

TAXATION ET FINANCEMENT DE L'INNOVATION

PHILIPPE AGHION – 25/10/16



**COLLÈGE
DE FRANCE**
— 1530 —

PARTIE 1 : FISCALITÉ ET MOBILITÉ INTERNATIONALE DES INVENTEURS

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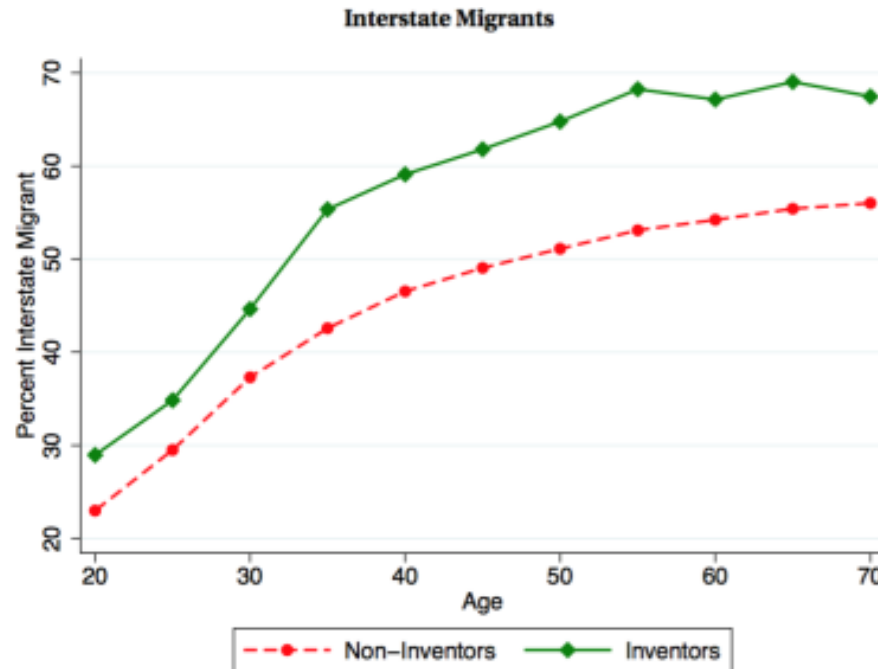
2015



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INTRODUCTION

- Les inventeurs sont plus enclins à immigrer que les non-inventeurs au cours de leur vie : Edison, Tesla, Bell, etc.



Akcigit, Grigsby, Nicholas (2016)



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QUESTIONS

- Le *brain drain* est-il réellement lié au système fiscal des pays ?
- Dans quelle mesure impacte-t-il plus les *top 1% inventors* ?
- Étude similaire sur la migration internationale des joueurs de football
 - Kleven, Landais & Saez (2013)

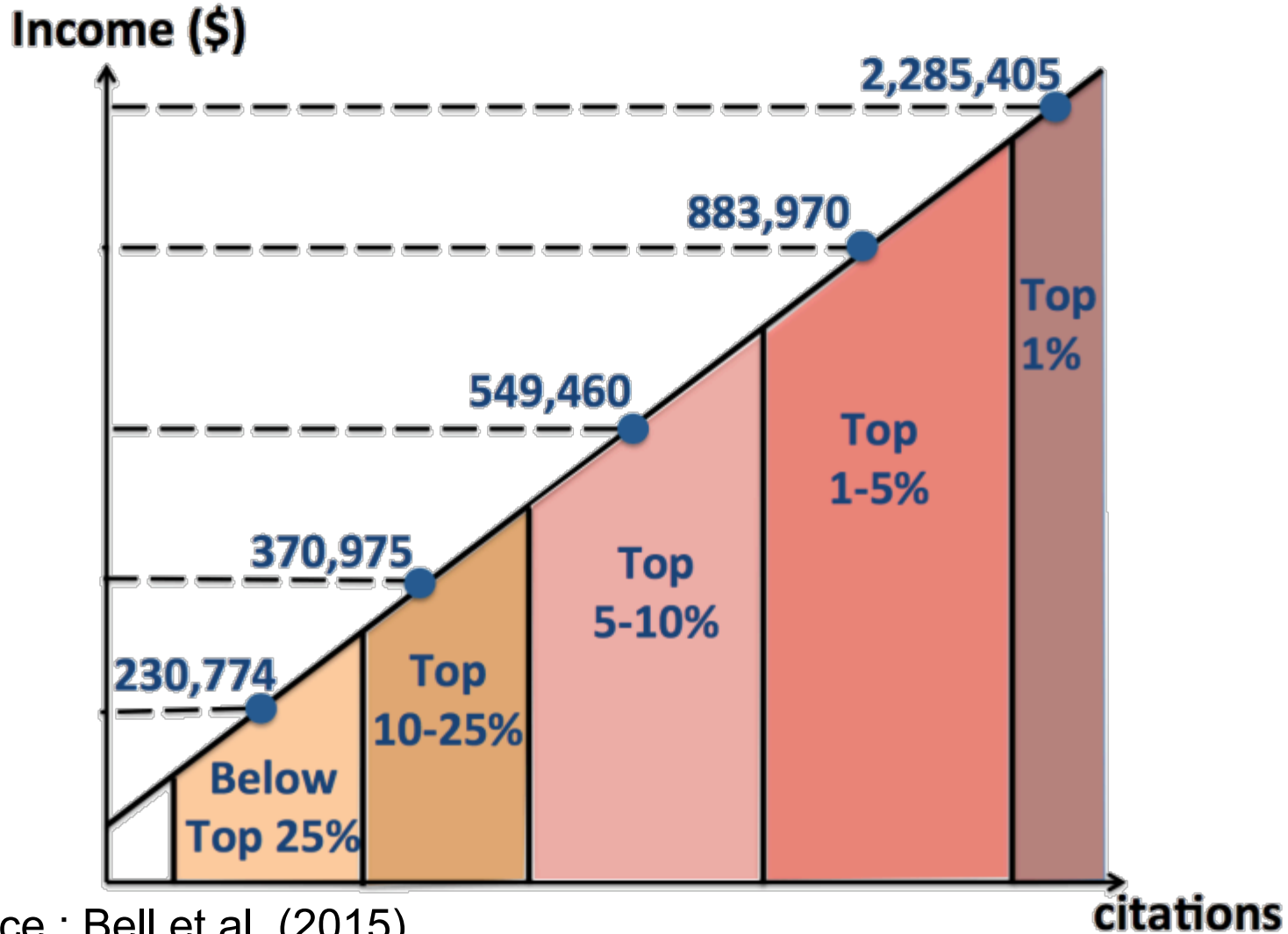


DONNÉES ET ÉTUDE

- **Données de panel internationales :**
 - Données de brevets 1977-2000 (USPTO & EPO)
 - Suivi des inventeurs de 8 grands pays dépositaires de brevets (Canada, Suisse, Allemagne, France, Italie, Japon, Etats-Unis, Grande-Bretagne)
- **Trois niveaux d'analyse :**
 - Au niveau macro, migration entre pays
 - Au sein des pays (suivi des réformes)
 - Au niveau individuel



