

***Economic Analysis Using Linked
Employer - Employee Data***

September 2009

**Workers' Mobility
and
Internal Labour Markets**

Anabela Carneiro

José Varejão

Marisa Tavares



Workers' Mobility and Internal Labour Markets

1. Intra-firm and Inter-firm mobility: who's moving?

- Theoretical background and objectives
- Models and empirical results

2. Returns to mobility: the effect of workers' mobility on wages

- Theoretical background and objectives
- Models and empirical results



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1. Intra-firm and Inter-firm mobility: who's moving?

Understanding what influences mobility is relevant for both organizations and individuals (Ostroff and Clark, 2001)

From the **companies' perspective**, mobility will be essential to achieve an efficient allocation of resources

From the **workers' perspective**, mobility may enhance career perspectives (in that company or in another company)

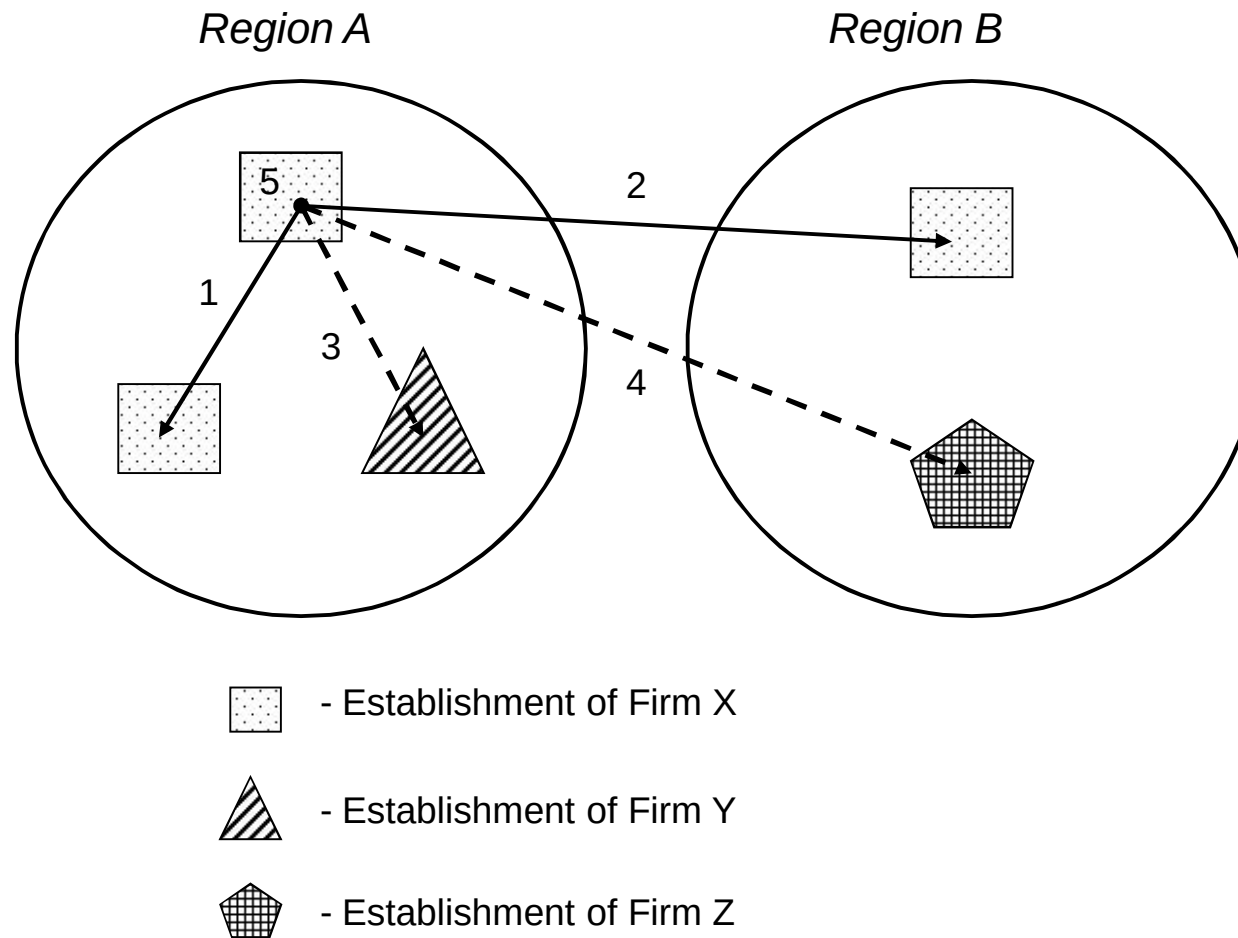


1. Intra-firm and Inter-firm mobility: who's moving?

- To analyze mobility probabilities, we defined the following classification:

