

Out-migration from metropolitan cities in Brazil

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Motivation

Around 10% (around 6 Mio. people) of 25-65 year old Brazilian workers moved between 2000 and 2010.

Table 1: Migrants between metropolitan and non-metropolitan micro-regions between 2009 and 2010.

<i>Origin</i>	<i>Destination</i>	
	Non-metropolitan	Metropolitan
Non-metropolitan	46.9%	21%
Metropolitan	19.2%	13.1%

N=810,196, using survey weights

Micro-regions: administrative unit of neighbouring municipalities, which share local labour market and economic activities:

- Non-metropolitan: inhabitants <1 Million, $N = 536$
- Metropolitan: inhabitants ≥ 1 Million (UNWUP definition), $N = 22$

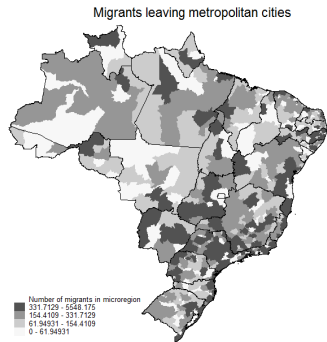
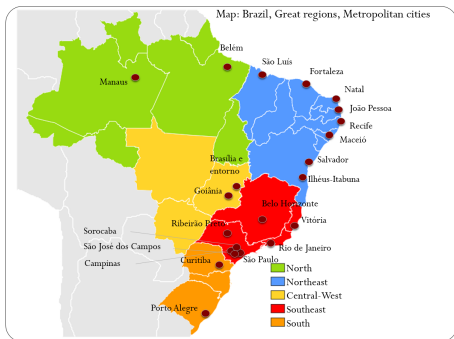


Figure 1: Map of greater regions and metropolitan cities of Brazil.

Figure 2: Map of micro-regions of destination of migrants leaving metropolitan cities in 2009.

Motivation

Table 2: Characteristics of micro-regions in 2010

	Non-metropolitan	Metropolitan
Population	213,680	2,679,687
Hourly wage (R\$)	7.03	11.51
Room rent (R\$)	50.37	81.45
Unemployed	0.05	0.07

- Literature mainly focuses on migration into capitals and metropolitan centers in developing countries, following two-sector development model (Harris-Todaro 1970)
- Demographic data from Brazil (Census 2010) shows large share of migration **out of** metropolitan cities and into non-metropolitan towns

Research question

- What is the return to migrating out of metropolitan cities in nominal and real terms?
- Estimate the counterfactual: What would the migrants have earned had they not moved out of the metropolitan city?

Empirical analysis:

- Challenges: Selection bias
- Matching method to reduce bias

Results:

- Real wage return for out-migrants positive, but negative nominal return for low educated workers.

Literature

- Migration decision and location choice:
 - Theory of cost-benefit rationality of migration:
 - Lewis 1954, Harris/Todaro 1970, Sjaastadt 1969, Tunalı 2000
 - Spatial equilibrium models:
 - Roback 1982, Moretti 2011, Diamond 2015, Chauvin et al. 2016, Morten and Oliveira 2016
- Counterfactual scenario of migrants in developing country:
 - McKenzie, Gibson and Stillman 2006, Brown and Jimenez 2008, Adams 1989/2006/2008, Adams and Cuecuecha 2013
- Importance of medium-sized cities:
 - Christiaensen et al. 2013, Fan and Stark 2008
- Migration in Brazil:
 - Yap 1976, Santos and Ferreira 2007, Fally et al. 2010, Aguayo-Tellez et al. 2010, Morten and Oliveira 2016

Data

- 1 **Censo Demográfico 2010:** 10% nationally representative survey of Brazilian population Census 2010:
 - Cross-section of 20 Mio. individuals
 - Full spatial coverage, municipality level
 - Information on household composition, living conditions, labour market, education, geographic location, **migration** (municipality of former residence and years since migration)
- 2 **Ipeadata:** Information on micro-region characteristics:
 - Information on GDP, exports, population, internal market access

Methodology: Counterfactual wages

The comparison of migrant wages between origin and destination can be interpreted as an evaluation problem.

Thus, the wage difference due to migration can be identified for migrants as average treatment effect on the treated (ATET):

$$ATET = E(Y^1 - Y^0 | M = 1) = E(Y^1 | M = 1) - E(Y^0 | M = 1) \quad (1)$$

$E(Y^0 | M = 1)$ is unobservable.

Methodology: Counterfactual wages

Cross-sectional data:

- 1 Estimate wages for residents at origins of migrants.
- 2 Predict wages for migrants \hat{y}
- 3 Return to migration: $r_i = y_i^d - \hat{y}_i^o$

\hat{y} will be **biased** because migrants are not a random sample.