LIEN ENTRE QUALITÉ ET REVENU



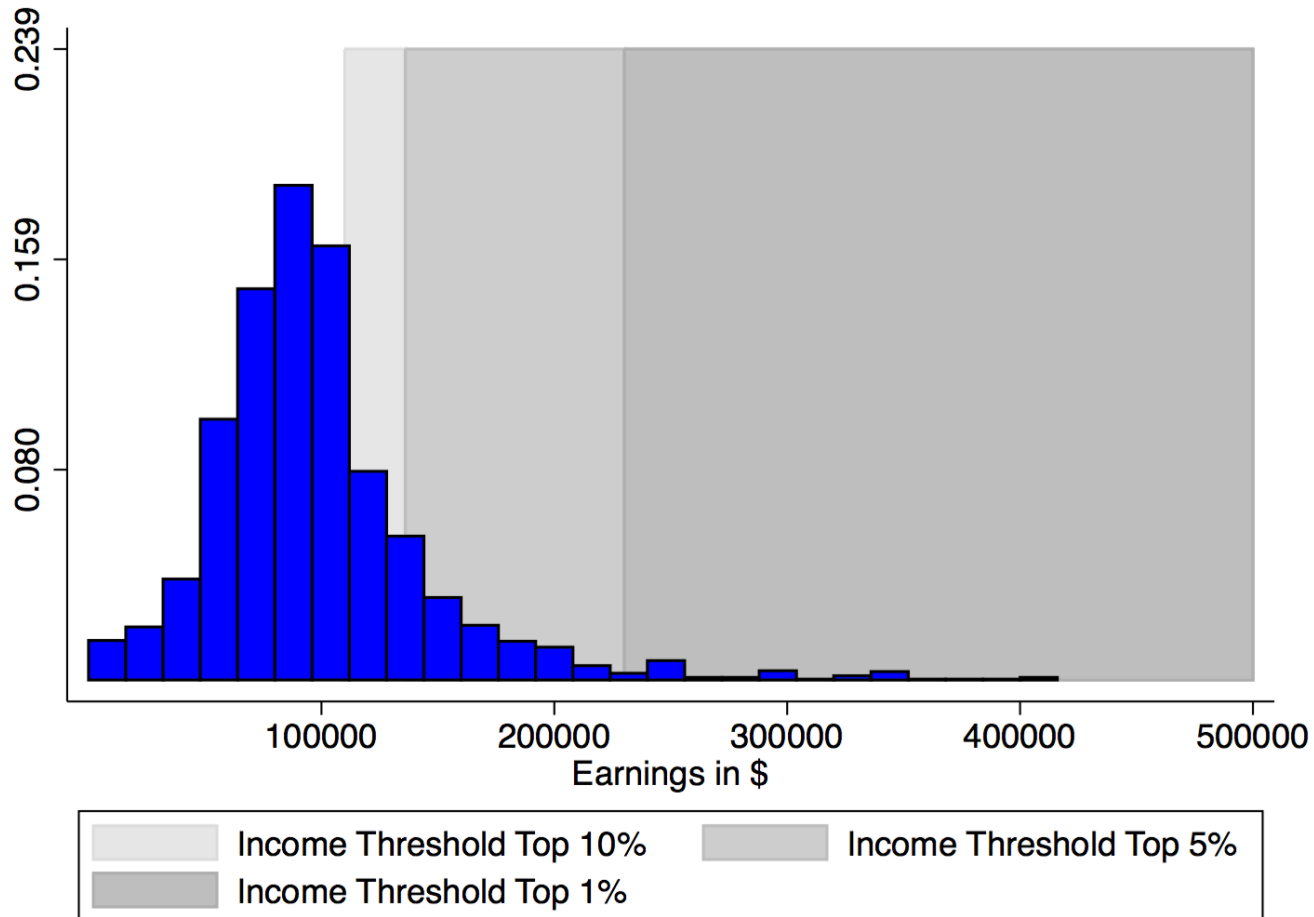
Source : Bell et al. (2015)



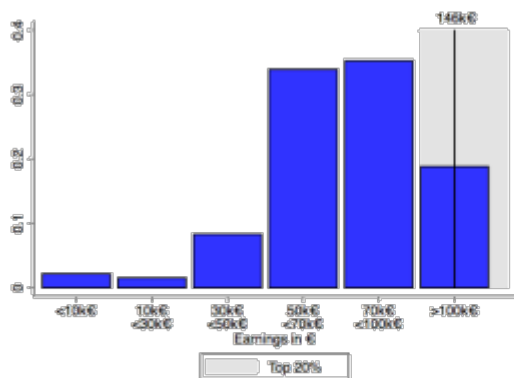
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DIFFÉRENCES ENTRE PAYS