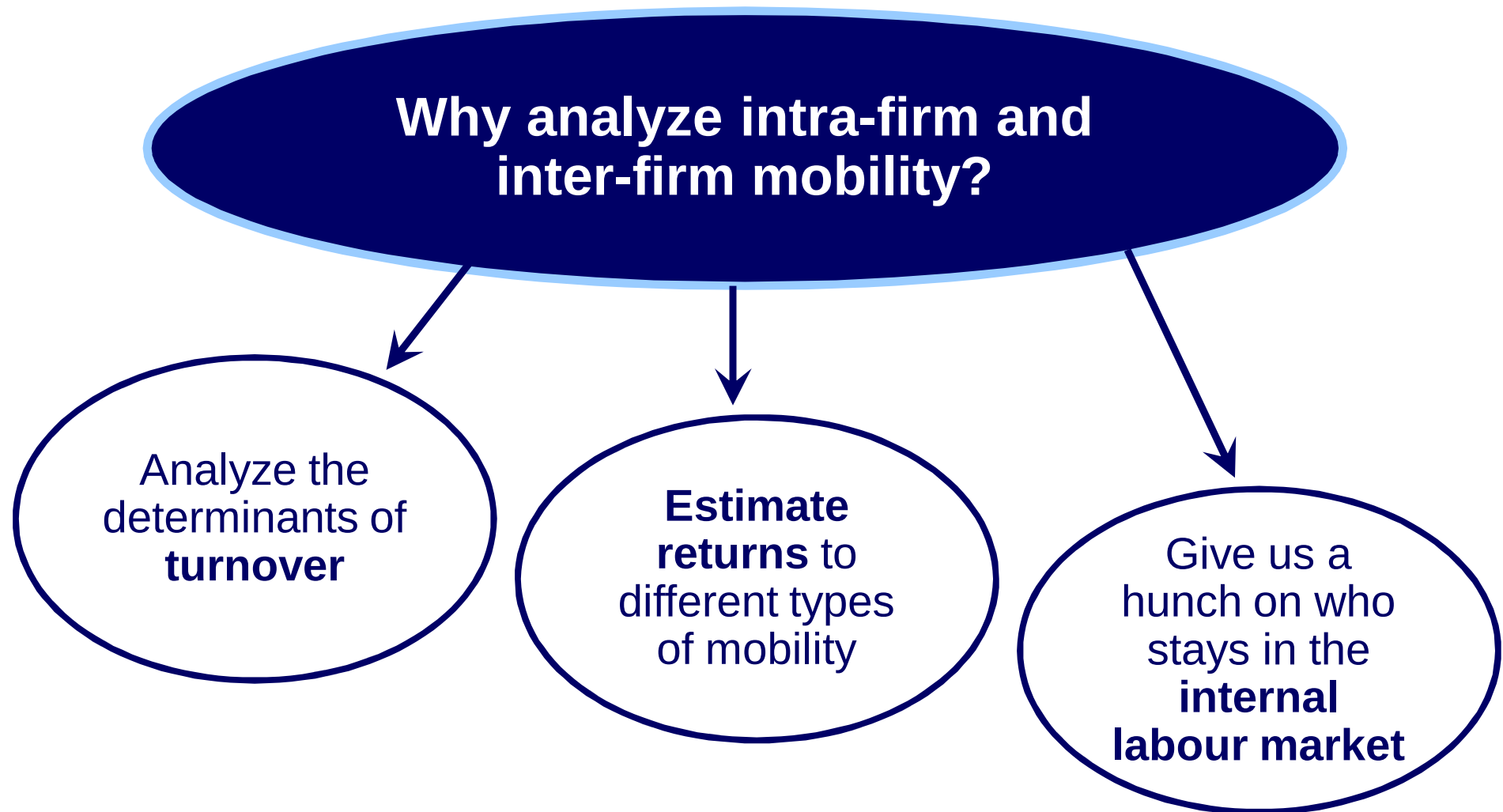
Type 1	Same-employer transfers without region change: workers that perform a local change of establishment within the same firm
Type 2	Same-employer transfers with region change: workers that perform a non-local change of establishment within the same firm
Type 3	Employer change without region change: workers that change firm within the same region
Type 4	Employer change with region change: workers that change firm and also change region
Type 5	Base category: employees that remain in the same establishment of the same firm