- Match migrants with residents at their origin based on observables using *propensity score matching (nearest neighbour)*:
 - age, sex, race, education, marital status and location (of origin for migrants)
 - Cross-section data: Sample chosen so that these characteristics cannot change.
- Predict wages based on matched sample.

Sample

- **Migrants (Treatment group):** $N = 19,322$
 - Live and work now in different micro-region than before and that is not their place of birth
 - Exclude commuters, thus no suburbanisation
 - Moved one year ago
 - 25-65 years old men and women, currently not in school
- **Non-migrants (Control group):** $N = 623,772$
 - Live and work now in the micro-region that is their place of birth and have not moved
 - Residents at origin micro-regions of migrants

Table 3: Characteristics of migrants and non-migrants

	Non-metropolitan residents	Metropolitan out-migrants	Metropolitan residents	Metropolitan in-migrants
Age	40.25	<i>36.85</i>	40.22	<i>35.31</i>
Female	0.41	<i>0.37</i>	0.45	<i>0.38</i>
<i>Education level</i>				
None	0.47	<i>0.29</i>	<i>0.29</i>	0.40
Primary	0.16	<i>0.16</i>	<i>0.17</i>	0.17
Secondary	0.26	<i>0.33</i>	<i>0.36</i>	0.28
Higher	0.11	<i>0.21</i>	<i>0.19</i>	0.16
<i>Labour market</i>				
Log(monthly wages)	6.59	<i>6.95</i>	<i>6.98</i>	6.85
Unemployed	0.05	<i>0.12</i>	0.06	<i>0.11</i>
<i>N</i>	<i>4,184,904</i>	<i>19,322</i>	<i>1,598,869</i>	<i>11,884</i>

Proportions and means computed using survey weights.

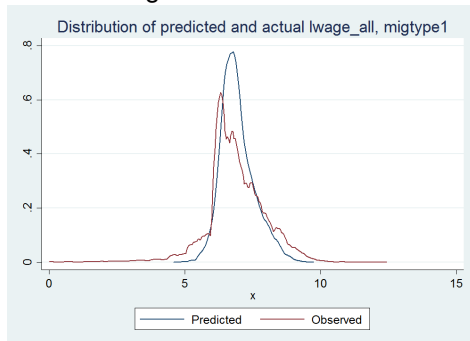
Results of counterfactual analysis

Table 4: Differences of actual and predicted wages for migrants, by migration direction

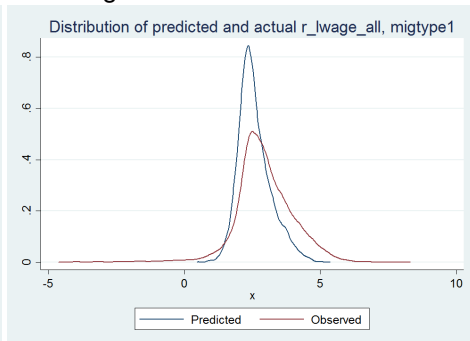
Log(nominal wages)	Metropolitan out-migrants	
	Unmatched Mean	Matched Mean
Observed	6.87	6.87
Predicted	6.82	6.93
Difference	0.05***	-0.06***
<i>N = 16,172</i>		
Log(real wages)	Mean	
	Mean	Mean
Observed	2.94	2.94
Predicted	2.73	2.58
Difference	0.16***	0.36***
<i>N = 16,172</i>		

Significance levels * 10% ** 5% *** 1% of difference between observed and predicted wages.

Nominal wages



Real wages



Distributions are statistically significantly different according to Kolmogorov-Smirnov test of equal distributions.

By education level

Table 5: Differences of actual and predicted wages for migrants after matching, by education level

	Metropolitan out-migrants	
	High educated	Low educated
Log(nominal wages)	0.34***	-0.05***
Log(real wages)	0.43***	0.09***
Observations	3,261	12,911

Significance levels * 10% ** 5% *** 1% of difference between observed and predicted wages.

Further results

- Crisis effect?
 - Results from migrants in previous years confirm pattern
- Local factors that increase probability to be 'winner' (Positive wage difference):
 - Nominal wages: higher GDP growth, international market access, higher formalization, North and Central-West
 - Real wages: lower living standards, higher formalization, North and Central-West
- Local factors that increase probability for migrant at destination to be:
 - Unemployed: higher share of low skilled workers, Northeast
 - Poor: lower formalization rate, Northeast, Southeast and South

Conclusion

- The return to migrating out of metropolitan cities in Brazil is **on average** positive in real terms.
 - high educated workers are pulled by demand for high skill
 - low educated workers are pushed out by high living costs
- 'Winners':
 - in fastest growing areas of North and Central-West
 - in more formalized labour markets
- Non-metropolitan areas as alternative to metropolitan unemployment or informal sector.

Thank you.