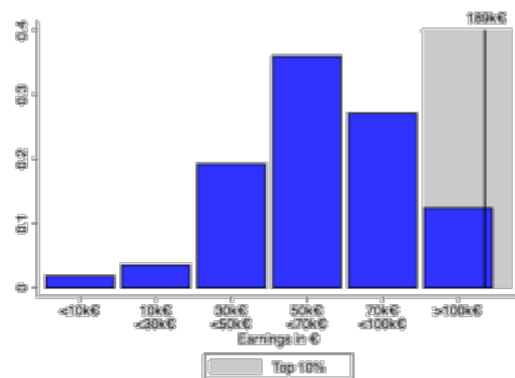
FIGURE 2: DISTRIBUTION OF INVENTOR EARNINGS IN THE NSF SURVEY 2003



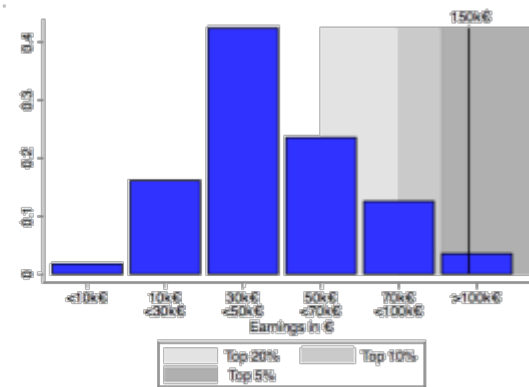
DIFFÉRENCES ENTRE PAYS



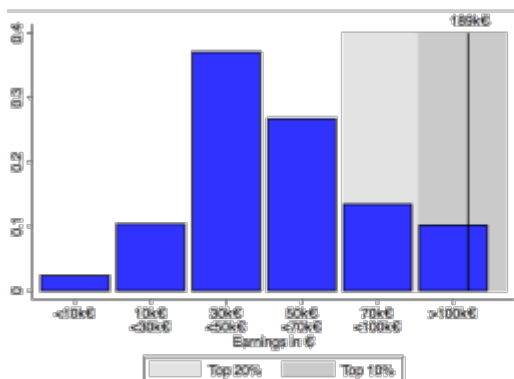
(a) Switzerland



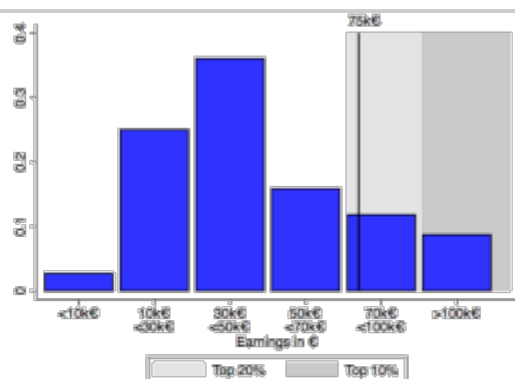
(b) Germany



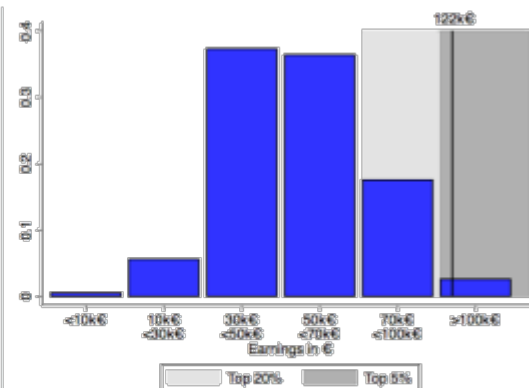
(c) France



(d) Great Britain



(e) Italy

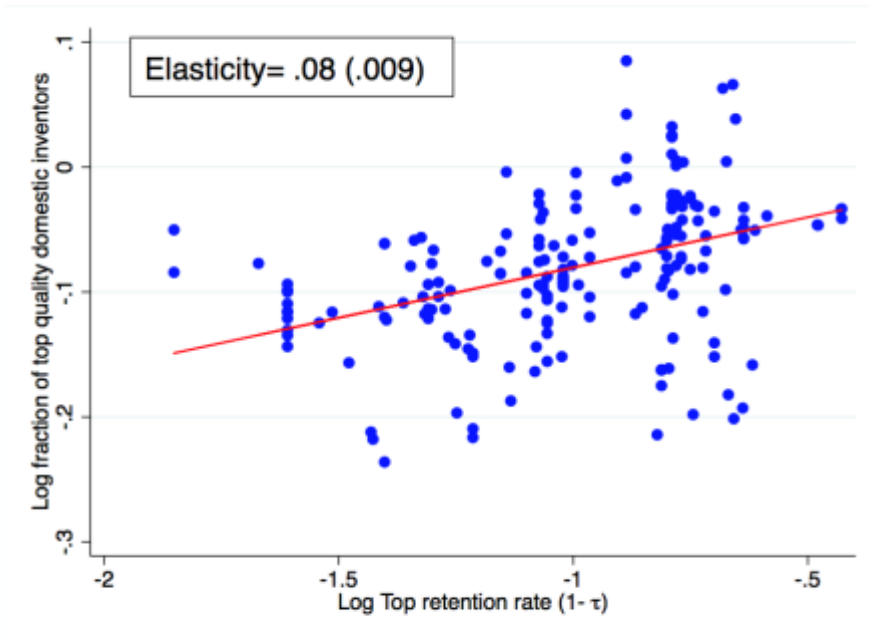


(f) Japan

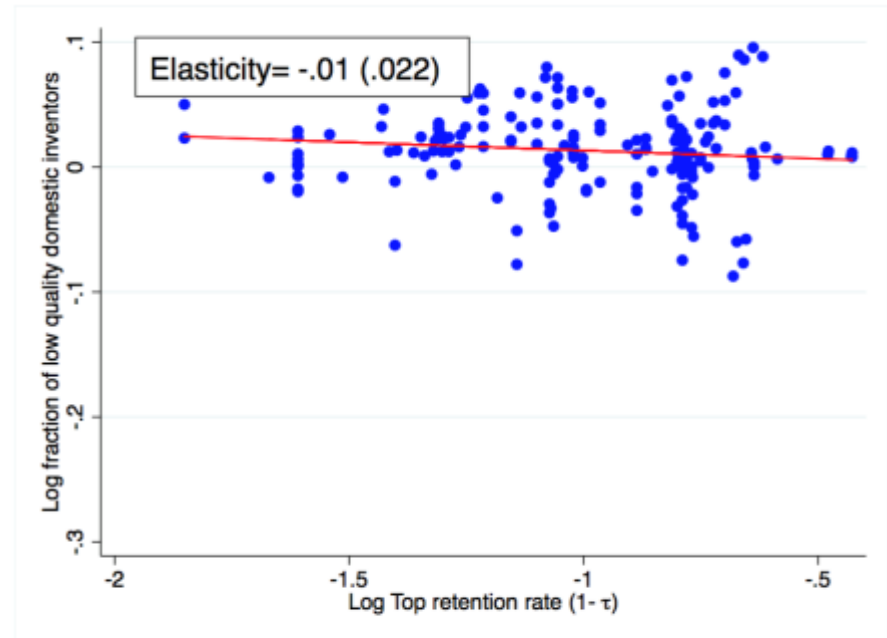


MIGRATIONS INTERNATIONALES

- Inventeurs restants dans leur pays d'origine



(a) Top quality inventors

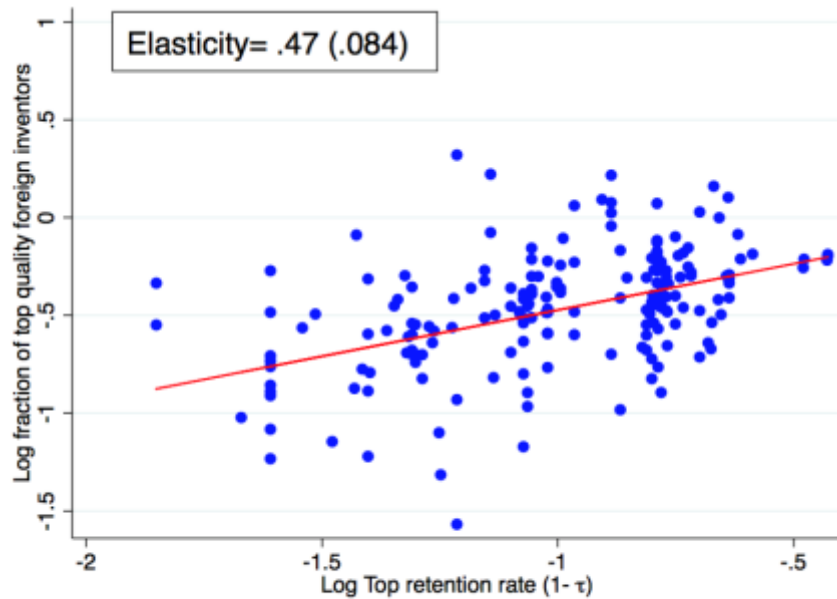