1. Intra-firm and Inter-firm mobility: who's moving?



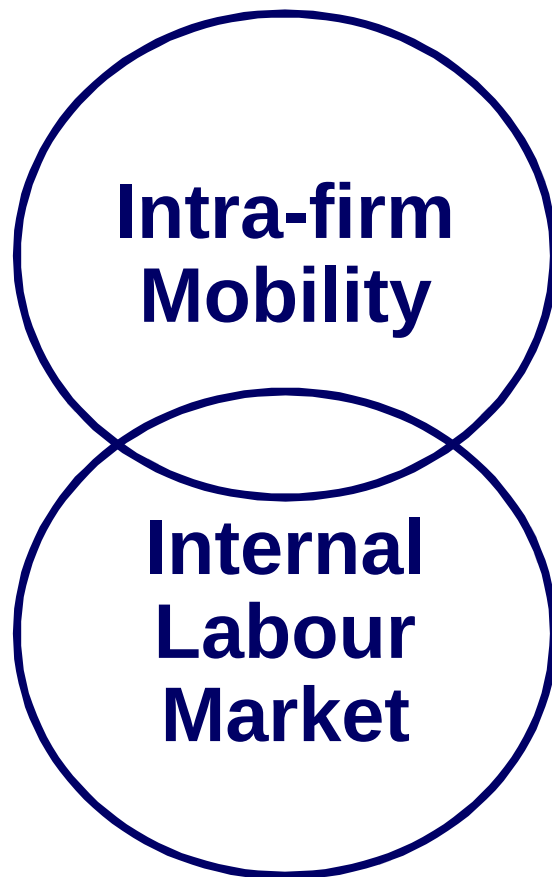


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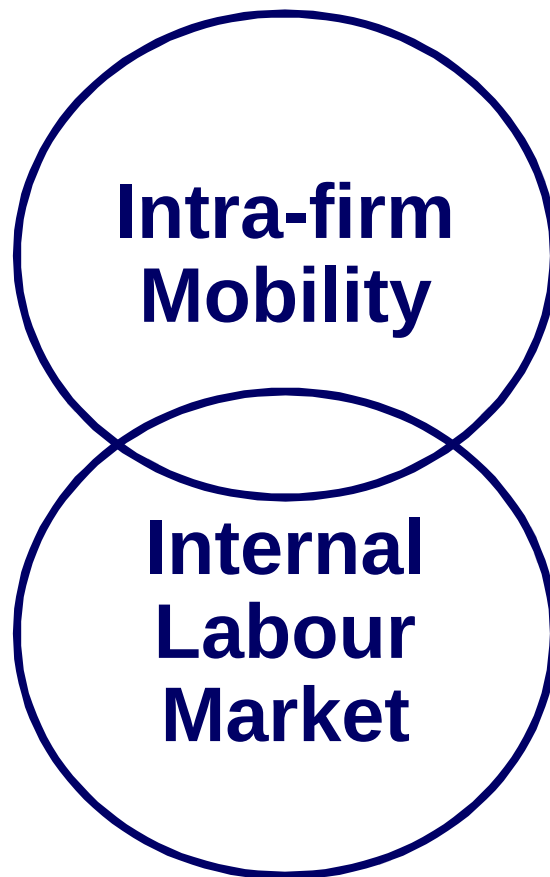


- Internal labour market's literature often explores the existence of an **internal job ladder**
- Numerous studies focus on **promotion dynamics** and on the **determinants of promotion**

(McCue, 1996; Pergamit and Veum, 1999; Lazear and Oyer, 2004; Lima, 2004; Lima and Centeno, 2003)



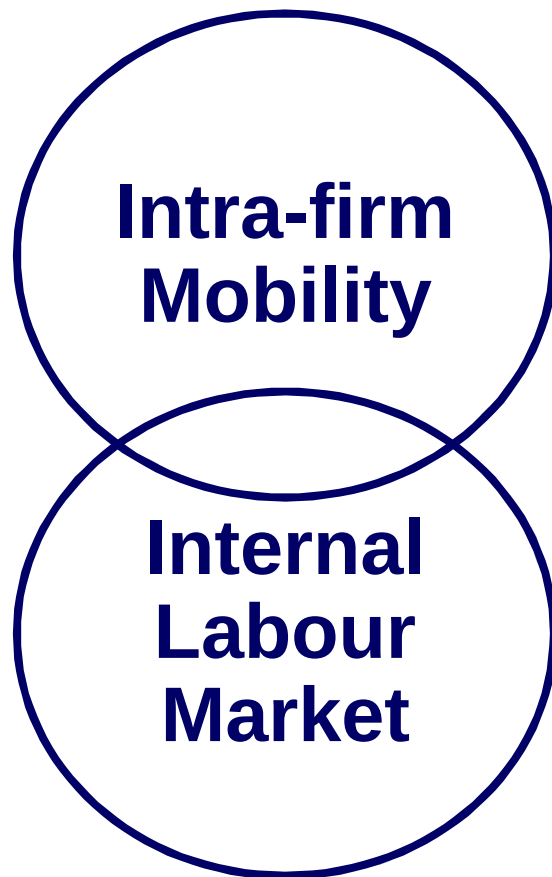
1. Intra-firm and Inter-firm mobility: who's moving?



- We want to propose a **different outlook on intra-firm mobility**
- The novelty in our approach is to focus on internal mobility that involves **an establishment change**, instead of focusing on the determinants of mobility **within the same establishment**



1. Intra-firm and Inter-firm mobility: who's moving?



- Although **with distinct features**, these transfers are also a way to move within the internal labour market of a firm
- In multi-plant firms, the existence of an internal labour market will not be restricted to **one** particular establishment
- In multi-plant firms the internal labour market will be based **on the firm as a whole**



1. Intra-firm and Inter-firm mobility: who's moving?

- Only a few studies report results for these group of internal movers (**Bartel, 1979; Hunt, 2004**)

However...