Motivation

Around 10% of 25-65 year old Brazilian workers moved between 2000 and 2010, around 6 Mio. people.

Table 6: Migrants between metropolitan and non-metropolitan micro-regions between 2009 and 2010, 2000 to 2010 in parentheses.

<i>Origin</i>	<i>Destination</i>			
	Non-metropolitan		Metropolitan	
	2009-10	(2000-10)	2009-10	(2000-10)
Non-metropolitan	46.9%	(43.4%)	21%	(25%)
Metropolitan	19.2%	(17.7%)	13.1%	(13.8%)

N=810,196 (5,921,494), using survey weights

Table 7: Characteristics of micro-regions in 2010

	Non-metropolitan	Metropolitan
Room rent (R\$)	50.37	81.45
Hourly wage (R\$)	7.03	11.51
Relative wages (High/Low educated)	1.75	1.59
Log(GDP)	13.575	16.726
GDP growth 2005-2010	0.176	0.156
Log(Exports)	17.076	20.806
Distance to state capital	258.410	53.202
Health quality index (0 to 1)	0.789	0.817
Education quality index (0 to 1)	0.732	0.768
Population	213,680	2,679,687

Table 8: Characteristics of micro-regions in 2010

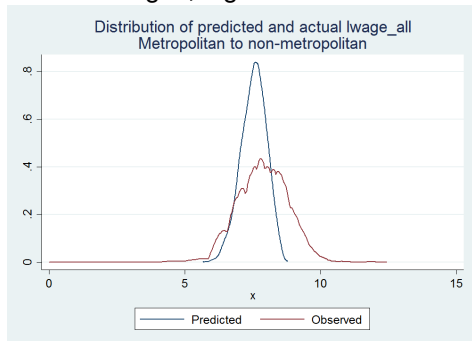
	Non-metropolitan	Metropolitan
<i>Skills</i>		
Unskilled workers	0.37	0.37
Skilled workers	0.40	0.31
High skilled workers	0.16	0.24
<i>Employment</i>		
Formally employed	0.40	0.57
Unemployed	0.05	0.07
<i>Sectors</i>		
Agriculture	0.30	0.09
Industry	0.18	0.21
Services	0.35	0.53
Public services	0.12	0.11
<i>Living standards</i>		
Urban residence	0.73	0.97
Adequate living conditions	0.35	0.57
Bolsa Familia recipients	0.09	0.05

Table 9: Differences of actual and predicted wages for migrants, by migration direction

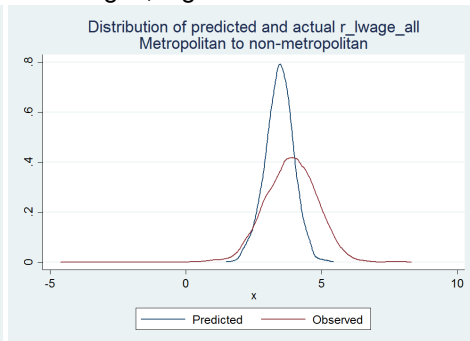
Log(nominal wages)	Metropolitan in-migrants		
	N	Mean	Std. Dev.
Observed	10,367	6.82	0.87
Predicted	10,583	6.63	0.57
Difference	6,695	0.18***	0.65
Log(real wages)	Metropolitan out-migrants		
	N	Mean	Std. Dev.
Observed	9,435	2.48	0.84
Predicted	9,600	2.63	0.50
Difference	9,435	-0.15***	0.65

Significance levels * 10% ** 5% *** 1% of difference between observed and predicted wages.

Nominal wages, high educated

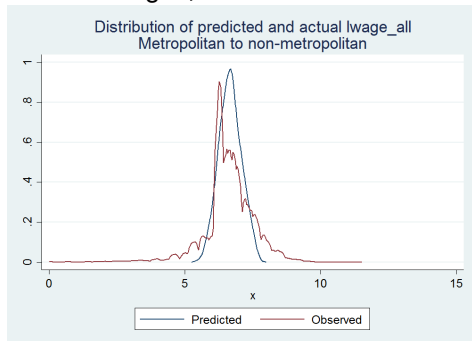


Real wages, high educated

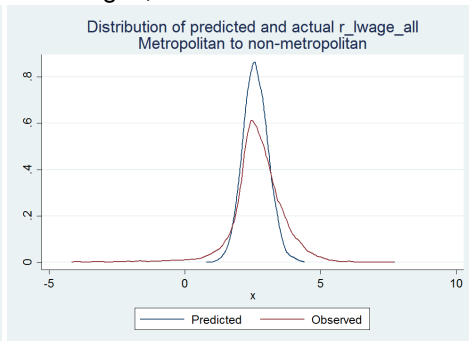


Distributions are statistically significantly different according to Kolmogorov-Smirnov test of equal distributions.

