

Do Frictions Matter in the Market for Chief Executives?

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Executive compensation: data facts

- CEOs of the largest U.S. publicly traded firms, S&P 500
- Average compensation, 2017: \$12.0 million [▶ US Income Distribution](#)
- Growth rate: 18% in real terms between 2009 and 2017
- Growth rate of the real average salary in the U.S. private sector: 6%

What promotes the growth of executive compensation?

- Firm size \Rightarrow Assignment models
(e.g., Gabaix and Landier, 2008)
 - Headhunting
 - Pay for luck
 - Entrenchment
- } Quantified in this paper

▶ Wage/Size

- ExecuComp: Compensation of the top five executives
- Compustat: Firm accounting data, including market values
- Sample: 297,226 executive-year observations in 1992-2017
- Selected data facts:
 - CEO jobs are scarce: 16% of executives ever served as CEOs
 - Low job finding probability: 2.6% per annum
 - Jobs are long lasting: average tenure of 5.4 years
 - Job-to-job transitions are infrequent, but increasingly popular (1%)

Theoretical framework

- Search and matching setup, Mortensen and Pissarides (1994)
- Heterogeneous firms and executives
- Productivity shocks, on-the-job search and counteroffers
- Closest model reference: Lise, Meghir and Robin (2016)

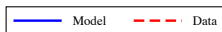
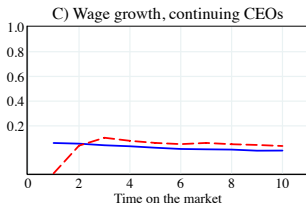
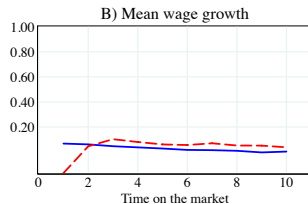
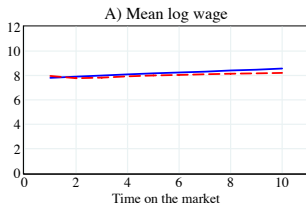
The key model features:

- Firm size ⇒ Production complementarity between executive talent and firm market value
- Headhunting ⇒ CEOs can receive offers from competing firms and possible counteroffers
- Pay for luck ⇒ Asymmetric renegotiations of pay in response to the market value shocks
- Entrenchment ⇒ Incumbent CEOs have higher bargaining power

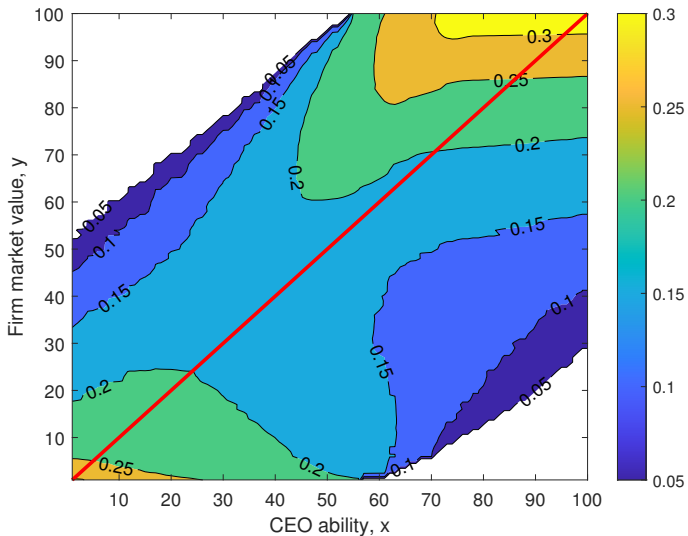
Model fit: employment transitions



Model fit: compensation



Equilibrium distribution of matches



Main results

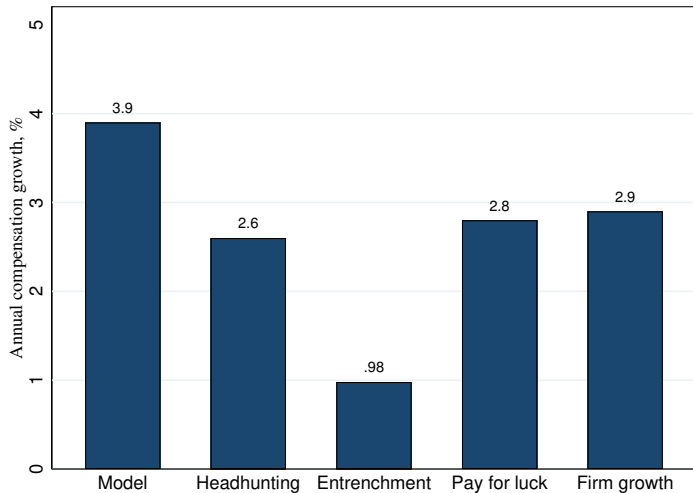
- The cost of frictions: Welfare losses of 34%
- Headhunting: Job-to-job transitions and counteroffers account for 25% of the steady state wage growth.
- Pay for luck: Wage renegotiations due to the market shocks account for 75% of the steady state wage growth.
- Entrenchment: Incumbents have 40% more bargaining power than candidates. Eliminating the difference reduces steady state wage growth by 28%.
- Firm size: Firm growth of the last 20 years can explain $1/3$ of the CEO pay growth.