- These papers focus on the relation between these transfers and **migration literature** rather than looking at them as movements in the **internal labour market**

**Intra-firm
mobility with
establishment
change**

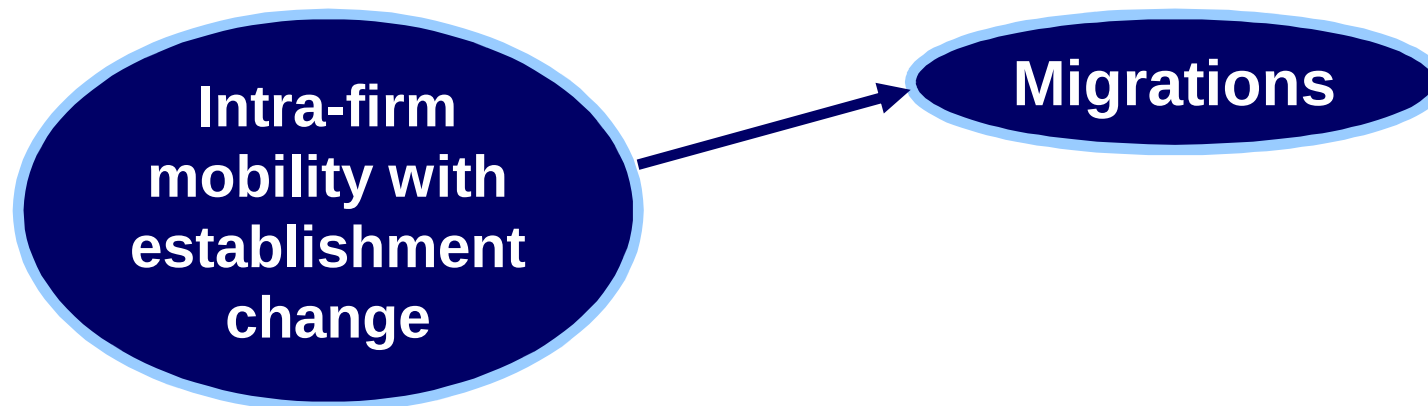


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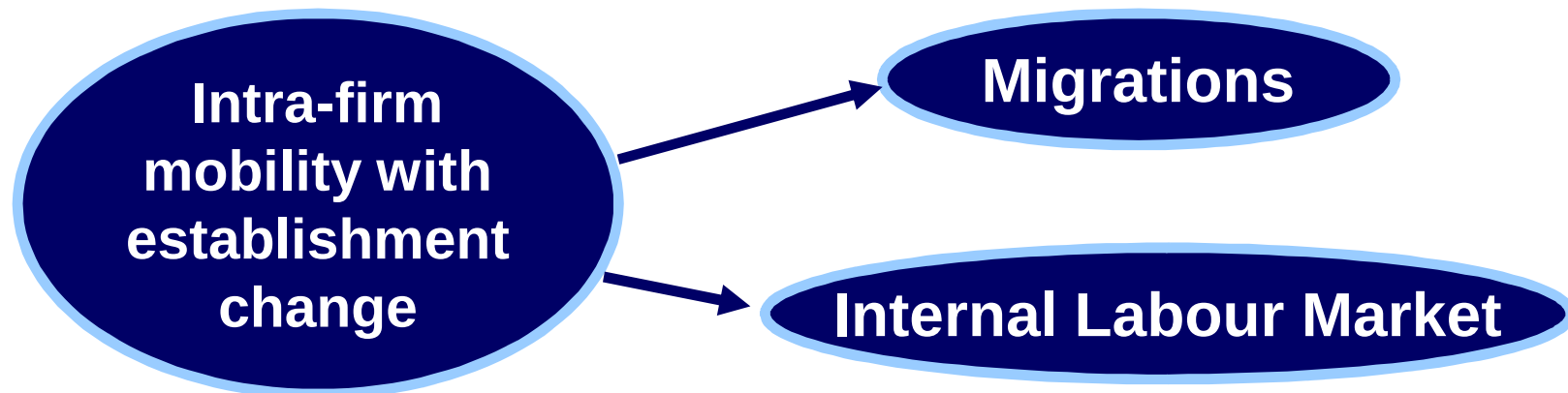


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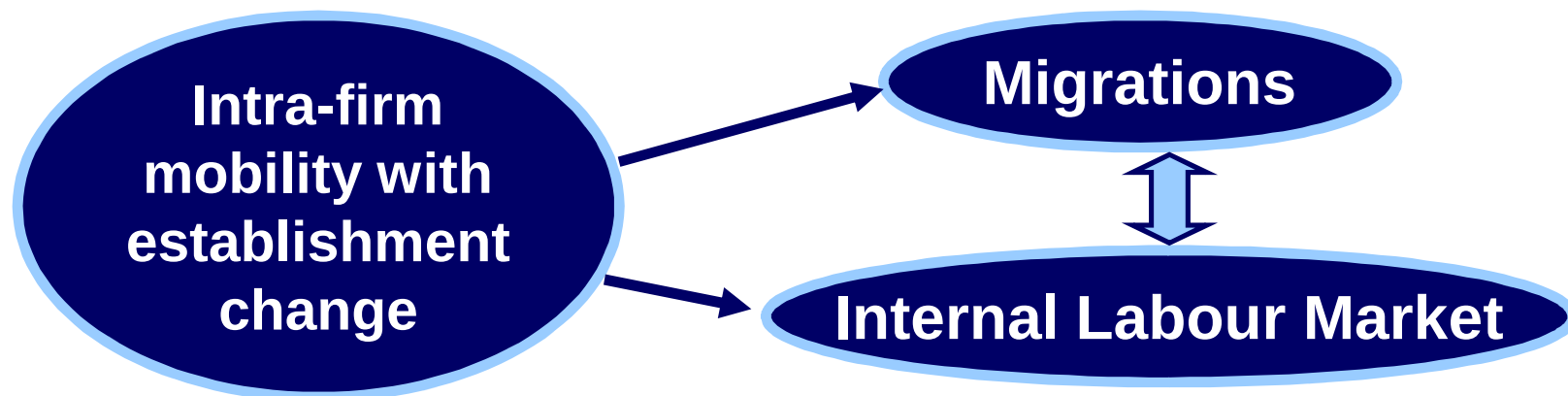


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1. Intra-firm and Inter-firm mobility: who's moving?

