Bill Wang
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Explanations of Heterogeneity in Selection in Bangladeshi Migrants into Construction Labor Market in Singapore

Motivation

In the coming months, I will answer the question of what characteristics explain the heterogeneity in selection of workers from Bangladesh into the Singaporean construction market and its effects on long-run dynamics and equilibrium. There are several seemingly unique characteristics of this market, such as high worker turnover as well as high and highly varied middleman fees (see summary statistics under econometric estimation section). After identifying the causes of selection, as outlined in the econometric procedures section, I will estimate the implications on the selection process on long-run equilibrium.

The majority, close to 70 percent, of Singapore's non-resident working population, numbering around 1.6 million workers, consists of low-skilled migrant labor (National Population and Talent Division 2011). Laborers are generally recruited from their home countries to a network of agencies and then matched with an employer. These workers are almost always temporary, remit much of their income, and live within modest means in Singapore. Additionally, many migrant workers have little to no grasp of English, the official language, which may cause a great deal of asymmetric information in these markets. The same implications can also be extrapolated to many other cities with large migrant workforces; other migration contexts where the same general process may apply includes migration to the Gulf States in the Middle East.

The characteristics of the labor market could be explained by the selection process of laborers into the market. The recruitment process for these workers is very different to conventional mechanisms of search and matching generally seen in the labor market. First, an employer with a certain number of vacancies sends a demand letter to an agent in Singapore for these vacancies to be filled. Next, the agent in Singapore will contact a counterpart in the migrant-origin country, who will then contact or send an agent to recruit from a village. The migrant will pay a fee to the third agent in the chain, who will then send the migrant's information back through the chain. The migrant will be provided with a short period of training to learn basic construction skills before being matched with an employer and provided an IPA (In-principle agreement), giving him his wage and length of contract. If the migrant agrees, he is then sent to Singapore and works under what is generally a one or two-year contract. After his contract the migrant generally returns to his country of origin and may have to reenter the process if he wants to find another job in Singapore.

Approach

Initially, I will identify the causes of selection based on basic assumptions about the labor recruitment market. Bangladesh was chosen due to the availability of data, large number of migrants in many destination countries, prior institutional knowledge, and the importance of migration on both Bangladesh's and Singapore's economies. After the cause of selection is found, then a theoretical model will be developed to give the implications on productivity and wages of workers in the long-run.

Literature Review

Papers that have influenced the model formation and empirical estimation at this stage include "Equilibrium Wage and Dismissal Processes" (Flinn 1997), and "Middlemen", which gives a basic structure and role of middlemen in the exchange process (Rubinstein, Wolinsky 1987). Flinn's 1997 paper explains labor market dynamics based on productivity and information asymmetry; I intend to model the structure of my paper on his. At a more basic level, another theoretical paper used in modeling selection based on productivity and information is "Games with Incomplete Information Played by "Bayesian" Players" (Harsanyi, 1967). In addition, "Asymmetric Information and Intermediation Chains" gives a general result that could be

"Asymmetric Information and Intermediation Chains" gives a general result that could be possible in this context, where there is trade under asymmetric information with long intermediation chains (Glode, Opp 2016). Although not a piece of economics literature, *Bangladeshi Migration to Singapore*, a sociological analysis, gives an immense amount of information on migration networks and institutions that inform my analysis (Mizanur Rahman 2017).

Contributions

Research in migration channels contributes to understandings of intermediation and provides either an example of efficiency loss or an approach of curtailing high search costs. If the analysis of selection does result in demonstrated deadweight-loss, this would be a demonstration of the results of "Asymmetric Information and Intermediation Chains" (Glode, Opp 2016). If we see a result that demonstrates efficient selection, then it is a demonstration of efficient outcomes under adverse-selection, which runs contrary to the standard model outcomes.

In addition to applications of theoretical models, this analysis would also add to the literature on developmental impacts of migration and migrant characteristics (See the work of Dean Yang or David McKenzie). However, there has not been as much of a focus on the middlemen intermediation networks of migration itself. Understanding these networks is crucial in understanding the developmental impacts of migration.

