The Value of Revolving Doors in Public Procurement

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November 2016

The Washington Post

Investigations
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By JEANNETTE NEUMANN
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- **Positive View:** Open Revolving Door raises efficiency (e.g., low prices)

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Research Question

- Aim: to make an empirical investigation of the effects of Revolving Door on Public Procurement
  - how prevalent are workers' movements between public institutions and their private suppliers?
  - how have those movements affected the procurement outcomes (public expenditure, volume, prices)?

- Context: Brazilian Public Procurement
  - Brazilian Data on Health Procurement and Formal Workers' career path
  - Novel Data allows us to create "Revolving door" indicators by combining:
    - ComprasNet's Data Warehouse: Identity of all public institutions and private suppliers in all purchases of medical supplies, hospital equipments and prescription drugs made by federal govt + state and local governments for pooled purchases. Period 2000-2009.
    - RAIS: annual census of all formal sector workers, who worked for public suppliers (firms) or public bodies (administrations) between 1998 and 2009.

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- We analyze the existence of career changes in two directions:

  - Officials work first for a public body and then join a private supplier.
  - Officials work first for a private supplier before joining a public body.

- We then show how movements of procurement officials affect procurement outcomes:

  - Aggregate measures: proba of getting contracts, amount of contracts
  - Contract-level measures: price, volume and contract value
  - Value for workers: compensation and career path (later).

- We expect effects to differ depending on:

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- Theory:
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  - Revolving doors/dynamic regulation: Laffont and Tirole (1993), Che (1995), Salant (1995), Martimort (1999).

- Empirics:
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Our Contributions and Preview of the Results

1. First evidence on revolving doors effects based on administrative data in the context of procurement.

2. First paper that can effectively measure the efficiency gains or losses for public bodies / private suppliers / workers created by revolving doors movements: information on prices

3. First evidence of revolving doors outside US, here for a large emerging country: Brazil.

4. Evidence on +/- revolving doors effects, depending on direction and timing of movements, characteristics of parties (public body, private supplier, type of workers).

5. Evidence of spillover effects of revolving door connections to other transactions, allowing to disentangle incentive effects.

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The Plan of the Talk

1. Databases and Revolving Doors' Indicators

2. Empirical Analysis:

   - Prevalence of revolving doors in public procurement

   - Effect of revolving doors on procurement outcomes: direct and spillover effects

   - Making sense of results: An information story

3. Next Steps and Future Research

4. Final Remarks and Conclusion

Databases

- <u>Procurement Data:</u> Contract value, volume and price paid for (standardized) pharmaceutical and medical supplies by national hospitals, medical centers and other health agencies + kind of procurement contracts used, and identity of officials (occupation and duties). 3,210,567contracts over a set of 1,647,105 different items-products (highly skewed), between 4,474 firms and 972 administrations over 2000-2009.

  Source: ComprasNet's Data Warehouse

- <u>Workers' Data:</u> Individual characteristics (education, age, gender), work contract information (political appointee, civil servant, temporary, regular worker), worker's occupation (directors, managers, and others), current and past employers, compensation, for 10,050,913 workers, who worked for public suppliers (firms) or public bodies (administrations) between 1998 and 2009.

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Merging Procedure of the Databases