- **Bartel (1979)**
 - Analyzes **migration** together with **job mobility** decisions
 - Distinguishes three kinds of migrations: **quits, layoffs and transfers** (workers that migrated without changing employer)
 - Concludes that the analyzed groups have different characteristics and determinants of migration
 - Analyzes **migration propensities** but also the effect of migration on **wages**



1. Intra-firm and Inter-firm mobility: who's moving?

- Hunt (2004)
 - Reports conclusions for transferred individuals (**restricting to inter-state movers**)
 - Once again, transfer goes hand in hand with migration decisions - ***same-employer migrants***
 - Her paper was a step forward in migration literature:
 - Most previous literature focused on the link between **migration** and **inter-firm mobility**
 - She explores the link between **migration** and **intra-firm mobility**



1. Intra-firm and Inter-firm mobility: who's moving?

- To study mobility probabilities we will use the **multinomial logit model (MNL)**, Schmidt and Strauss, 1975)
- Let y denote a random variable taking values $\{0,1,...,J\}$ for J a positive integer
 - In our model y will denote the type of mobility performed by the worker with $J=4$
- Let $\mathbf{X}$ denote a set of regressors.
 - In our model $\mathbf{X}$ will contain individual specific variables and firm characteristics'



1. Intra-firm and Inter-firm mobility: who's moving?

- We are interested in how, *ceteris paribus*, changes in the elements of $\mathbf{X}$ affect the response probabilities, $P(y=j|\mathbf{X})$, $j=0,1,2,\dots,J$
- MNL model has response probabilities:

$$P(y = j|\mathbf{X}) = \frac{e^{x\beta_j}}{1 + \sum_{h=1}^J e^{x\beta_h}}$$

- We can compute the odds-ratios:

$$\frac{P_j(x,\beta)}{P_0(x,\beta)} = e^{x\beta_j}$$



The data

- **Quadros de Pessoal (QP)** – a matched employer-employee dataset
- Panel from **1999 to 2005**, but for the year 2001 **data on workers is not available**
- The data includes:
 - **Firm-specific information** (location, industry, number of establishments, employment, sales, ownership, legal setting, etc.)
 - **Establishment-specific details** (number of workers, location, activity, etc.)
 - **Workforce characteristics** (gender, age, schooling, occupation, tenure, earnings, hours of work, etc.)



Variables definition

Tenure 200	Tenure less than 200 months
Tenure 400	Tenure between 200 and 400 months
Age	Worker's age in years
Age squared	Square of worker's age (divided by 100)
Female	Gender dummy equal 1 for female
Education 4	4 or less years of schooling
Education 9	6 or 9 years of schooling
Education 12	12 years of schooling
Nationality	Dummy equal 1 for foreign worker
Promotion [-3,0]	Dummy equal 1 if the worker was promoted in the previous 3 years
ln W lag	Regular real hourly wage in the previous year



Variables definition

Size lag	Firm size in the previous year (log number of workers)
Δ Size	Change in firm size
Tenure	Tenure in years
Tenure squared	Squared tenure in years (divided by 100)
Level...	Dummies for hierarchical levels
n_est	Number of establishments
SE_same_reg_X	Dummy equal 1 X years after changing estab. in the same region
SE_change_reg_X	Dummy equal 1 X years after changing estab. with region change
Change emp_same_reg_X	Dummy equal 1 X years after changing employer in the same region
Change emp_change_reg_X	Dummy equal 1 X years after changing employer with region change



1. Intra-firm and Inter-firm mobility: who's moving?

- Estimated average probability of choosing each type of mobility:

Pr (Same employer_same region)	5,23%
Pr (Same employer_change region)	1,1%
Pr (Change employer_same region)	8,84%
Pr (Change employer_change region)	1,45%
Pr (No change)	83,38%