(b) Low quality inventors

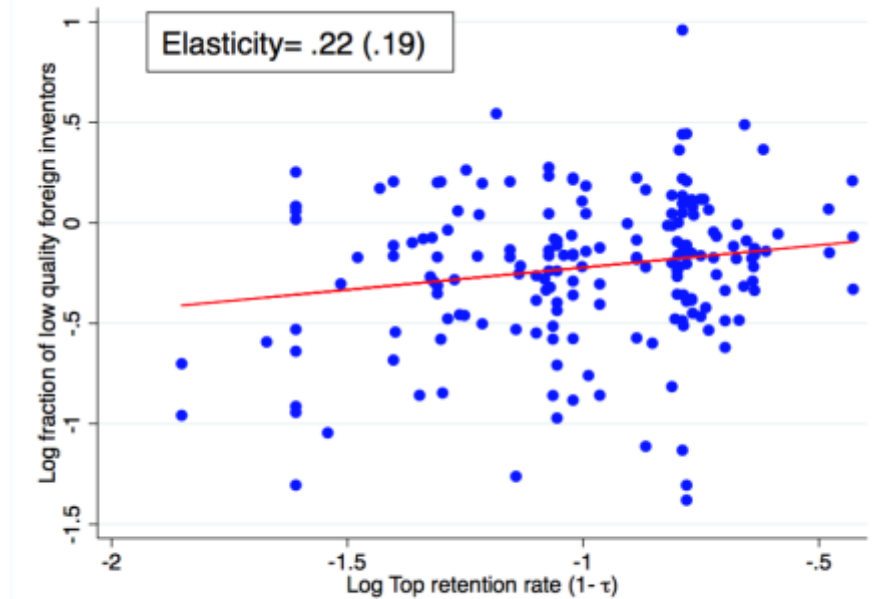


MIGRATIONS INTERNATIONALES

- Inventeurs provenant de pays étrangers



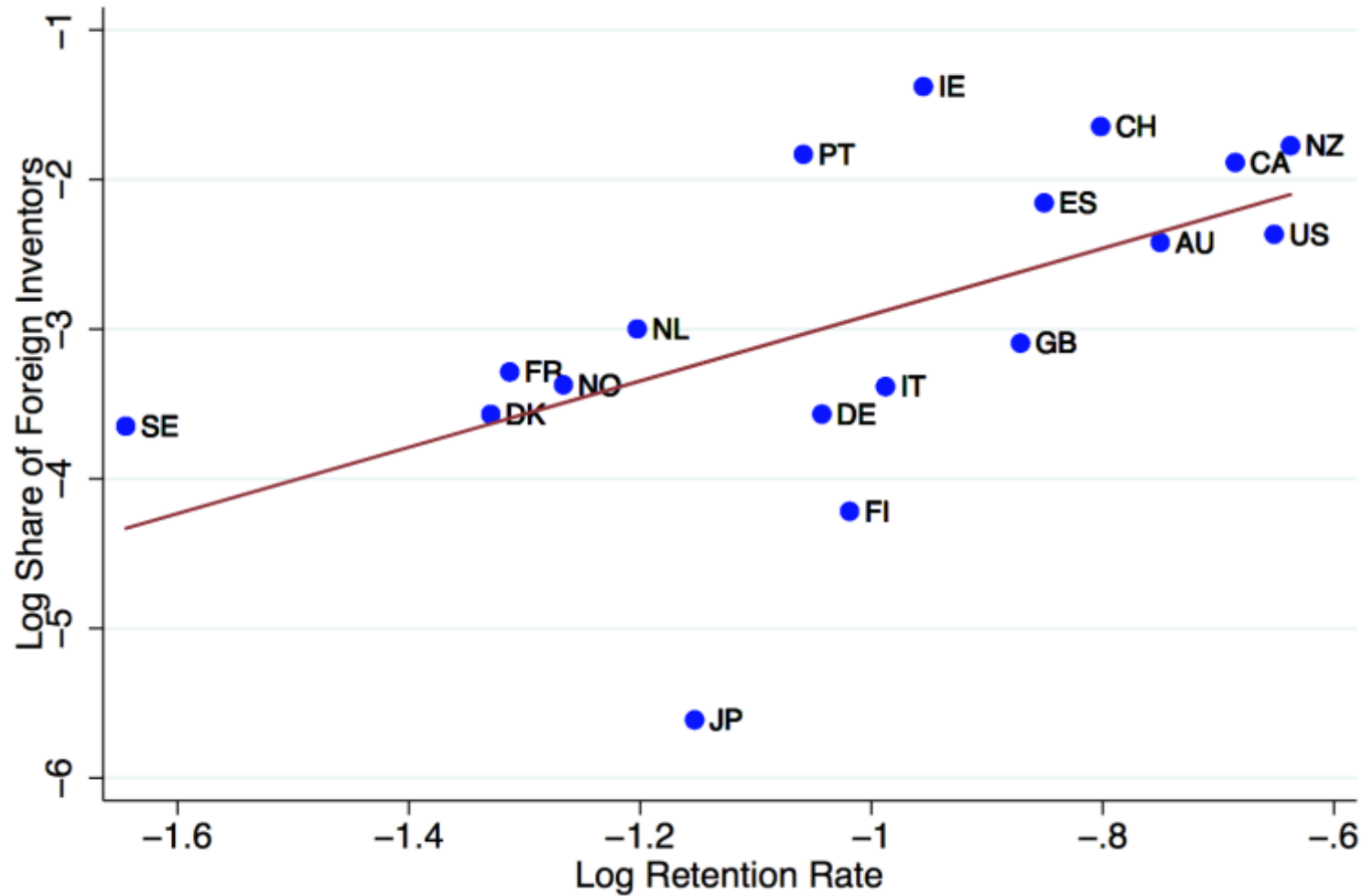
(a) Top quality inventors



(b) Low quality inventors



MIGRATIONS INTERNATIONALES



MIGRATIONS INTERNATIONALES

- *Top quality inventors* plus sensibles à la fiscalité

	Benchmark DID		PCT
	Top 25% inventors (1)	Bottom 50% inventors (2)	All inventors (3)
Domestic Elasticity	0.080*** (0.009)	-0.013 (0.022)	0.074* (0.038)
Foreign Elasticity	0.473*** (0.084)	0.222 (0.190)	0.984* (0.483)
(Domestic) Observations	192	192	244
(Foreign) Observations	191	188	238