ComprasNet's Data Warehouse: health procurement 2000-2009
3,210,567 contracts between 4,474 firms and 972 administrations
(identified by ID number - CNPJ first 8 digits)
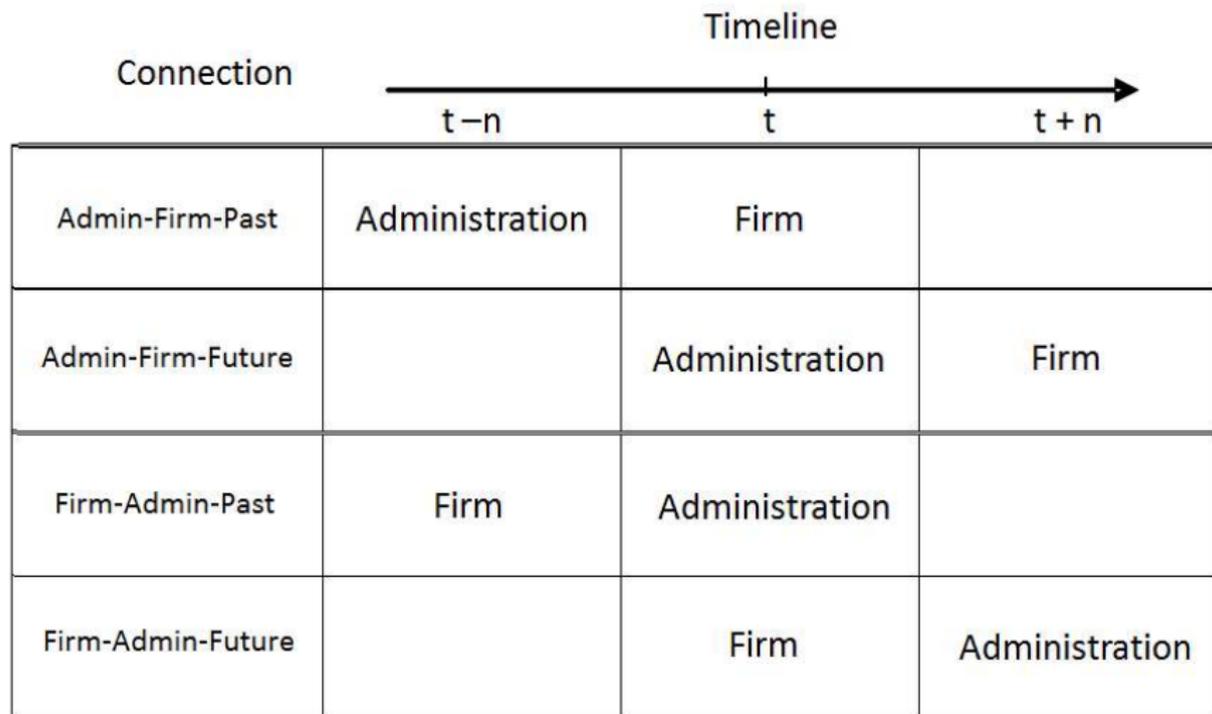
↓

RAIS-MIGRA: 1998-2009
Using ID number, extract all individuals who worked at some point for these 4,474 firms and 972 administrations: 10,050,913 individuals

↓

For all firm-administration pairs (154,673), identify individuals who worked at some point for both parties.
Create Revolving Doors (RD) dummy variables for these pairs, depending on the type of movement.

Timeline

Connection	t − n	t	t + n
Admin-Firm-Past	Administration	Firm	
Admin-Firm-Future		Administration	Firm
Firm-Admin-Past	Firm	Administration	
Firm-Admin-Future		Firm	Administration

Revolving Doors' Variables: Individual Level

- Administration-Firm Dummies:

$$\text{Admin-Firm-Past}_{ijkt} = \begin{cases} 1 & \text{if individual } i \text{ employed in firm } j \text{ at time } t \\ & \text{has worked for administration } j \text{ before time } t. \\ 0 & \text{otherwise.} \end{cases}$$

$$\text{Admin-Firm-Future}_{ijkt} = \begin{cases} 1 & \text{if individual } i \text{ employed in administration } k \text{ at time } t \\ & \text{becomes a worker for firm } j \text{ after time } t. \\ 0 & \text{otherwise.} \end{cases}$$

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- Remark: Those dummies are also broken down in political appointee, civil servant, and job occupation (e.g., director/manager), and then aggregated to the admin-firm-contract level.

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Empirical Analysis

- <u>Part I:</u> Prevalence of revolving doors in public procurement

    1. How prevalent are workers' movements between public institutions and their private suppliers?

    2. Which are the worker's characteristics of their work contracts that make workers to move between administration and suppliers?

- <u>Part II:</u> Effect of revolving doors on procurement outcomes

    1. Direct effect, overall and by types of worker

    2. Spillover effects

Descriptive Statistics

Revolving Door Data: Individual Level

Variable	Number of Workers	% of the Total Number of Workers*
Admin-Firm (DFDR)	3,639	0.03621%
Firm-Admin (DBDX)	5,164	0.05138%

Variable	D=1	Mean
Admin-Firm (DFDR): Appointed	152	0.00151%
Admin-Firm (DFDR): Civil Servants	3,304	0.03287%
Admin-Firm (DFDR): Other Workers	183	0.00182%
Admin-Firm (DFDR): Directors	39	0.00039%
Admin-Firm (DFDR): Non-Directors	3,600	0.03582%
Admin-Firm (DFDR): Appointed-Director	35	0.00035%
Admin-Firm (DFDR): Civil Servants-Director	4	0.00004%
Admin-Firm (DFDR): Other Workers - Director	0	0.00000%