Nominal wages, low educated



Real wages, low educated



Distributions are statistically significantly different according to Kolmogorov-Smirnov test of equal distributions.

Table 10: Nominal and real wage differences between high and low educated migrants.

	Nominal	Real
High and low educated out-migrants	1.06	1.01
High educated stayers and low educated out-migrants	1.12	0.65
High educated out-migrants and low educated stayers	0.87	1.24
High educated and low educated stayers	0.93	0.88

Motivation

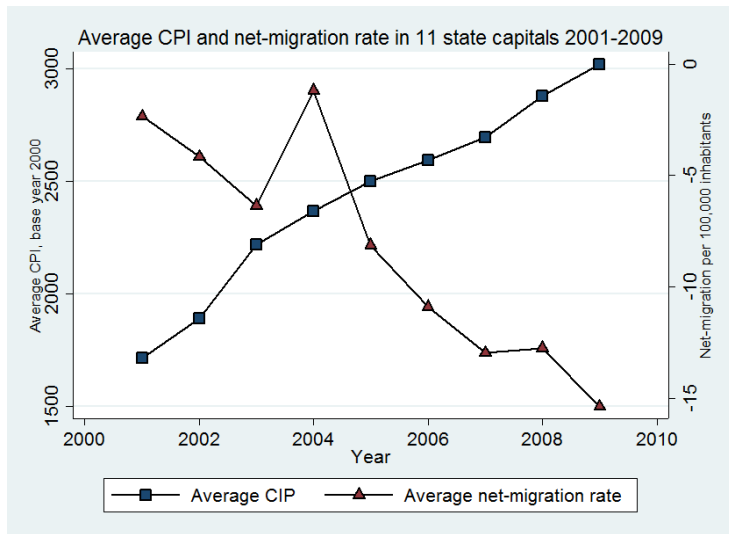


Figure 3: Prices and net-migration rate in 11 metropolitan cities from 2001 to 2009.

Motivation

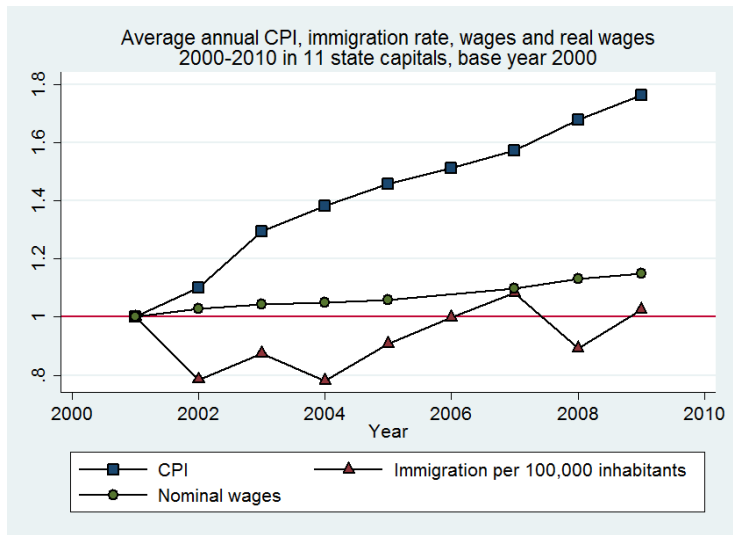


Figure 4: Nominal and real wages and immigration in 11 metropolitan cities 2001 to 2009

Motivation

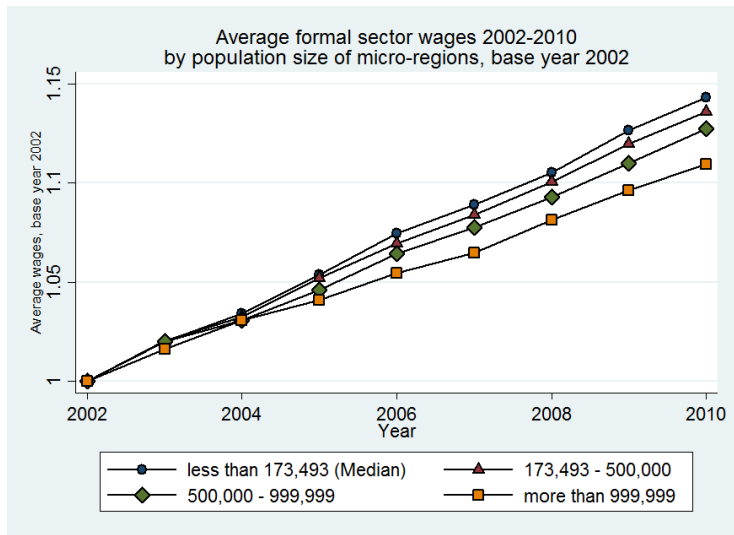


Figure 5: Formal sector wages microregions of different size from 2002 to 2010.