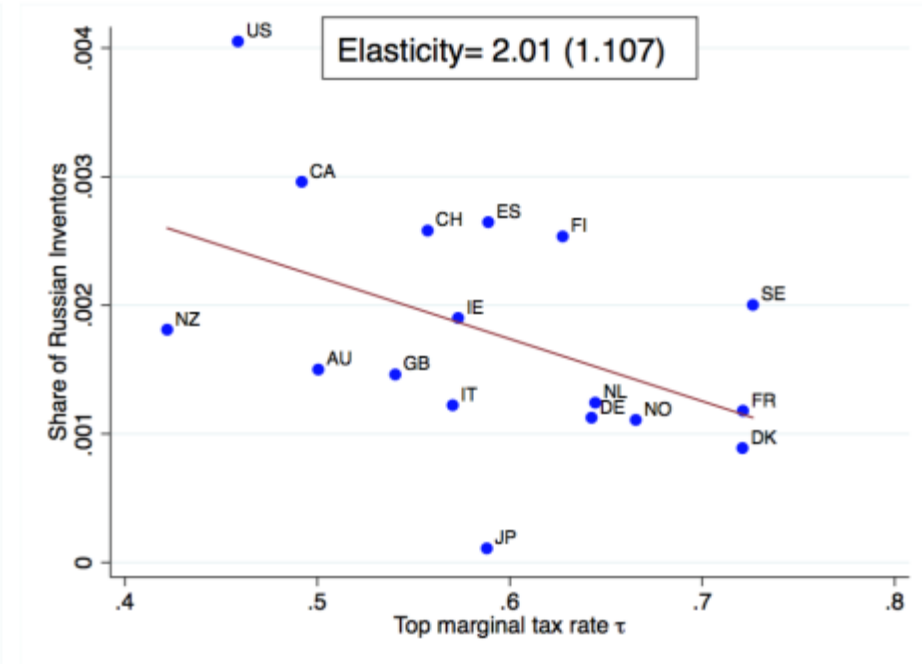
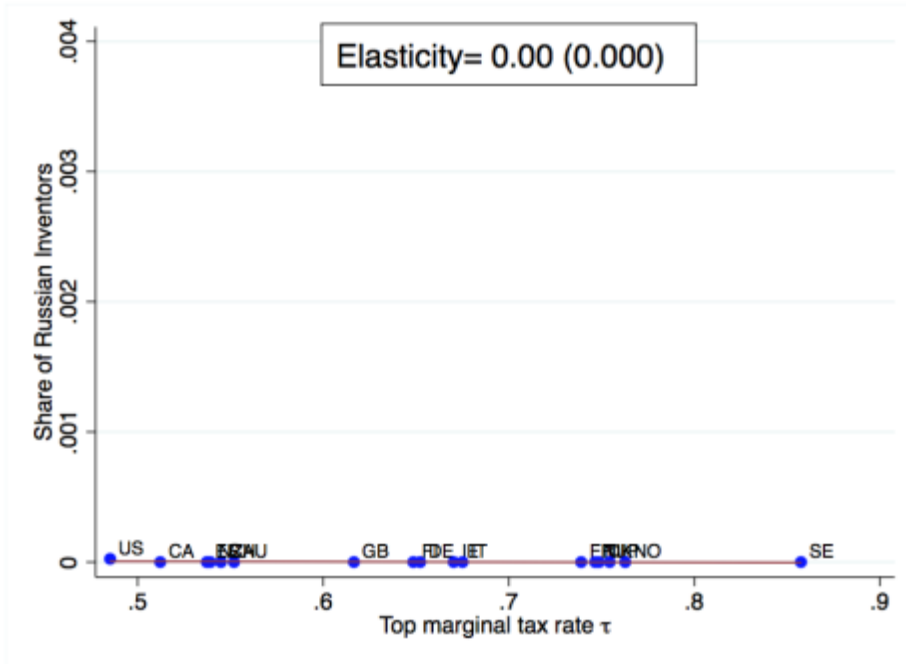


ÉTUDE D'UN PAYS EN PARTICULIER

- URSS / Russie : une quasi-expérience
 - Pays fermé à l'occident avant la chute de l'URSS
 - Ouverture après la chute
- Idée : Chercheurs russes « lâchés » sur le marché international



LES INVENTEURS RUSSES



(a) Pre Soviet Union Collapse: No possible migration

(b) Post Soviet Union Collapse: Migration negatively correlated with top τ .