Variable	D=1	Mean
Firm-Admin (DBDX): Appointed	295	0.00294%
Firm-Admin (DBDX): Civil Servants	4,722	0.04698%
Firm-Admin (DBDX): Other Workers	147	0.00146%
Firm-Admin (DBDX): Directors	125	0.00124%
Firm-Admin (DBDX): Non-Directors	5,039	0.05013%
Firm-Admin (DBDX): Appointed - Director	92	0.00092%
Firm-Admin (DBDX): Civil Servants - Director	24	0.00024%
Firm-Admin (DBDX): Other Workers - Director	9	0.00009%

* The total number of workers is 10,050,913.

Revolving Doors' Dummies: Firm-Admin-Contract Level

- For each revolving door dummies created (RD), we create:

$$\text{RD}_{jkt} = \max_i \{RD_{ijkt}\}$$

- Example: Admin-Firm-Past$_{jkt}$ dummy is equal to 1 if firm j employs at time t at least one individual, who has been previously employed by administration k.

- All RD dummies were also created for political appointees, civil servants, and job occupations (e.g., directors/managers) at admin-firm-contract level.

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Descriptive Statistics
Revolving Door: Firm-Admin-Contract Level

Variable	Obs	D=1	Mean	% Total Amount of Contracts
Any Revolving Door	1,950,318	39,722	2.04%	5.41%
Admin-Firm	1,950,318	20,472	1.05%	2.73%
Admin-Firm-Past	2,299,776	13,710	0.60%	1.86%
Admin-Firm-Future	1,950,310	12,169	0.62%	1.85%
Firm-Admin	1,950,318	26,835	1.38%	5.01%
Firm-Admin-Past	2,299,776	19,050	0.83%	4.19%
Firm-Admin-Future	1,950,310	16,585	0.85%	4.46%

Correlation Matrix		
	Admin-Firm	Firm-Admin
Admin-Firm	1	
Firm-Admin	0.2937	1

Effect of revolving doors on procurement outcomes

- How do workers' movements between public institutions and their private suppliers affect outcomes in Brazilian health public procurement?

1. Empirical Strategy

2. Estimation Results and Findings

- To identify how worker's movements between administrations and firms affects on price, volume and contract value

$$y_{ljkt} = \alpha_l + \kappa_t + \tau_{jk} + RD'_{jkt}\beta + W'_{ljkt}\gamma + u_{ljkt},$$

- The parameter β's are identified by comparing the overtime variation of the outcome variables for *jk* pairs which experienced some "movement" with those of the pairs which did not experience "movement".

Consider the following pair of firms-admin:

1. **Revolving door group:** Firm j - Admin k trade every period, and have a worker i who has moved from Admin-k to firm-j.

2. **Counterfactual:** Firm l - Admin k trade every period, but they did not have a worker who moved between them: Firm-Admin$_{lkt} = 0$, in a given period.

Revolving Door Group:

worker i location	None	None	A	A	F	F	F	F	F	F
t	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Admin-Firm-Future$_{jkt}$ =	0	0	1	1	0	0	0	0	0	0
Admin-Firm-Past$_{jkt}$ =	0	0	0	0	1	1	1	1	1	1
Admin-Firm$_{jkt}$ =	0	0	1	1	1	1	1	1	1	1

Counterfactual Group:

t	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Admin-Firm-Future$_{lkt}$ =	0	0	0	0	0	0	0	0	0	0
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Admin-Firm$_{lkt}$ =	0	0	0	0	0	0	0	0	0	0

Empirical Strategy: An Illustrative Example

Administration to Firms: Figure(b)

Revolving Door Group:

worker i location	None	None	A	A	F	F	F	F	F	F
t	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Admin-Firm-Future $_{jkt}$ =	0	0	1	1	0	0	0	0	0	0
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Admin-Firm $_{lkt}$ =	0	0	0	0	0	0	0	0	0	0

Threats to the Identification Strategy

- Control for any time invariant determinants that may affect movements, by looking at within-pairs estimates.