Econometric Procedures in Estimating Heterogeneity in Selection

Data Sources:

Currently, I have access to three sources of data: a work history survey done by a migrant advocacy non-profit, a smaller set I personally collected, and a migrant household survey done by the International Organization of Migration and UK Department for International Development. I will attempt to get access to a migrant household survey done in Bangladesh in 2013 by the International Organization of Migration (IOM) and the UK Department for International Development (DFID). The dataset I personally collected, in June and July of 2016, is small, with 142 samples, 126 of which are from Bangladesh. This was from a one-time survey, giving information on migrant age, education, wage, agency fees, years worked in Singapore, company, and remittances. The dataset collected by the NGO has 910 samples collected in November 2015 to May 2016, 407 of which are workers from Bangladesh. This survey is also cross-sectional and gives information on previous migrations and salary history of migrants. The IOM and DFID survey samples 1200 migrant households from Bangladesh, of which 527 are international migrants.

Estimation and Tests

Under the assumption of middlemen as monopolists practicing first-degree price discrimination, there are at least four possible sources in heterogeneity from agency fees. The four possible explanations I have identified are

- Productivity
- Reservation Wage
- Information
- Risk Preference

For the first possible explanation, productivity, it is assumed that productivity is observable, while for the latter three, productivity is assumed unobservable. Even if we assume productivity to be observable in the latter three instances, it does not make a significant difference on the econometric estimation. Each explanation of selection will have different implications regarding sector productivity. After the most fitting explanation for selection is identified, long-run dynamics and equilibrium will be tested. The test for each explanation and the implications is as follows:

Productivity:

If we assume that, under perfect information, productivity is the source of heterogeneity in migrants, this would have two testable implications. For one, workers who have already worked in the market would be willing to pay more, as they are assumed to be more productive. Secondly, wages and middlemen fees would be positively correlated. If this explanation is the case, then there is no productivity loss from the middlemen recruitment chain.

Tests:

1)

1)

2)

- W: Wage
- f: Middleman Fee
- X: Years worked
- Y: year of migration

If productivity explains selection, then , and .

Reservation Wage:

It may be the case that workers with lower reservation are more likely to pay more for a job overseas. We assume that credit markets are operational (a fair assumption as almost all workers take loans for middleman fees), and workers with poorer opportunities would be willing to take pay higher fees for more lucrative opportunities overseas. For these tests, we assume productivity to be uniform, productivity to be unobservable, and wages to be a lottery. Workers are assumed to have knowledge of the wage distribution.

The test is simple, a regression of pre-migration income (Q33 on Migrant Household Survey) to agency fees. Regarding implications on returning migrants, it is reasonable to assume reservation wage would increase with future migrations, as remittance money would improve living conditions at home (an assumption that will also be tested). If reservation wage increases, then previous migrants would be less likely to re-enter the market.

Tests:

1)

- W_p: pre-migration wages (Q33 in Household Survey)

If reservation wage explains selection, then

2)

- Q: Quality of life, self-reported (Q67 in Household Survey)
- M: indicator variable (1=migrant, 0=non-migrant)
- W: wage

If , then once again test:

1)

If reservation wage explains selection, then

Information

In qualitative literature, there are descriptions of middlemen targeting more naïve potential workers to charge a maximum possible agency fee. For these tests, we assume productivity to be uniform, and wages to be a lottery. Potential workers are assumed to have different expectations of wages.

If this it is the case that heterogeneity is from imperfect information, there will be many characteristics of the selection and migration that differ from the above explanations Firstly, wages and agency fees paid will be uncorrelated; secondly, repeat migrants would be willing to pay lower fees than first-time migrants; Thirdly, we would see the share of returning migrants steadily decrease over time. Also, if information asymmetry were the explanation, workers who had prior contacts or knew someone in the foreign labor sector, other than a middleman, would be willing to pay less than those who did not have such connections.

Tests:

1)

2)

Retesting this regression, if information asymmetry explains the selection process, then , , and .

3)

- C = Connections at destination other than middleman (1=yes, 0=no)

In terms of measuring distribution to confirm or reject this hypothesis, we would measure the kurtosis of the distribution and using a quantile-quantile plot against a normal distribution to compare skewness.

