for. In the context of the taxi industry we can undertake a similar test by investigating how wages vary at different ranks. Each driver is operating one taxi, ie using one unit of capital and ruling out unobserved differences in capital per worker, and all drivers are doing exactly the same job- driving a taxi. We argue that if the labour market for taxi drivers is competitive we should not find differences in earnings across different ranks.

As highlighted by the models discussed above, the method of payment offered by owners may affect earnings and so this is also controlled for in the earnings regression.

Variations of the following earnings function for drivers are estimated:

$$\log(\text{hourly wage}) = a_0 + a1'X + a2'Educ + a3Licence + a4Contract + a5'Rank + a6'Payment + u$$

where X represents the set of individual characteristics made up of age, experience, experience² and a female dummy variable. Education is included categorically, with categories for primary, secondary and tertiary education and no formal schooling being the base category. *Licence* and *Contract* are dummy variables (where contracts can be written or verbal). *Rank* is a set of mutually exclusive categorical variables, indicating the rank from which a driver operates. The method by which a driver receives payment is indicated in the *Payment* categories. Finally, u is the stochastic error term.

We also experimented with using the average owner's profit by rank as an explanatory variable instead of rank dummies. This would be a more direct test of whether (average) owner profits at the rank a driver works from are correlated with driver's earnings and thus provide some evidence on profit sharing. Unfortunately this test is compromised by the Moulton problem (Moulton, 1986), because we have an independent variable that is constant for all drivers with the same rank and this is only an estimate of the true average profits per rank. This means that the standard errors on this variable when using OLS are incorrect and too low. Further investigation revealed that in all the regression models we estimated with the average profits per rank this variable was statistically insignificant after correcting the standard errors for the Moulton problem, following (DiNardo, 2012). We thus do not report these results in the paper.

We estimate four variations of the drivers' earning equation, the results of which are presented in Table 8, including standard errors robust to heteroscedasticity. The first, presenting a base specification, controls only for the demographic and human capital variables, as well as the licence and contract dummies.

The base specification explains very little of the variation in drivers' hourly wages, with an R² value of 3.85%. While such a result may be unsurprising for a sample of earners in different industries or different jobs, it is remarkably low in this instance, where all workers are performing an identical task with one unit of capital.

The second and third specifications build on the base by adding in the rank and payment dummies respectively. The fourth specification combines the rank and payment method dummies.

The inclusion of the rank dummies in the second specification results in a number of statistically significant rank coefficients - five at the 1% level and one each at the 5% and 10% levels. The inter-industry wage differential argument would suggest this result implies a violation of competitive theory because wages are not supposed to depend on firm characteristics, including which rank a driver operates at.

The base category of the rank dummies is GP: Faraday - a rank in central Johannesburg where all drivers report being paid a fixed wage. The rank with the coefficient of greatest magnitude is Thohoyandou, Limpopo, with the coefficient implying drivers at this rank earn 150% more per hour than drivers based at the Faraday rank. Since all drivers at both Thohoyandou and Faraday report earning a fixed wage, this is not a result of a difference in payment methods. The smallest coefficient is from a rank in Durban (-.679) implying a more than 300% difference between the highest and lowest paid rank, an extremely large wage differential.

Specification three includes the method of payment dummies, where the base payment category is remuneration by a fixed wage. All of the other payment categories have positive coefficients, indicating that fixed wage earners have the lowest hourly wages. Of the four payment dummies included in the regression, three (per day payment, fixed taxi rental and commission-based payments) have coefficients that are statistically significant at least at the 5% threshold. Drivers earning on a per day, fixed rental and commission basis have hourly wages that are 66%, 74% and 50% higher than fixed wage earners respectively.

The fourth and final specification combines the effects of ranks and payment methods. Interestingly, even more of the ranks have statistically significant coefficients compared to specification (3). Payment method dummies all have positive coefficients, but only commission-based payments are statistically significant. This result is highly practically significant too, suggesting that drivers paid on commission have hourly wages 123% higher than those earning fixed wages. This would imply that the payment coefficients reported in (3) were biased by not controlling for rank. This is not surprising, considering the large differences in payment methods across ranks. Again, the differences between the highest and lowest paying ranks on average is more than 300%, suggesting that driver earnings depend dramatically depending on which rank they operate at.

Table 8: Log hourly earnings equations for drivers

		S1	S2	S3	S4
	Age	0.014* (0.008)	0.009 (0.006)	0.015** (0.007)	0.007 (0.006)
	Female (dummy)	0.274 (0.621)	0.389 (0.561)	0.353 (0.620)	0.401 (0.562)
	Experience	-0.019 (0.018)	-0.005 (0.014)	-0.025 (0.017)	-0.007 (0.014)
	Experience ²	0.000 (0.001)	0.000 (0.000)	0.001 (0.001)	0.000 (0.000)
	Licence (dummy)	-0.366 (0.450)	-0.288 (0.449)	-0.082 (0.459)	-0.165 (0.431)
	Contract (dummy)	0.121 (0.079)	0.342*** (0.091)	0.150* (0.078)	0.292*** (0.078)
Education dummies	Primary	-0.090 (0.117)	-0.148 (0.137)	-0.024 (0.106)	-0.226 (0.149)
	Secondary	-0.034 (0.129)	-0.070 (0.156)	0.014 (0.118)	-0.093 (0.159)
	Tertiary	0.376 (0.462)	0.171 (0.364)	0.454 (0.431)	0.082 (0.335)
Rank dummies	GP: Baragwanath		-0.235** (0.103)		-0.255** (0.104)
	GP: Soweto (other)		-0.044 (0.092)		-0.037 (0.097)
	Limpopo: Jane Furse		0.263 (0.266)		0.148 (0.304)
	Limpopo: Vleisboom		0.800*** (0.245)		0.732*** (0.269)
	Limpopo: Thohoyandou		0.965*** (0.086)		0.954*** (0.083)
	KZN: NMR Pine Street		-0.383*** (0.126)		-0.387*** (0.126)
	KZN: Endongeni		-0.136 (0.160)		-0.177 (0.161)
	KZN: Durban		-0.679*** (0.129)		-0.683*** (0.123)
	KZN: Ulundi		-0.328 (0.267)		-0.884** (0.389)
	WC: Cape Town Station		0.517*** (0.132)		-0.045 (0.218)
	WC: Thembaletu/George		-0.133 (0.093)		-0.187** (0.086)
	WC: Knysna		-0.169* (0.099)		-0.188* (0.097)
	WC: Khayelitsha		0.051 (0.082)		-0.653** (0.275)
Payment method dummies	Per hour			0.013 (0.075)	0.128 (0.081)
	Per day			0.506** (0.250)	0.398 (0.320)
	Fixed rental			0.551*** (0.167)	0.321 (0.220)
	Commission			0.386***	0.796***