- Control for time variant observable characteristics:
  - Admin budgets, firms sales, awarding procedure
  - Product specific time variant characteristics: price

- Time variant unobservable characteristics, by differing along additional dimension of heterogeneity:
  - Revolving doors corresponding to different types of workers (D_w dummies: appointees, civil servants, directors):

  $$y_{ljkt} = \alpha_l + \kappa_t + \tau_{jk} + RD'_{jkt}\beta + (RD'_{jkt} * D_w)\delta + W'_{ljkt}\gamma + u_{ljkt},$$

  - Other aspects: size of admin / firms; Regions

Estimation Strategy and Counterfactual

- Include all dummies together: cross-control for other types of connections in one regression (Model A)

- Include dummies one by one, and remove observations with other types of connections : counterfactual is set of observations without any connections (Model B)

- Remark: Only Model A's estimations will reported (results are pretty much the same).

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- Remark: Only Model A's estimations will reported (results are pretty much the same).

Challenge: Estimation

- <u>Issue:</u> We have a large number of firm-administration pairs (154,673), and products (1,647,105), so for convenience we transform original variables into deviations from firm-administration means.

$$(y_{ljkt} - \bar{y}_{jk}) = \phi + \alpha_l + \kappa_t + RD'_{jkt}\beta + (W_{ljkt} - \overline{W}_{jk})'\gamma + (u_{ljkt} - \bar{u}_{jk}),$$

- Estimation Remarks:

  - Not a balanced panel.

  - We include pair, product, and time fixed effects.

  - Outcome variables are in log: prices, contract value, contract quantity, yearly amount

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Estimation: Outcome variables

1. Firm-Admin pair-level's yearly outcomes

   - We first collapse the data by firm-administration pairs, and look at the effect of revolving doors within pairs on:

     - Amounts of contracts

2. Firm-Admin contract-level's outcomes

   - We then use the contract-level data, and look at the within-pairs, within-products effect of revolving doors on:

     - Prices
     - Quantities
     - Contract value

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Estimation Results

- Overall effect of revolving doors: aggregating all movements dummies

- Movements from Administration to Firm

- Movements from Firm to Administration

Estimation Results

Overall effect of Revolving Doors

	Yearly Amount		Prices		Quantity		Contract Value	
	1	2	3	4	5	6	7	8
	No Control	Controls	No Control	Controls	No Control	Controls	No Control	Controls
Any Revolving Door	0.18687**	0.1991***	-0.1800***	-0.1464***	0.2556***	0.2501***	-0.0626***	-0.0366*
(s.e.)	0.0749	0.0748	0.0165	0.0163	0.0224	0.0218	0.0194	0.0188
Fixed Effects								
Firm-Admin F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product F.E.	NO	NO	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E. (Year)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	156,325	156,325	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318

Summary Results
Overall effect of Revolving Doors

- <u>Yearly data:</u> Increase amounts

- <u>Contract data:</u>

  - decreases prices

  - increases quantity

  - decreases total value

$\Rightarrow$ If this is the net effect, then revolving door movements are beneficial overall (public sector buys more at lower price).

Administration to Firm Movements

	Yearly Amount		Prices		Quantity		Contract Value	
	1	2	3	4	5	6	7	8
	No Control	Controls	No Control	Controls	No Control	Controls	No Control	Controls
Admin-Firm	0.19366*	0.2435**	-0.2980***	-0.2473***	-0.2683***	-0.1130***	-0.4204***	-0.2961***
(s.e.)	0.1091	0.1135	0.0215	0.0211	0.0292	0.0283	0.0253	0.0245
Admin-Firm-Past	0.5335***	0.5554***	-0.2171***	-0.1941***	-0.2190***	-0.1344***	-0.3168***	-0.2524***
(s.e.)	0.1137	0.0969	0.0252	0.0248	0.0342	0.0332	0.0297	0.0287
Admin-Firm-Future	-0.0417	0.0102	-0.2125***	-0.1697***	-0.3202***	-0.1573***	-0.3590***	-0.2382***
(s.e.)	0.1271	0.1270	0.0283	0.0279	0.0385	0.0374	0.0334	0.0323
Fixed Effects								
Firm-Admin F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product F.E.	NO	NO	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E. (Year)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	156,325	156,325	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318

- Yearly data:

  - Increase amounts / number of contracts (mostly in second period of relationship when worker has moved to the firm (Admin-Firm-Past)).

- Contract data:

  - clear negative effects on prices, quantity and total value

  - they lead to smaller contracts, at lower prices.