MNL Empirical Results

Log L	-2395292,2
Prob> χ^2	0,0000
Pseudo R^2	0,0961
N	4199886

	mobility = 1		mobility = 2		mobility = 3		mobility = 4	
Indep. var.	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Tenure200	0,2024***	(12,63)	0,1210***	(3,59)	0,8825***	(45,27)	2,1581***	(23,47)
Tenure400	0,0070	(0,45)	-0,1209***	(-3,65)	0,1750***	(8,87)	0,2228**	(2,35)
Age	-0,0008	(-0,45)	0,0235***	(6,12)	-0,0769***	(-61,20)	-0,0759***	(-25,57)
Age squar.	0,0018	(0,87)	-0,0348***	(-7,69)	0,0698***	(45,05)	0,0658***	(17,79)
Female	-0,0086*	(-1,65)	-0,4225***	(-33,75)	-0,0555***	(-13,78)	-0,4888***	(-49,23)
Educ4	-0,0976***	(-8,87)	-0,1316***	(-5,74)	-0,3658***	(-40,59)	-0,7811***	(-39,58)
Educ9	-0,1360***	(-14,40)	-0,1241***	(-6,14)	-0,2418***	(-30,08)	-0,6175***	(-35,43)
Educ12	-0,0254***	(-2,85)	-0,0012	(-0,06)	-0,2960***	(-37,58)	-0,5916***	(-34,58)
Nationality	0,2633***	(11,67)	0,5426***	(14,83)	0,4856***	(29,24)	0,5638***	(17,09)
Prom [-3,0]	0,0128*	(1,89)	0,1228***	(9,04)	-0,3353***	(-49,40)	-0,4594***	(-27,95)
ln π lag	0,0402***	(6,73)	0,2028***	(17,00)	-0,2093***	(-41,68)	-0,3490***	(-30,76)
Size lag	0,2897***	(224,36)	0,5284***	(181,49)	-0,0061***	(-6,05)	-0,0801***	(-35,54)
Δ Size	0,1547***	(46,76)	0,3079***	(41,32)	-0,0266***	(-12,09)	-0,0034	(-0,74)
n_est	0,0012***	(76,12)	-0,0003***	(-6,61)	0,0021***	(124,07)	-0,0005***	(-7,64)



Workers' Mobility and Internal Labour Markets

1. Intra-firm and Inter-firm mobility: who's moving?

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2. Returns to mobility: the effect of workers' mobility on wages

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2. Returns to mobility: the effect of workers' mobility on wages

- Most existing literature focus on **returns** for **two** broad kinds of mobility:



Migrations and, in most studies, this implies inter-firm mobility

(Shaw, 1991; Farber, 1983; Yankow, 2003)



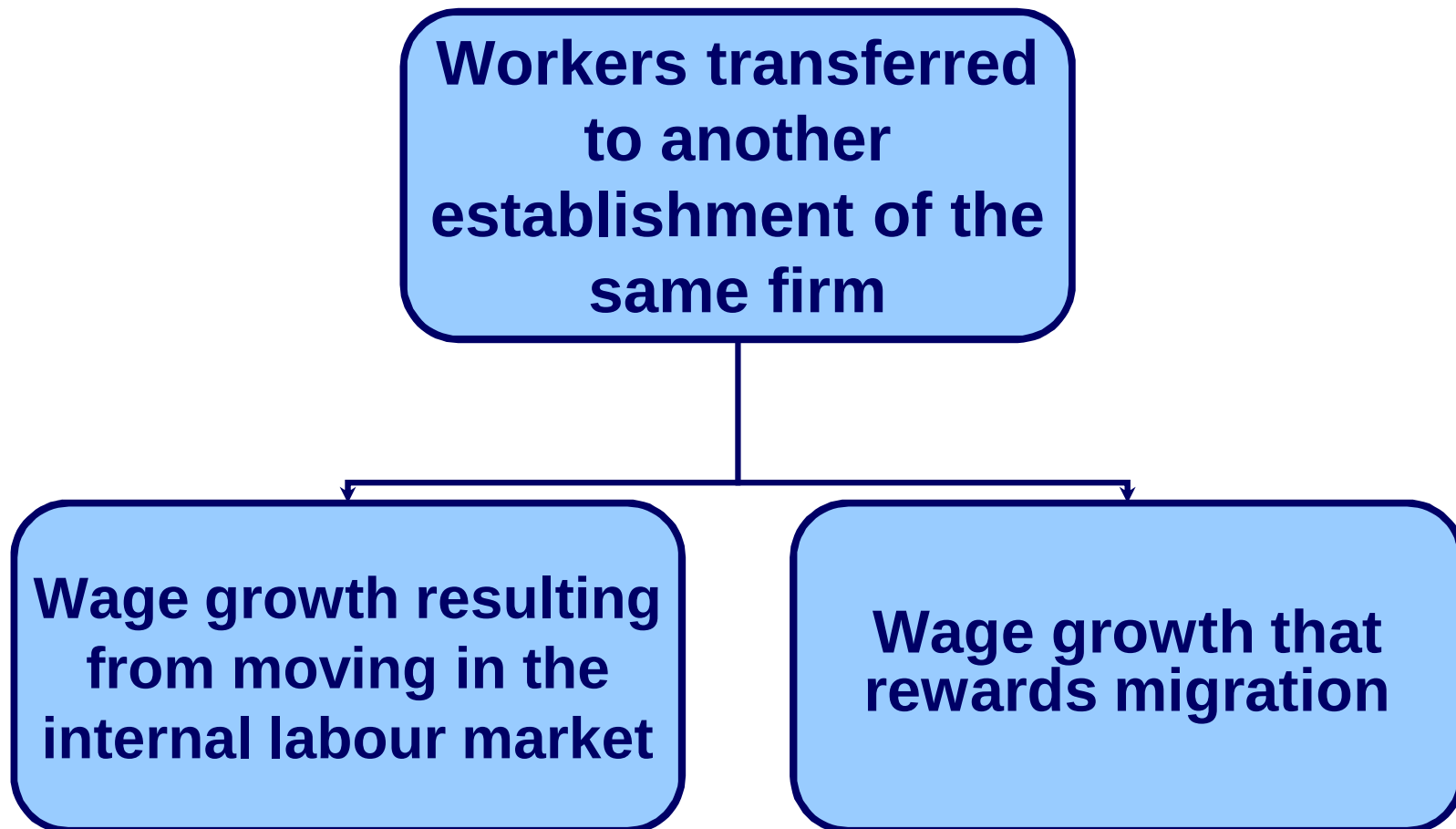
Internal mobility and, in most studies, this implies mobility within the same establishment