Risk Preference

It is possible that workers who are more risk-loving are more willing to take the gamble of working overseas. Although there is no direct empirical measure of risk aversion, risk measure can be reasonably proxied by the number of household members and dependents. The

can be reasonably proxied by the number of household members and dependents. The assumptions uniform productivity and wage determination as a lottery still hold. Risk-loving workers would be willing to pay more to enter the lottery, with knowledge that wage is effectively random. If this is the case, we would once again see no correlation between wage and middleman fees. However, we should see agency fees decrease as the number of dependents increases. Also, controlling for dependents, the distribution of workers by experience should be a uniform distribution, if we assume risk profiles remain constant over time.

Tests:

1)

- D: Dependents
- M: Married (0 = single, 1 = married)
- A: Age
- X: years worked

If risk preference is the cause of selection, then controlling for age and years in the labor force, . Also testing the distribution of workers, using kurtosis and a Q-Q plot, should show a uniform distribution.

Descriptive Statistics

Dataset 1: (N=142)

stats	Age	Salary	Amount~d	Educat~n	years
mean	29.63043	898.0159	428292.2	11.07692	5.587209
sd	5.665977	357.7773	239792.7	1.732567	3.798524
min	18	275	0	5	.5
max	45	2600	1000000	16	22

Recent Migrants (Years=<5) (N=71)

stats	Age	Salary	Amount~d	Educat~n	years
mean	28.26087	815.0938	508907.9	11.36923	2.947183
sd	5.433156	314.0647	263153.5	2.012222	1.516185
min	20	275	0	5	.5
max	45	2600	1000000	16	5

Salary (SGD)
Amount Paid (BDT)
Education (Years)
Years = years of migration

Dataset 2 (N=910):

Age:

(b) Percent of respondents

	Bdesh	China	India	Other	All
19 or younger	0.2	0.0	0.0	0.0	0.1
20-24	25.2	2.6	11.6	11.8	17.5
25-29	41.8	8.7	41.8	29.4	37.1
30-34	19.2	16.5	30.5	29.4	22.9

35-39	7.7	14.8	9.6	14.7	9.5
40-49	4.9	53.9	6.2	11.8	11.8
50-59	0.2	3.5	0.0	0.0	0.5
Unclear answer or not stated	0.9	0.0	0.3	2.9	0.7
Total	100.0	100.0	100.0	100.0	100.0
Weighted average age	28	40	30	31	30
Approx mean age	27	40	30	31	29

Length of Work

(a) Number of responses

When commenced current job	Bdesh	China	India	Other	All
2000 or earlier	12	0	7	1	20
2001 - 2005	15	3	16	1	35
2006 - 2010	138	19	93	19	269
2011	45	6	29	0	80
2012	57	13	28	3	101
2013	53	29	27	4	113
2014	47	6	33	4	90
2015	84	32	39	1	156
2016	1	0	0	0	1
Total	452	108	272	33	865
Subtotal since 2014	132	38	72	5	247
Subtotal since 2011	287	86	156	12	541

Year Current Job Began

(a) Number of responses

When commenced current job	Bdesh	China	India	Other	All
2000 or earlier	6	0	6	0	12
2001 - 2005	7	2	8	1	18
2006 - 2010	66	7	64	12	149
2011	24	3	23	0	50
2012	41	9	19	3	72
2013	33	18	20	2	73
2014	27	4	27	3	61
2015	49	24	19	1	93
2016	1	0	0	0	1
Total	254	67	186	22	529
Subtotal since 2014	77	28	46	4	155
Subtotal since 2011	175	58	108	9	350

Salary

On First Job:

(a) Number of respondents (n=518) who gave a starting basic salary, current basic salary, and year of starting present job

When began this job?	Bdesh	China	India	Other	All
2000 or earlier	6	0	6	0	12
2001 - 2005	7	2	8	1	18
2006 - 2010	65	6	63	12	146
2011 - 2013	97	28	62	5	192
2014 - 2016	75	26	46	4	151

Total	250	62	185	22	519

(b) Average monthly basic salary at start of job ($)

When began this job?	Bdesh	China	India	Other	All
2000 or earlier	615		569		592
2001 - 2005	566	1900	613	468	730
2006 - 2010	587	930	602	809	626
2011 - 2013	600	1470	608	864	736
2014 - 2016	620	1137	548	809	692