  - In relative terms, prices decrease and quantities increase when the worker moves from the administration to the firm.

Estimation Results

Administration to Firm Movements: Political Appointees/Civil Servants/Directors

	Yearly Amount		Prices		Quantity		Contract Value	
	1 No Control	2 Controls	3 No Control	4 Controls	5 No Control	6 Controls	7 No Control	8 Controls
Admin-Firm-Past x Appointed	0.056	0.087	1.0777***	0.7850***	0.5510*	0.017	1.3301***	0.7917***
(p-value)	0.907	0.856	0.000	0.000	0.057	0.953	0.000	0.001
Admin-Firm-Past x Civil Servant	0.5692***	0.5913***	-0.2362***	-0.2101***	-0.2216***	-0.1222***	-0.3371***	-0.2630***
(p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Admin-Firm-Past x Director	-0.344	-0.351	-1.5121***	-1.5092***	0.474	0.232	-1.2940***	-1.4066***
(p-value)	0.676	0.670	0.000	0.000	0.274	0.580	0.001	0.000
Admin-Firm-Future x Appointed	-0.397	-0.406	0.8647***	0.8223***	0.499	0.121	1.0933***	0.8746***
(p-value)	0.482	0.471	0.003	0.004	0.199	0.749	0.001	0.007
Admin-Firm-Future x Civil Servant	0.016	0.070	-0.2099***	-0.1657***	-0.3257***	-0.1474***	-0.3589***	-0.2299***
(p-value)	0.903	0.592	0.000	0.000	0.000	0.000	0.000	0.000
Admin-Firm-Future x Director	-1.6885**	-1.6259**	-1.5528***	-2.4712***	0.603	0.450	-1.2753***	-2.2730***
(p-value)	0.023	0.028	0.000	0.000	0.222	0.348	0.003	0.000
Fixed Effects								
Firm-Admin F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product F.E.	NO	NO	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E. (Year)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	156,325	156,325	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318

- Yearly data: The increase in amounts is driven by civil servant's movements

- Contract data:
  - Prices: Civil servants' / directors' movts. reduce prices, Appointees' movts. raise prices.
  - Quantity: Civil servants' movts. lead to smaller contracts, Appointees' movts. lead to weakly bigger ones).
  - Total value: Civil servants' / directors' movts. reduce value, Appointees' movts. raise value.

$\Rightarrow$ Civil servants' (directors) revolving door movements seem to be beneficial overall (buy more at lower price), and Appointee's movements seem to be detrimental (bigger contracts at higher price).

- Possible interpretation:

    - while in public sector, worker attempts to display competence by doing his job: he brings prices down and favors competition among suppliers, also reducing quantities going to each of them.
    - Having secured a post-administration job thanks to favorable signal, worker now uses his skills to allow the firms that hired him to win more contracts. This goes through tougher competition, hence lower prices.

- Signaling occurs in early stage of relationship and is directed to all firms. So effect is also bad for specific firm in the pair.

- Once worker has moved to this firm, it becomes more competitive.

⇒ Overall: Support for benign view of efficiency-enhancing revolving door.

- Effects are driven by civil servants (directors) movements (detrimental for appointed ones)

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Summary Results: Interpretation
Administration to Firm Movements

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Estimation Results

Firm and Administration Movements

	Yearly Amount		Prices		Quantity		Contract Value	
	1	2	3	4	5	6	7	8
	No Control	Controls	No Control	Controls	No Control	Controls	No Control	Controls
Firm-Admin	0.1049	0.1029	-0.0208	0.0056	0.5325***	0.4309***	0.2229***	0.1939***
(s.e.)	0.0834	0.0833	0.0204	0.0201	0.0277	0.0269	0.0240	0.0233
Firm-Admin-Past	0.3025***	0.2932***	0.0753***	0.0191	0.4586***	0.2060***	0.2849***	0.1083***
(s.e.)	0.0938	0.0937	0.0221	0.0218	0.0301	0.0293	0.0261	0.0253
Firm-Admin-Future	0.0276	0.0331	0.0177	0.0743***	0.3687***	0.4020***	0.1865***	0.2502***
(s.e.)	0.0916	0.0915	0.0212	0.0209	0.0288	0.0280	0.0250	0.0242
Fixed Effects								
Firm-Admin F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product F.E.	NO	NO	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E. (Year)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	156,325	156,325	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318

Summary Results
Firm and Administration Movements

- Yearly Amount:

    - Positive impact on amounts of contract per year in second period of relationship when worker has moved to the administration (Firm-Admin-Past).