Welfare analysis

	Model	Frictionless equilibrium	Counterfactuals:		
			H/H	Entr	PfL
Match output	42.8	93.7	44.5	42.8	42.8
Non-CEO production	65.5	58.3	64.9	65.5	65.5
Recruitment cost	8.2	0.0	8.1	8.2	8.2
Total welfare	100.0	152.0	101.3	100.0	100.0
Match quality (output per match)	0.037	0.074	0.036	0.037	0.037
CEO employment rate, %	11.5	12.6	12.2	11.5	11.5
Number of firms	1263	1263	1333	1263	1263
CEO compensation:					
Average	8.11	5.31	8.15	8.11	8.14
% of match output	0.037	0.074	0.036	0.037	0.037
Growth rate, %	3.9	0.00	2.6	0.98	2.8

▶ Results

Wage growth counterfactuals (summary)



Conclusions and policy implications

- Labor market frictions are associated with substantial welfare losses in the market for CEO talent
- Pay for luck and CEO entrenchment are the main drivers of executive compensation growth
- Focus on policies that limit the bargaining power of incumbent CEOs:
 - “say on pay”
 - pay caps
 - taxes at the very top of the distribution

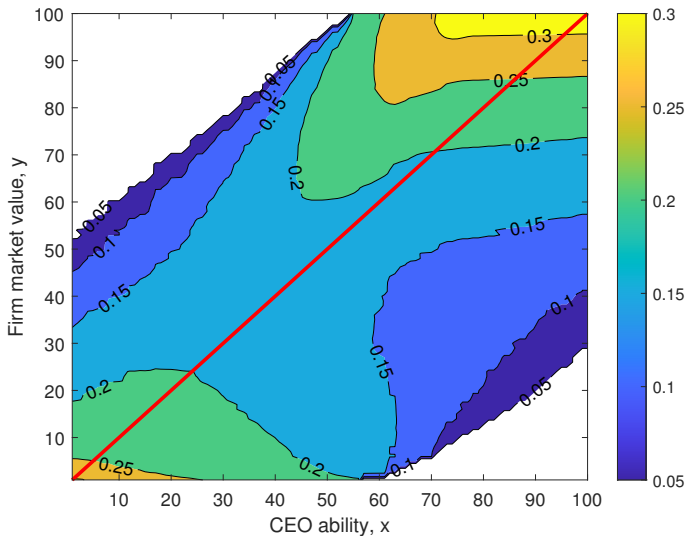
Estimates

Estimation results

Parameter	Estimate	Standard error
Matching efficiency, η	0.041	0.015
New CEO bargaining power, β_0	0.503	0.141
Incumbent CEO bargaining power, β_1	0.692	0.051
Relative search intensity among employed CEOs, s	1.359	0.230
Probability of exogenous job destruction, ξ	0.007	0.004
Probability of a productivity shock, δ	0.147	0.013
Vacancy cost, c	6.014	2.085
The value of CEO outside option, b	0.269	0.039
Parameters of the production function:		
Technology, A	-1.164	0.091
Weight on the CEO talent, α	0.689	0.051
Elasticity of substitution, ρ	-0.806	0.237
Mortality rate, μ	0.009	0.000

► Firm and CEO distributions

Surplus function



Counterfactuals

Counterfactuals

- 1 Headhunting: set $s = 0$ to eliminate job-to-job transitions
- 2 Pay for luck and entrenchment:
 - Set $\beta_1 = 0$ to eliminate extraction of additional surplus \Rightarrow (small) negative wage growth
 - Set $\beta_1 = \beta_0$ to eliminate entrenchment
 - Headhunting is equivalent to 0.14 decrease in β_1
 - Halving $\beta_1 = 0.375$ sets CEO wage growth to 1% per annum
- 3 Firm size: two simulations with 1992 and 2017 distributions of market values \Rightarrow 1/3 of the wage growth for the observation period, 1992-2017
- 4 Complementarity: vary parameter $\rho \Rightarrow$ a change from -0.95 to -0.55 is required to replicate wage growth from 2009-2017