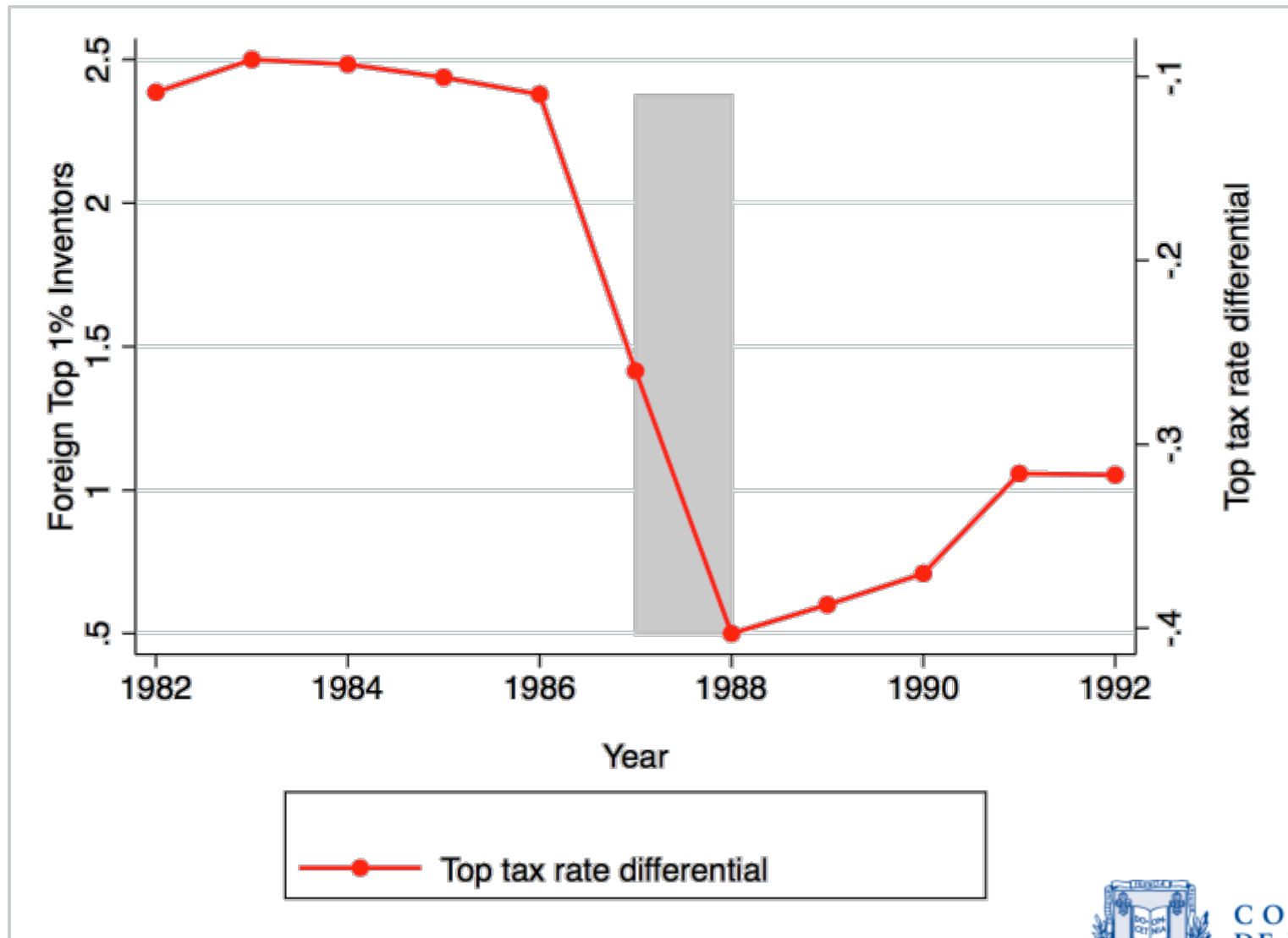


ETATS-UNIS : *TAX REFORM ACT 1986*

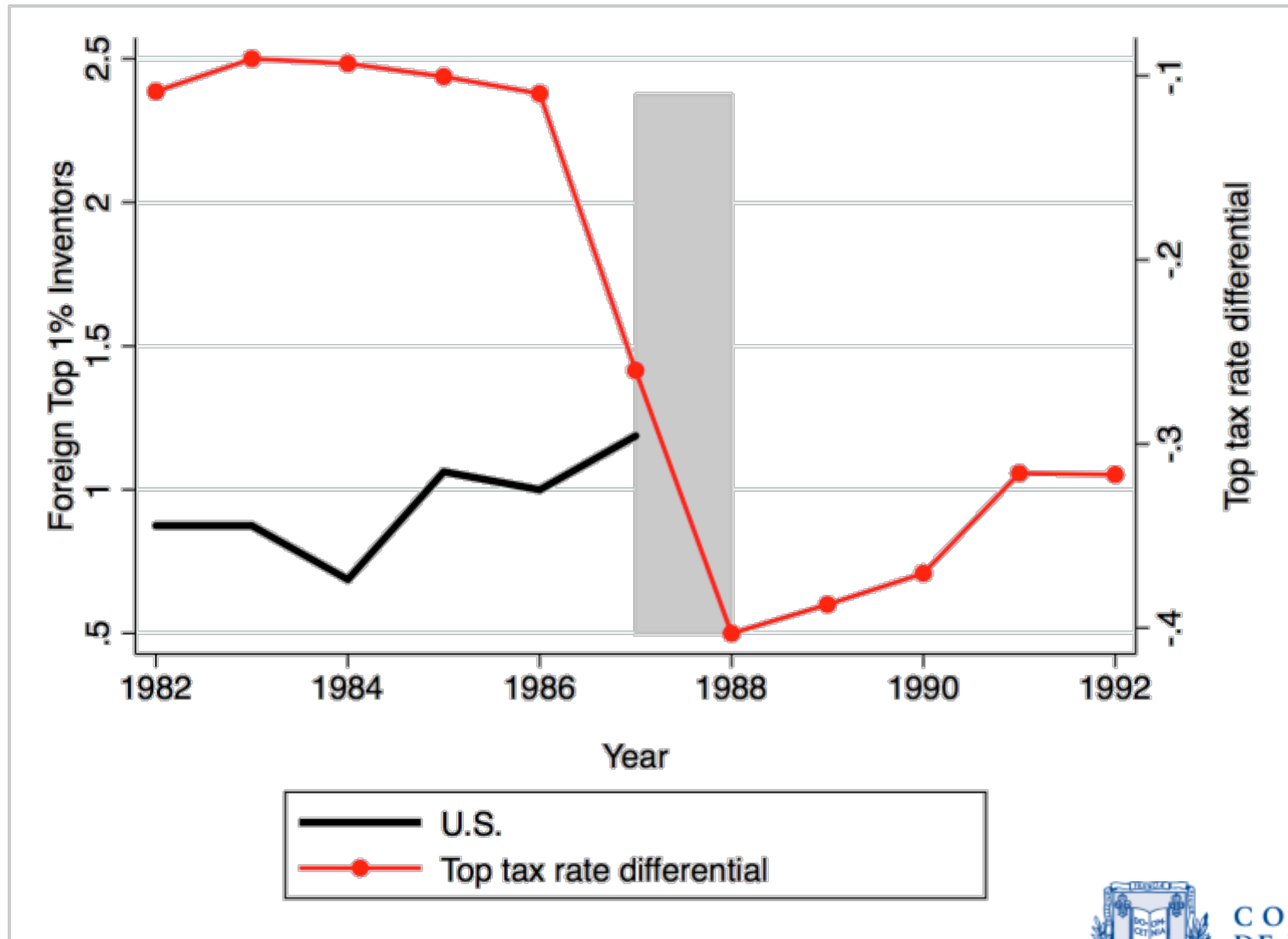
- Deuxième *Reagan tax cut*, après le *Kemp-Roth Tax Cut* de 1981
- **Réforme bipartisane** du système fiscal
- Construite de façon à être *tax-revenue neutral*
- Évolution de l'impôt sur le revenu :
 - **Baisse des *Top tax-rates*** pour les particuliers :
50% -> 28%
 - Augmentation de l'impôt sur les sociétés, les plus-values