- Contract level:

    - Weakly positive effect on prices (it depends on controls).

    - Positive effect on quantity overalls

    - Positive effect on value overall

Estimation Results

Firm and Administration Movements: Political Appointee/Civil Servants/Directors

	Yearly Amount		Prices		Quantity		Contract Value	
	1 No Control	2 Controls	3 No Control	4 Controls	5 No Control	6 Controls	7 No Control	8 Controls
Firm-Admin-Past x Appointed	-0.261	-0.261	-0.4958***	-0.3392***	-0.3796***	-0.428***	-0.6697***	-0.5268***
(p-value)	0.385	0.384	0.000	0.000	0.000	0.000	0.000	0.000
Firm-Admin-Past x Civil Servant	0.3544***	0.3433***	0.1256***	0.0433*	0.5266***	0.2556***	0.3662***	0.1542***
(p-value)	0.000	0.001	0.000	0.063	0.000	0.000	0.000	0.000
Firm-Admin-Past x Director	0.246	0.286	0.239	0.172	0.71926***	0.5643***	0.5689***	0.4195**
(p-value)	0.636	0.581	0.122	0.257	0.001	0.006	0.002	0.017
Firm-Admin-Future x Appointed	0.447	0.382	-0.9040***	-0.5245***	0.8989***	1.0646***	-0.4919**	-0.058
(p-value)	0.326	0.401	0.000	0.004	0.000	0.000	0.024	0.784
Firm-Admin-Future x Civil Servant	0.010	0.017	0.0892***	0.1430***	0.3238***	0.3644***	0.2375***	0.3024***
(p-value)	0.919	0.855	0.000	0.000	0.000	0.000	0.000	0.000
Firm-Admin-Future x Director	0.726	0.733	0.6292***	0.5117*	0.465	0.307	0.8416***	0.6454**
(p-value)	0.109	0.105	0.006	0.024	0.138	0.313	0.002	0.014
Fixed Effects								
Firm-Admin F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product F.E.	NO	NO	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E. (Year)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	156,325	156,325	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318	1,950,318

- Yearly data: The increase in amounts is driven by appointees and civil servant's movements (resp. first and second period of the relationship)

- Contract data:

  - Prices: Appointees' movts. reduce prices, Civil servants' and directors' movts. raise prices.

  - Quantity: Civil servants' movts. weakly lead to bigger contracts. Appointees' effect ambiguous.

  - Total value: Appointees' movts. reduce value, Civil servants' and directors' movts. raise value.

$\Rightarrow$ Appointees' revolving door movements seem to be beneficial overall (buy more at lower price), and Civil Servants' movements seem to be detrimental (bigger contracts at higher price).

- Connected firms appear to have larger contracts, at higher prices. In this case, the worker is already in one specific firm from the start: the anticompetitive effect kicks in immediately.

<div align="center" style="color:red">

Detrimental effects of Revolving Doors!

</div>

- The negative effects are stronger for civil servants (and to some extent directors)

- <u>Remark:</u> Evidence that appointees' movements are not detrimental

Additional Results

- Next, we look at "spillovers", for evidence of effects related to the incentives of moving worker:

  - How do workers in a connected pair affect other outside firms / admin dealing with the place where they currently work ?