(c) Average monthly basic salary now ($)

When began this job?	Bdesh	China	India	Other	All
2000 or earlier	828		1020		924
2001 - 2005	906	2000	888	988	1024
2006 - 2010	797	1318	838	1270	875
2011 - 2013	697	1665	684	971	841
2014 - 2016	649	1185	582	859	726

Figures in grey are based on sample subsets smaller than 20

Not on First Job

(a) Number of respondents (n=332) who gave a starting basic salary, current basic salary, and year of starting present job

Began present job	Bdesh	China	India	Other	All
2000 or earlier	5	0	1	1	7
2001 - 2005	8	1	8	0	17
2006 - 2010	72	12	29	7	120
2011 - 2013	56	17	22	2	97
2014 - 2016	55	9	26	1	91
Total	196	39	86	11	332

(b) Average monthly basic salary at start of present job ($)

Began present job	Bdesh	China	India	Other	All
2000 or earlier	428		390	1200	533
2001 - 2005	705	600	744		717
2006 - 2010	639	1106	699	688	703
2011 - 2013	623	1406	647	624	765
2014 - 2016	654	1283	724	750	737

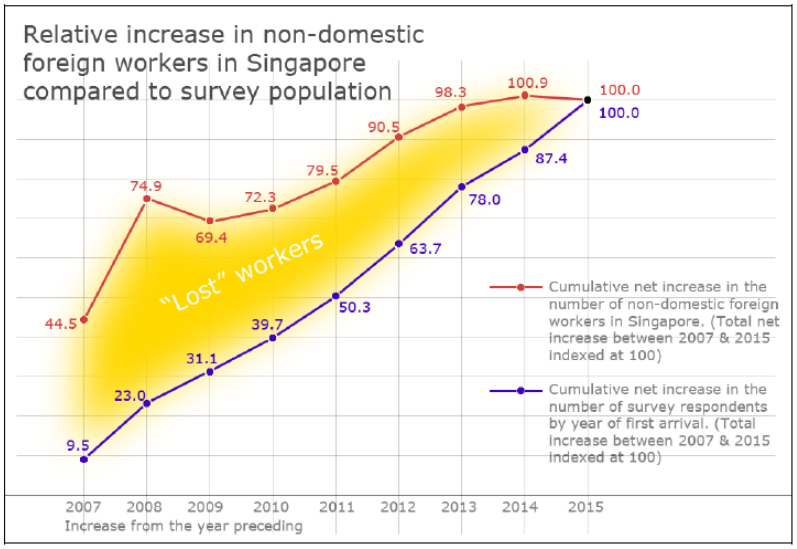
(c) Average monthly basic salary now ($)

Began present job	Bdesh	China	India	Other	All
2000 or earlier	806		1950	1500	1068
2001 - 2005	874	650	904		875
2006 - 2010	810	1580	868	896	906
2011 - 2013	758	1581	708	715	890
2014 - 2016	723	1413	788	850	811

Figures in grey are based on sample subsets smaller than 20

Proxy for Worker Attrition:

Chart 4



Dataset 3 (N=4767):

Migrant status of household 1	Freq.	Percent	Cum.
internal migrant	2,362	49.55	49.55
international migrant	2,252	47.24	96.79
regional migrant	153	3.21	100.00
Total	4,767	100.00	

International Migrants:

in most recent migration, where did s/he move to (country) ?	Freq.	Percent	Cum.
ksa	112	19.44	19.44
uae	159	27.60	47.05
kuwait	18	3.13	50.17
oman	43	7.47	57.64
qatar	7	1.22	58.85
bahrain	2	0.35	59.20
lebanon	4	0.69	59.90
india	68	11.81	71.70
south africa	1	0.17	71.88
jordan	4	0.69	72.57
libya	6	1.04	73.61
malaysia	87	15.10	88.72
singapore	29	5.03	93.75
south korea	1	0.17	93.92
italy	2	0.35	94.27
japan	3	0.52	94.79
egypt	1	0.17	94.97
brunei	3	0.52	95.49
mauritius	5	0.87	96.35
iraq	1	0.17	96.53
maldives	9	1.56	98.09
others	11	1.91	100.00
Total	576	100.00	