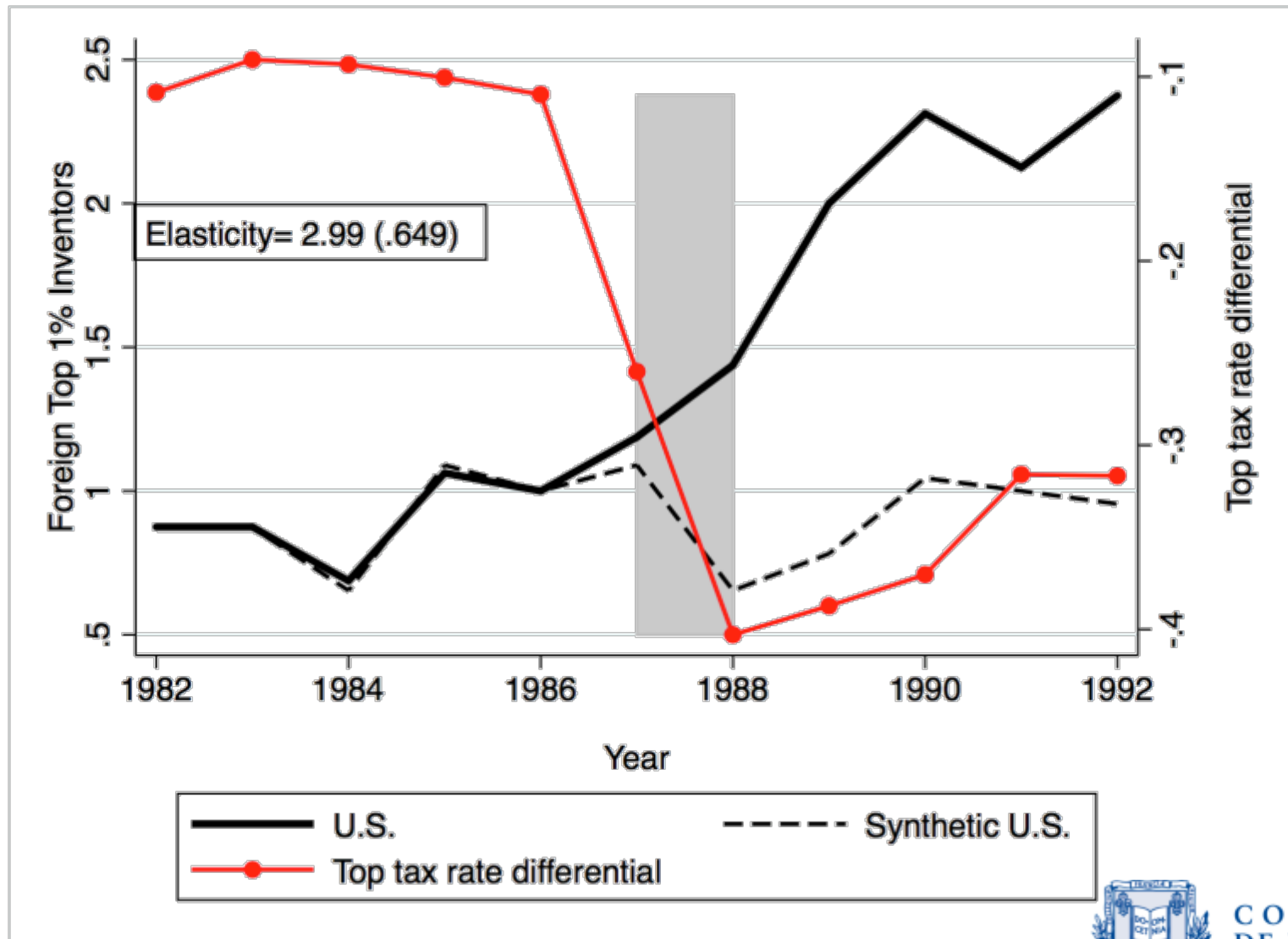
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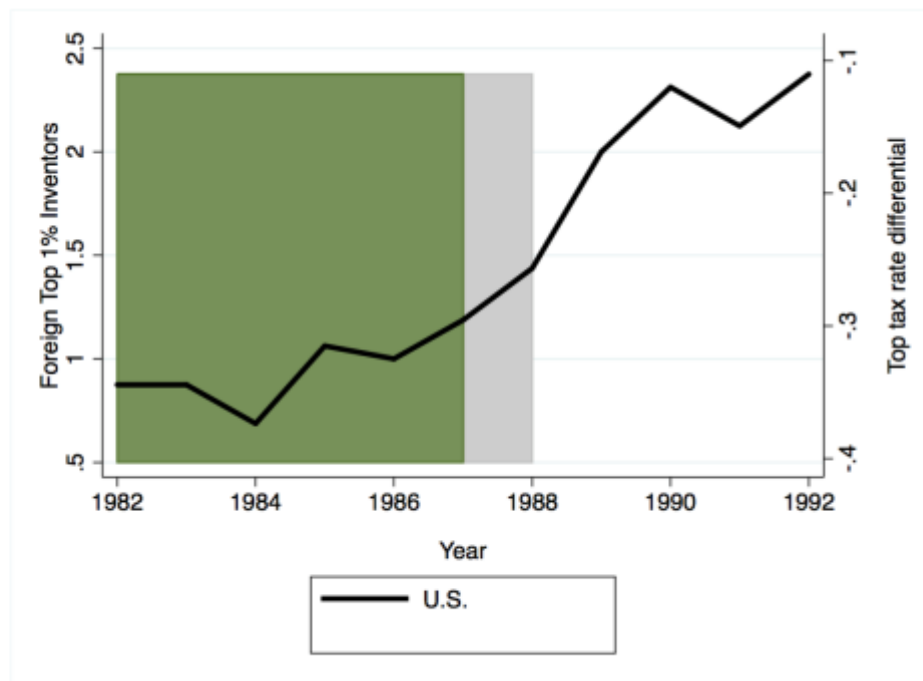
ETATS-UNIS : TAX REFORM ACT 1986