  - This should provide evidence of whether they are tough and make extra effort on the job or alternatively whether they shirk / collude and favor counterpart.
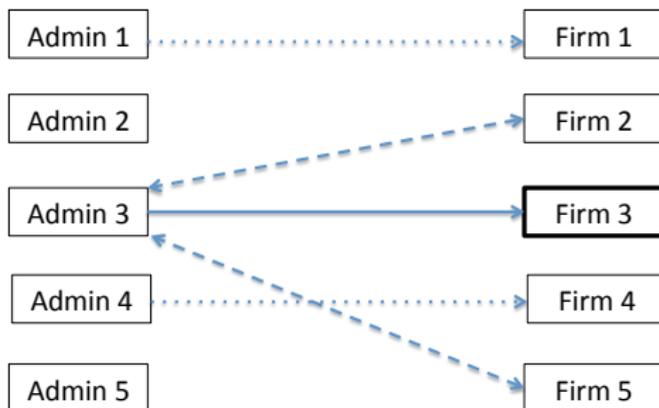
- Before he moves from Admin 3, guys lower prices from other firms he is dealing with
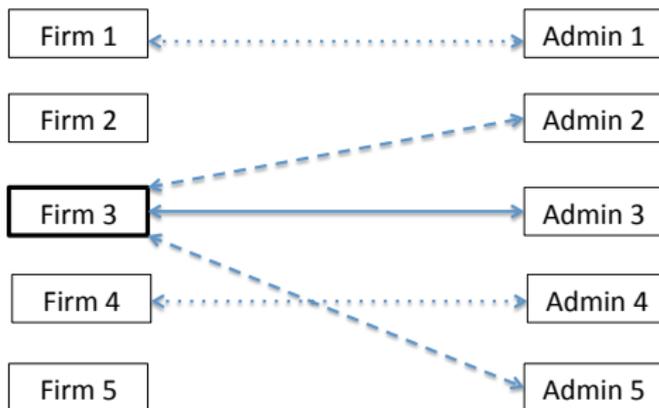- Consistent with procurement official being efficient.
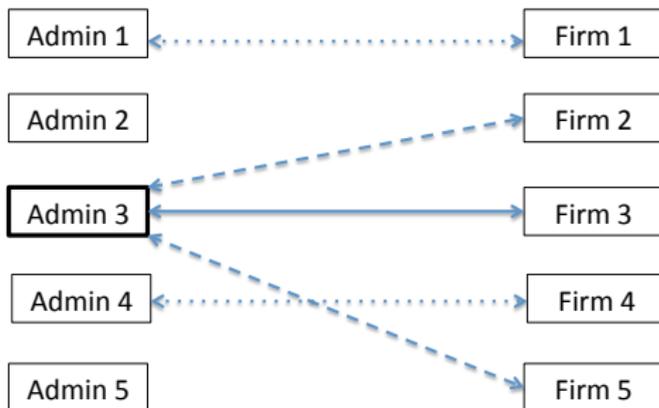
- After guys moves to Firm 3, Admin 3 buys at higher prices from other firms
- Consistent with procurement official being efficient.

"Spillovers"
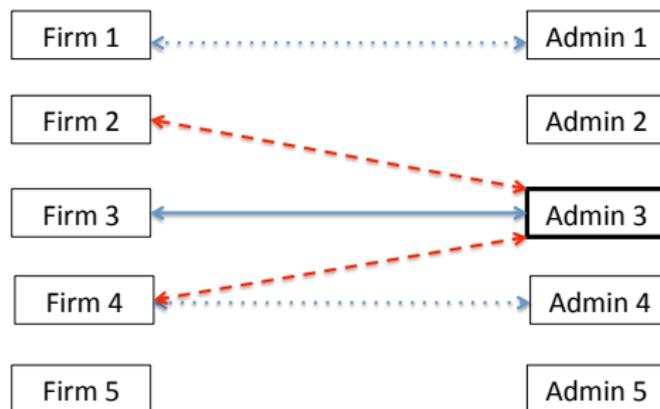Firm to admin movement - First period

- Before he moves from Firm 3, this firm sells lower quantities at lower prices to other admin
- Consistent with collusion between Firm 3 and Admin 3

- After he moves to Admin 3, Admin 3 buys at higher prices from other firms
- Consistent with guys taking bribes

Next Steps and Further Research
Working in Progress

- Other dimensions of heterogeneity
  - Admin to firm (beneficial) effect stronger for small administrations, while firm to admin (detrimental) one stronger for big administrations.
  - Negative finding (price increase) in firm to admin case mostly found in the Northeast region.

- To be done:
  - Goods versus Services: very standardized (drugs, other standard goods)
  - Exogenous variation in the movements: political cycles and number of political appointed workers.

Final Remarks and Conclusion

- We study the link between workers' movements between public institutions and their private suppliers, career changes in two directions, and how this affect outcomes in Brazilian health public procurement.
- We find both beneficial and detrimental effects of revolving doors.
- Direct and spillover effects consistent with interpretation based on collusion in one case, and reward for high-skill workers in the other one.
- Information / incentive story:
  - in admin-to-firm mvts, individuals trying to establish a reputation to gain connections (future counterpart not known)
  - in firm-to-admin mvts, individuals using their already established connections (counterpart known).
- Complex incentive issues are challenging for policy recommendations.