► Results

Value functions: candidates without jobs

- Eligible candidates without CEO jobs are available to take available positions at a suitable wage rate
- They receive a flow income that depends on their ability, $b(x)$
- The present value of staying out of a CEO role for a candidate with talent x , $W_0(x)$, is defined by

$$(r + \mu)W_0(x) = b(x) + \kappa\beta_0 \int_{y' \in \mathcal{A}(x)} S(x, y')v(y')dy',$$

where $\mathcal{A}(x) = \{y : S(x, y) \geq 0\}$ is a set of firms that can form a sustainable match with the candidate of type x , r is subjective discount rate, κ is a market tightness parameter, and $\kappa v(y)$ is the rate at which a prospective CEO meets firms with value y

Value functions: firms with vacant CEO positions

- Firms have to pay the cost c to keep a CEO position open.
- The present value of an open CEO position at firm y is

$$\begin{aligned} r\Pi_0(y) = & -c + \delta \int [\Pi_0(y') - \Pi_0(y)] \gamma(y') dy' \\ & + \kappa(1 - \beta_0) \int_{x' \in \mathcal{B}(y)} S(x', y) u(x') dx' \\ & + s\kappa \iint_{(x', y') \in \mathcal{C}(y)} [S(x', y) - S(x', y')] h(x', y') dx' dy', \end{aligned}$$

where $u(x)$ is the number of jobless CEOs with talent x , $\kappa u(x)$ is the rate at which a firm makes contact with these CEO's, s is the relative search intensity of working and candidate CEO's, $h(x, y)$ is the joint (endogenous) distribution of matches, and $s\kappa h(x, y)$ is the rate at which a firm makes contact with employed CEOs.

Value functions: employed CEO's

The present value of a CEO job that pays wage w , $W_1(w, x, y)$, is determined from the following Bellman equation:

$$\begin{aligned} & \left[r + \mu + \delta + \xi + s\kappa \int_{y' \in \mathcal{A}(w, x, y)} v(y') dy' \right] [W_1(w, x, y) - W_0(x)] \\ & = w - b(x) - \kappa\beta_0 \int_{y'} S(x, y')^+ v(y') dy' \\ & + \delta \left[\int_{y': 0 \leq S' < \Delta W'} S(x, y') \gamma(y') dy' + \int_{y': S \leq S', \Delta W' < \beta_1 S'} \beta_1 S(x, y') \gamma(y') dy' \right. \\ & \quad \left. + \int_{y': \beta_1 S' \mathbb{1}\{S \leq S'\} \leq \Delta W' \leq S'} [W_1(w, x, y') - W_0(x)] \gamma(y') dy' \right] \\ & + s\kappa \int_{y' \in \mathcal{D}(w, x, y)} [\min\{S(x, y), S(x, y')\} + w_0(x, y') \mathbb{1}\{S(x, y) \leq S(x, y')\}] v(y') dy'', \end{aligned}$$

where

$$\mathcal{A} = \{y' : W_1(w, x, y) - W_0(x) < S(x, y')\}.$$

The match output and joint surplus

The three value functions defined above pin down the surplus value $S(x, y)$ that does not depend on the current wage contract and is defined by the fixed point of the following equation:

$$\begin{aligned}(r + \xi + \delta + \mu)S(x, y) = & f(x, y) - b(x) - \kappa\beta_0 \int_{y' \in \mathcal{A}(x)} S(x, y')v(y')dy' \\ & + c - \kappa(1 - \beta_0) \int_{x' \in \mathcal{B}(y)} [S(x', y) - w_0(x', y)]u(x')dx' \\ & - s\kappa \iint_{(x', y') \in \mathcal{C}(y)} [S(x', y) - S(x', y')]h(x', y')dx'dy'.\end{aligned}$$

▶ Return

Steady-state equilibrium

The following items are constant in a stationary equilibrium:

- The total number of CEO jobs
- The distribution of matches
- The distribution of talent among out-of-job candidates
- The distribution of firm values for available jobs

▶ Return

Estimation results: firm and executive characteristics

Parameter	Estimate	Standard error
CEO talent distribution:		
Mean, μ_x	6.536	0.732
Standard deviation, σ_x	3.226	0.332
Minimum, x_{min}	139.648	11.718
Maximum, x_{max}	14000	1130
Market value distribution:		
Mean, μ_y	7.820	0.317
Standard deviation, σ_y	1.548	0.029
Minimum, y_{min}	58.297	0.703
Maximum, y_{max}	68400	3900