				(0.088)	(0.279)
	Constant	2.047*** (0.509)	2.110*** (0.504)	1.612*** (0.531)	2.127*** (0.489)
Observations		339	329	339	329
R-squared		0.04	0.29	0.10	0.35
Pr > F		0.48	0.00	0.00	0.00

Coefficients on personal characteristics and human capital generally lack significance across the different specifications. The education dummies are all insignificant. The contract dummy has consistently positive coefficients, with some degree of statistical significance.

In order to gain an insight into how different methods of driver payment are related to profitability, a second regression equation was estimated using owner income. Unfortunately, due to the small sample of owners interviewed, including both rank and payment categories resulted in perfect collinearity. Thus, the owner earnings equation was specified as follows:

$$\log(\text{per taxi monthly income}) = a_0 + a_1'X + a_2'Educ + a_3Contract + a_4'Payment + u$$

Here, again, X represents the set of individual characteristics made up of age, experience, experience² and a female dummy variable. Education is included categorically, with the same categories as the driver specification. *Contract* is a dummy variable, indicating whether the owner has written contracts with drivers. The method by which the owner remunerates drivers is indicated by the *Payment* categories, and u is the stochastic error. The results of the regression on owner's average per taxi monthly income are presented in Table 9.

Table 9: Regression on owners' log per taxi monthly income

		(1)
	Age	0.042* (0.023)
	Experience	-0.012 (0.106)
	Experience ²	0.000 (0.004)
	Female (dummy)	0.606 (0.466)
	Contract (dummy)	0.635 (1.109)
Education dummies	Primary	-0.139 (0.576)
	Secondary	-0.143 (0.524)
	Tertiary	-0.799 (1.551)
Payment method dummies	Commission	1.305** (0.573)
	Constant	5.626*** (1.493)
Observations		40
R-squared		0.27
Pr > F		0.06

Robust standard errors in parentheses. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1. Base categories for education, and payment dummies are 'No formal education' and 'Fixed wage' respectively.

Since owners only reported two payment methods - fixed wages and commission - only one payment method dummy is ultimately included in the specification. The coefficient on commission-based payments is both practically and statistically significant (at the 5% level). The coefficient of 1.305 indicates that owners who pay on a commission basis earn, on average, 269% more per taxi each month. This result supports efficiency wage theories in which profit sharing results in an increase in the firm's profits, although the payment method may well be determined by route characteristics that are also related to profitability, ie the payment method may be endogenous.

Conclusion

Minibus taxi ownership is characterised by powerful associations, which we have shown allow owners to make large profits. With low skill requirements, little bargaining power and a complete absence of regulation in an economy characterised by high unemployment, the labour market for taxi drivers would appear to fit the mould of the competitive labour market model. However, difficulty in observing driver effort levels and output may make the market less competitive. In this paper, we have analysed a sample of taxi drivers to explore whether the labour market is competitive.

Evidence against a competitive market is found in two forms. Firstly, although most drivers report being paid a fixed wage, a substantial minority of drivers report being paid a percentage of earnings-

clear evidence of profit sharing between owners and drivers. We also noted that tournaments are a way taxi associations and owners provide incentives for drivers not to shirk despite a lack of observability of effort or output, and that they can result in drivers being paid a fixed wage even though agents in the market lack the perfect information required to meet the definition of a competitive market.

Secondly, extremely large inter-rank wage differentials indicate that a driver's wage varies dramatically depending the rank at which they operate from, a result that is not consistent with the labour market being competitive. Since the data are cross-sectional, we are unable to account for individual or firm fixed effects or short term frictions in our regression analysis of inter-rank earnings differentials. We noted though that each taxi driver is using one unit of capital, providing homogeneity in firm-level factors that have previously been argued to be the cause of inter-industry differentials in the literature.

Inter-industry differentials are also consistent with fairness norms dictating that owners at higher profitability pay their drivers more, however, so we cannot rule out this as part of the explanation for the large inter-industry differentials. Future work should attempt to distinguish between some of the explanations that we have put forward for the large differentials in driver pay across ranks. Investigating the source of the extremely high returns for some owners would also be a fruitful line of research.

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www.saldru.uct.ac.za

Level 3, School of Economics Building, Middle Campus, University of Cape Town
Private Bag, Rondebosch 7701, Cape Town, South Africa

Tel: +27 (0)21 650 5696

Fax: +27 (0) 21 650 5797

Web: www.saldru.uct.ac.za