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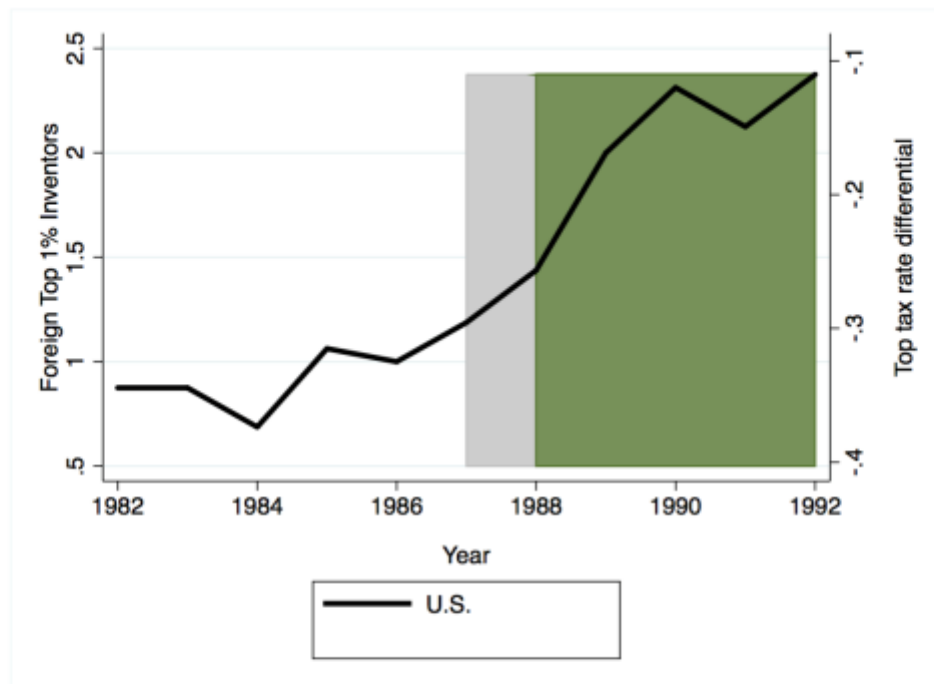


Structural break in growth of foreign top 1% relative to lower quality inventors.

Inventor quality	Pre T.R.A 1986	Post T.R.A 1986
Top 1%	6.8%	16.4%
Below Top 1%	10.5%	11.3%



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INVENTEURS : TRAJECTOIRES INDIVIDUELLES

$$Pr(y_{it} = c) = f(\alpha_{rit} \log(1 - \text{top MTR}_{ct}^i) + \beta_c \mathbf{x}_{ti} + \eta \mathbf{x}_{cti} + \zeta \mathbf{x}_{ct})$$

Variables individuelles

Variables de pays

Relation individu/pays
(langue, secteur de recherche
Développé, etc.)



SUPERSTAR VS. NON-SUPERSTAR

	(1)	(2)	(3)	(4)
Log Retention Rate × Top 1	1.376*** (0.478)	1.508*** (0.486)	1.451*** (0.489)	1.404*** (0.489)
Log Retention Rate × Top 1-5	0.926** (0.449)	1.065** (0.455)	1.004** (0.458)	0.950** (0.457)
Log Retention Rate × Top 5-10	0.629 (0.449)	0.773* (0.455)	0.713 (0.457)	0.654 (0.456)
Log Retention Rate × Top 10-25	0.357 (0.441)	0.511 (0.447)	0.454 (0.448)	0.396 (0.447)
Log Retention Rate × Below Top 25	0.0775 (0.444)	0.263 (0.451)	0.210 (0.449)	0.166 (0.449)
Quality × Country FE	NO	YES	YES	YES
Quality × Country FE × Year	NO	NO	YES	YES
Quality × Country FE × Year × Field FE	NO	NO	NO	YES
Control: Top 5-10				
Domestic elasticity	.02	.02	.02	.02
s.e	(.005)	(.005)	(.005)	(.005)
Foreign elasticity	.63	.62	.62	.63
s.e	(.18)	(.18)	(.19)	(.19)
Control: Top 10-25				
Domestic elasticity	.03	.02	.02	.02
s.e	(.005)	(.005)	(.005)	(.005)
Foreign elasticity	.85	.84	.83	.84
s.e	(.18)	(.18)	(.18)	(.18)
Control: Below Top 25				
Domestic elasticity	.03	.03	.03	.03
s.e	(.005)	(.005)	(.006)	(.006)
Foreign elasticity	1.09	1.05	1.04	1.04
s.e	(.190)	(.196)	(.201)	(.203)
Observations	8644280	8616336	8616336	8616336



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SIMULATION : BAISSSE DE 10% DU TOP TAX RATE EN 2000

Country	Domestic elasticity	Foreign elasticity	% change in domestic inventors	% change in foreign inventors
United States	0.004	1.25	0.1%	23.7%
Great Britain	0.48	1.60	10.6%	35.1%
Canada	0.41	1.59	7.9%	30.6%
Denmark	0.07	1.57	1.9%	43.8%
France	0.17	1.59	6.1%	56.4%
Italy	0.18	1.59	4.0%	35.5%
Japan	0.02	1.59	0.3%	32.6%
Switzerland	0.24	1.59	5.5%	36.1%

Columns 3, 4: Implied % change after 10 pp decline in top tax rates in 2000.



SIMULATION : BAISSSE DE 10% DU TOP TAX RATE EN 2000

Country	Small Patent Value		Large Patent Value	
	5% points tax change	10% points tax change	5% points tax change	10% points tax change
United States	58.0	116.1	1,225.5	2,451.0
Great Britain	16.4	32.7	345.5	691.0
Canada	17.6	35.1	370.6	741.3
Germany	17.7	35.4	373.2	746.5
France	10.9	21.7	229.1	458.3
Italy	3.0	5.9	62.7	125.3
Japan	8.5	17.0	180.0	360.0
Switzerland	5.5	11.0	116.0	232.0



LE RÔLE DES ENTREPRISES

	(1)	(2)
Log Retention Rate × Top 1	1.400*** (0.500)	0.980* (0.537)
Log Retention Rate × Top 1-5	0.868* (0.473)	0.548 (0.493)
Log Retention Rate × Top 5-10	0.514 (0.473)	0.199 (0.491)
Log Retention Rate × Top 10-25	0.181 (0.468)	-0.0974 (0.481)
Log Retention Rate × Below Top 25	-0.254 (0.472)	-0.560 (0.485)
Log Retention Rate × Not Multinational	-0.216* (0.129)	
Log Retention Rate × Activity abroad		-1.470*** (0.137)
Quality × Country FE	YES	YES
Quality × Country FE × Year	YES	YES
Quality × Country FE × Year × Field FE	YES	YES
Control: Top 5-10		
Domestic elasticity	.018	.011
s.e	(.0045)	(.0047)
Foreign elasticity	.809	.420
s.e	(.201)	(.154)
Control: Top 10-25		
Domestic elasticity	.024	.016
s.e	(.0045)	(.0046)
Foreign elasticity	1.113	.579
s.e	(.197)	(.151)
Control: Below Top 25		
Domestic elasticity	.034	.027
s.e	(.0047)	(.0049)
Foreign elasticity	1.511	.828
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Observations	7059856	6168504



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CONCLUSIONS

- Les *inventeurs superstars* réagissent aux taux d'imposition des tranches élevées
- Mais les **choix de carrière** restent aussi un facteur prépondérant
- Inventeurs travaillant pour les multinationales plus sensibles
- **Question ouverte** : quel est le **coût économique du système fiscal** si on prend en compte la migration des inventeurs et de leurs externalités positives ?