▶ Return

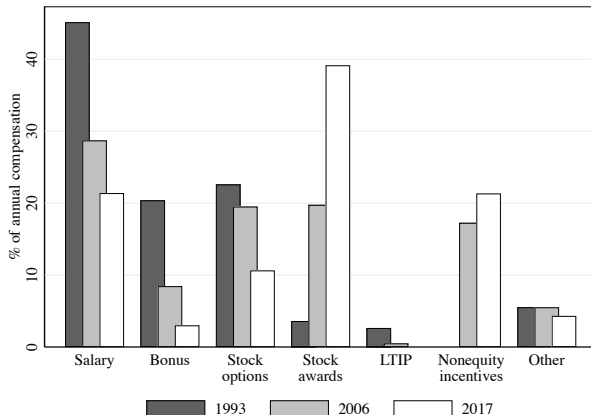
Average income in top U.S. income groups, 2017

Income group	Number of families	Average income in the group	Income share	
			2017	1980
Full population	170,531,000	\$66,168	100.0	100.0
Bottom 90%	153,477,900	\$36,344	49.4	65.4
Top 10-5%	8,526,550	\$158,341	11.9	11.5
Top 5-1%	6,821,240	\$275,359	16.7	13.1
Top 1-0.5%	852,655	\$572,090	4.3	2.9
Top 0.5-0.1%	682,124	\$1,121,882	6.8	3.7
Top 0.1-0.01%	153,478	\$4,098,754	5.6	2.1
Top 0.01%	17,053	\$34,903,739	5.3	1.3

Source: <http://elsa.berkeley.edu/saez/TabFig2018prel.xls>

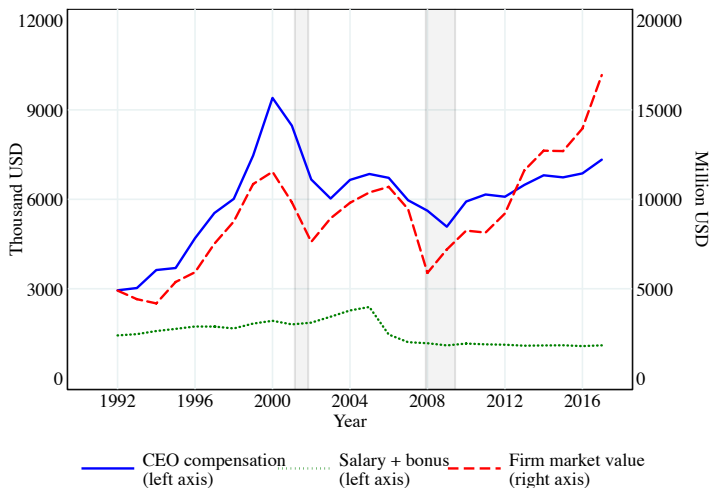
▶ Return

The structure of executive compensation



▶ Return

Executive compensation, base salary and firm market values



Variable	Firm market value range:		
	Quartile 1	Quartiles 2-3	Quartile 4
Annual CEO compensation, thousand USD			
Mean	2,043	4,735	13,093
Median	1,448	3,396	9,366
Standard deviation	2,927	6,313	21,002
Firm market value, million USD			
Mean	365	2,303	32,167
Median	367	1,872	14,602
Standard deviation	190	1,389	55,321
Annual compensation of non-CEO executives, thousand USD			
Mean	855	1,706	4,760
Median	629	1,223	3,084
Standard deviation	978	2,282	7,905
Annual CEO compensation growth, %	-0.9 (65.7)	6.9 (63.3)	6.2 (60.6)
Wage change, becoming a CEO, %	7.4 (84.5)	25.7 (81.0)	33.4 (72.5)
Wage change from job switching, %	-44.2 (168)	57.6 (242)	42.7 (207)

Variable	Firm market value range:		
	Quartile 1	Quartiles 2-3	Quartile 4
Annual prob of CEO job loss, %	16.8 (37.4)	12.8 (33.4)	12.9 (33.5)
Annual prob of CEO job switch, %	0.65 (8.0)	1.0 (10.0)	1.1 (10.4)
Annual prob of CEO job finding, %	0.24 (4.8)	0.34 (5.8)	0.15 (3.9)
Duration of the CEO appointments, years			
Mean	7.6	7.5	6.5
Median	5.0	6.0	5.0
Standard deviation	7.8	6.8	5.5
Number of firms	2,130	2,993	1,184
Number of executives	19,865	31,641	14,665
Number of CEOs	3,365	5,125	2,317
Number of CEO-firm matches	2,617	3,598	1,567
Number of completed spells	1,758	2,454	1,086