(Lima, 2004; Lima and Pereira, 2003; Hegedus & Hartman, 1992)



2. Returns to mobility: the effect of workers' mobility on wages

- We distinguish returns to different types of mobility:

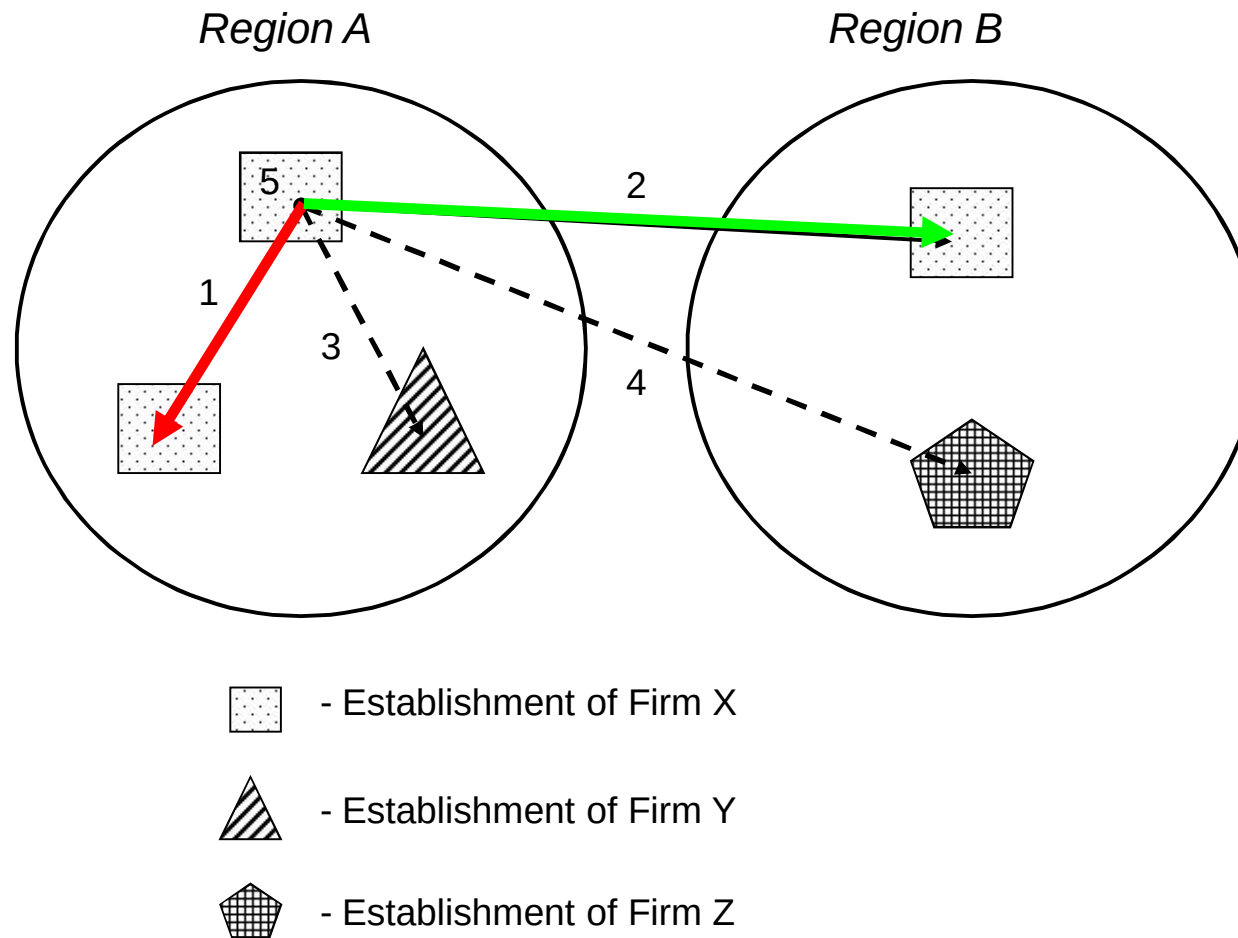




2. Returns to mobility: the effect of workers' mobility on wages

- We propose a **new approach to measure migration premiums**:
 - Compare the wage premium of workers that are locally transferred with the premium of individuals that are transferred another region
 - The first premium will be related to movements in the internal job ladder
 - The **additional wage growth** when the transfer involves a region change will measure the **migration premium**

2. Returns to mobility: the effect of workers' mobility on wages





2. Returns to mobility: the effect of workers' mobility on wages

Background...