Middlemen Fees:

Variable	Obs	Mean	Std. Dev.	Min	Max
q28	1132	137281.8	306926.7	40	3500000

Connections:

prior to moving, did have any contacts/connections at the most recent destinatio	Freq.	Percent	Cum.
no	568	48.05	48.05
yes	614	51.95	100.00
Total	1,182	100.00	

who was the contact/connection

contact/connection at the most recent destination stated in q21 ?	Freq.	Percent	Cum.
migrant self	147	23.94	23.94
family member	292	47.56	71.50
friend	115	18.73	90.23
agent at origin	13	2.12	92.35
agent at destination	29	4.72	97.07
workmate	1	0.16	97.23
other	17	2.77	100.00
Total	614	100.00	

Preliminary Tests (Done on smallest dataset)

Estimation of

Source	SS	df	MS	Number of obs =	103
				F(2, 100) =	3.12
Model	.782174286	2	.391087143	Prob > F =	0.0485
Residual	12.5352929	100	.125352929	R-squared =	0.0587
				Adj R-squared =	0.0399
Total	13.3174672	102	.130563404	Root MSE =	.35405

lnsalary	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnagentfees	-.0693826	.0631823	-1.10	0.275	-.1947344	.0559692
years	.0162711	.0101349	1.61	0.112	-.0038362	.0363785
_cons	7.520025	.8366692	8.99	0.000	5.860097	9.179953

Estimation of

Source	SS	df	MS	Number of obs =	98
				F(4, 93) =	9.89
Model	9.31063208	4	2.32765802	Prob > F =	0.0000
Residual	21.8848851	93	.235321345	R-squared =	0.2985
				Adj R-squared =	0.2683
Total	31.1955172	97	.32160327	Root MSE =	.4851

lnagentfees	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Married	.1322896	.1275649	1.04	0.302	-.1210291	.3856083
children	.0769964	.0793393	0.97	0.334	-.0805558	.2345485
years	-.0511183	.0144162	-3.55	0.001	-.079746	-.0224906
Age	-.0326024	.0109063	-2.99	0.004	-.05426	-.0109447
_cons	14.00475	.2835425	49.39	0.000	13.44169	14.56781

Estimation of

Source	SS	df	MS	Number of obs =	106
				F(2, 103) =	9.00
Model	5.94233518	2	2.97116759	Prob > F =	0.0002
Residual	33.9975133	103	.330072945	R-squared =	0.1488

Total	39.9398485	105	.38037951	Adj R-squared = 0.1323 Root MSE = .57452

lnagentfees	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
years	-.0575983	.0239409	-2.41	0.018	-.1050794	-.0101172
YearofMigration	.0057031	.0214838	0.27	0.791	-.0369049	.0483111
_cons	1.673024	43.28788	0.04	0.969	-84.17828	87.52433

Theoretical Framework

Given the results of the econometric estimation, there will be a different set of models for long-run equilibrium. If productivity and can be observed and explains selection heterogeneity between migrants, then the market will be modelled as the first-best production outcome under a standard principle-agent model: a complete information optimal contract. Otherwise, in any of the three explanations, it will be modelled a dynamic game with three sets of actors.

Model Primitives (Productivity)

-Actors: N Principals (aggregation of firms and middlemen), K Agents, K>>N

-Payoffs:

1. Agent's Cost Function:
    a. Payoff: u(W)=u((w-)q)
2. Principal's Payoff:
    a. At equilibrium,

-Timing: Static Game: t=0, agent (worker) discovers type; t=1, Principal offers contract; t=2, agent accepts or refuses contract; t=3, contract executed

Model Primitives (Reservation Wage or Information Asymmetry)

Actors: K workers, Employers (aggregated as "B"), Middlemen (aggregated, denoted "M")

- Heterogeneity: workers expected payoff of working, cumulative distribution function denoted $G_i(x)$

Payoffs: (See attached document)

- Attached model only factors information asymmetry, but the long-run outcomes are similar for reservation wage

Timing: Dynamic game,

- Changes between states: exogenous retention rate $\boldsymbol{\tau}$ and discount factor $\boldsymbol{\beta}$

Theoretical model with long-run outcomes under selection for risk is forthcoming

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