- Yankow (2003) suggests a way to measure migration premiums by comparing returns across local and non-local job changers
- May include greater uncertainty as several variables that affect returns may be difficult to control

We believe that comparing workers that remain **with the same employer** allow us to better isolate the additional **migration premium**



2. Returns to mobility: the effect of workers' mobility on wages

- We estimate by OLS an equation capturing the **difference in earnings** for the different types of mobility considered:

$$\ln W_{it} = \beta_1 X_{it} + \beta_2 Z_{it} + \sum_{k=0}^4 SESR_{it}^k \delta_k + \sum_{k=0}^4 SECR_{it}^k \lambda_k + \sum_{k=0}^4 CESR_{it}^k \alpha_k + \sum_{k=0}^4 CECR_{it}^k \tau_k + \gamma_t + \varepsilon_{it}$$

OLS Empirical Results

Independent variables	Coef.	t-ratio	Level 2	-0,1950***	(-175,33)
SE_same_reg ₀	0,0008	(0,96)	Level 3	-0,3549***	(-316,92)
SE_same_reg ₁	0,0059***	(5,98)	Level 4	-0,5940***	(-651,31)
SE_same_reg ₂	0,0098***	(8,64)	Level 5	-0,7617***	(-779,54)
SE_same_reg ₃	0,0267***	(19,08)	Level 6	-0,7661***	(-604,16)
SE_same_reg ₄	0,0298***	(14,13)	Size	0,0618***	(721,20)
SE_change_reg ₀	0,0401***	(21,86)	Change emp_same_reg ₀	0,0177***	(25,84)
SE_change_reg ₁	0,0452***	(21,33)	Change emp_same_reg ₁	0,0212***	(27,74)
SE_change_reg ₂	0,0453***	(14,98)	Change emp_same_reg ₂	0,0237***	(27,53)
SE_change_reg ₃	0,0461***	(15,06)	Change emp_same_reg ₃	0,0290***	(27,76)
SE_change_reg ₄	0,0579***	(12,39)	Change emp_same_reg ₄	0,0410***	(24,17)
Age	0,0256***	(223,91)	Change emp_change_reg ₀	0,0366***	(23,19)
Age squared	-0,0223***	(-162,38)	Change emp_change_reg ₁	0,0443***	(24,21)
Female	-0,2211***	(-628,20)	Change emp_change_reg ₂	0,0446***	(20,84)
Education 4	-0,6774***	(-794,23)	Change emp_change_reg ₃	0,0481***	(18,16)
Education 9	-0,5246***	(-659,89)	Change emp_change_reg ₄	0,0445***	(9,70)
Education 12	-0,3126***	(-389,50)	Constant	1,780	(742,52)
Nationality	0,0101***	(6,36)	$\bar{R}^2$	0,61	
Tenure	0,0087***	(139,05)	N	5603759	
Tenure squared	-0,0092***	(-50,14)			



2. Returns to mobility: the effect of workers' mobility on wages

- We estimated a regression with **individual-specific effects**
- Fixed effects estimates of mobility dummies do not have a direct interpretation since they represent within-individual earnings changes
- Nevertheless, the fixed effects estimation reports similar results



Fixed-effects Empirical Results

Independent variables	Coef.	t-ratio
SE_same_reg ₀	0,0134	(22,27)
SE_same_reg ₁	0,0160	(24,49)
SE_same_reg ₂	0,0166	(22,25)
SE_same_reg ₃	0,0299	(33,10)
SE_same_reg ₄	0,0315	(23,42)
SE_change_reg ₀	0,0144	(11,10)
SE_change_reg ₁	0,0167	(11,80)
SE_change_reg ₂	0,0129	(8,10)
SE_change_reg ₃	0,0173	(8,86)
SE_change_reg ₄	0,0190	(6,42)
Age	0,0341	(161,96)
Age squared	-0,0231	(-91,10)
Education 4	-0,0828	(-54,60)
Education 9	-0,0800	(-55,51)
Education 12	-0,0655	(-47,82)
Tenure	0,0038	(46,94)
Tenure squared	-0,0011	(-3,83)

Level 2	-0,0358	(-31,77)
Level 3	-0,0435	(-34,06)
Level 4	-0,1143	(-108,83)
Level 5	-0,1586	(-139,36)
Level 6	-0,1954	(-150,79)
Size	0,0412	(264,47)
Change emp_same_reg ₀	0,0143	(27,82)
Change emp_same_reg ₁	0,0224	(49,59)
Change emp_same_reg ₂	0,0276	(45,63)
Change emp_same_reg ₃	0,0333	(46,74)
Change emp_same_reg ₄	0,0417	(37,37)
Change emp_change_reg ₀	0,0252	(22,14)
Change emp_change_reg ₁	0,0387	(30,66)
Change emp_change_reg ₂	0,0407	(28,11)
Change emp_change_reg ₃	0,0453	(25,82)
Change emp_change_reg ₄	0,0480	(16,15)
Constant	0,5764	(119,00)



2. Returns to mobility: the effect of workers' mobility on wages

We are now working on...

- Definition of **region change**: change to a non-contiguous district
- Estimation with **two** dimensional fixed effects: individual and firm
- **Self-selection**: OLS estimation is appropriated if same-employer transfers could be seen as a quasi-experiment



2. Returns to mobility: the effect of workers' mobility on wages

Self-selection

- If unobserved individual heterogeneity affects the probability of mobility, we may have **self-selection**
- In this line of reasoning, we explore the use of an **instrumental variables estimation (IV)**



2. Returns to mobility: the effect of workers' mobility on wages

Self-selection

- **Instrument:** establishment concentration
- Estimate the wage equation correcting for selectivity using the multinomial logit model
- **Treatment effects model with multinomial treatments**



Thank you!