Online Appendix for "Taxation and the International Mobility of Inventors"

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A Data Construction

We construct the benchmark micro-level dataset using the following data sources. The Disambiguated Inventor Data is available from Harvard Dataverse Network[1]. Other details on patents come from the NBER patent data[2]. International data on top marginal income taxes comes from Piketty et al. (2014).[3]

The forward citations for each patent are the truncation-adjusted citations, as defined in Hall, Jaffe, and Trajtenberg (2001). For each of the quality measures defined in Section 2.3, we define a reference distribution for each year and for each of the three regions (i) Europe and Canada, ii) United States, iii) Japan). We then rank inventors according to their percentile in that year. We take as our benchmark sample those inventors who have ever been in the top 25% in any year of their life in te sample. Note however that the quality measure used to define top 1%, top 1-5%, etc. and used in levels in the regressions is a dynamic measure, taking into account the quality of the inventor in each given year. Hence, an inventor can be ranked in the top 1% in some year, but not in some other year.

The definitions of the constructed variables used in the micro-level regressions in Section 5 are as follows: *Home country of inventor:* first country in which an inventor is observed in the data.

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[1] invpat.zip file from https://thedata.harvard.edu/dvn/dv/patent/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/15705&studyListingIndex=1_cb493c4a38c48c6b3b3b31b31a44

[2] pat76_06_assg.dta and assignee.dta from https://sites.google.com/site/patentdataproject/Home/downloads

[3] Available for download here: http://scholar.harvard.edu/stantcheva/publications/optimal-taxation-top-incomes-tale-three-elasticities.

Table A1: Correlation matrix for the four quality measures

	Citations-weighted patent number	Number of patents	Average citations per patent	Max citations per patent
Citations-weighted patent number	1			
Number of patents	0.71	1		
Average citations per patents	0.31	0.03	1	
Max citations per patent	0.62	0.36	0.75	1

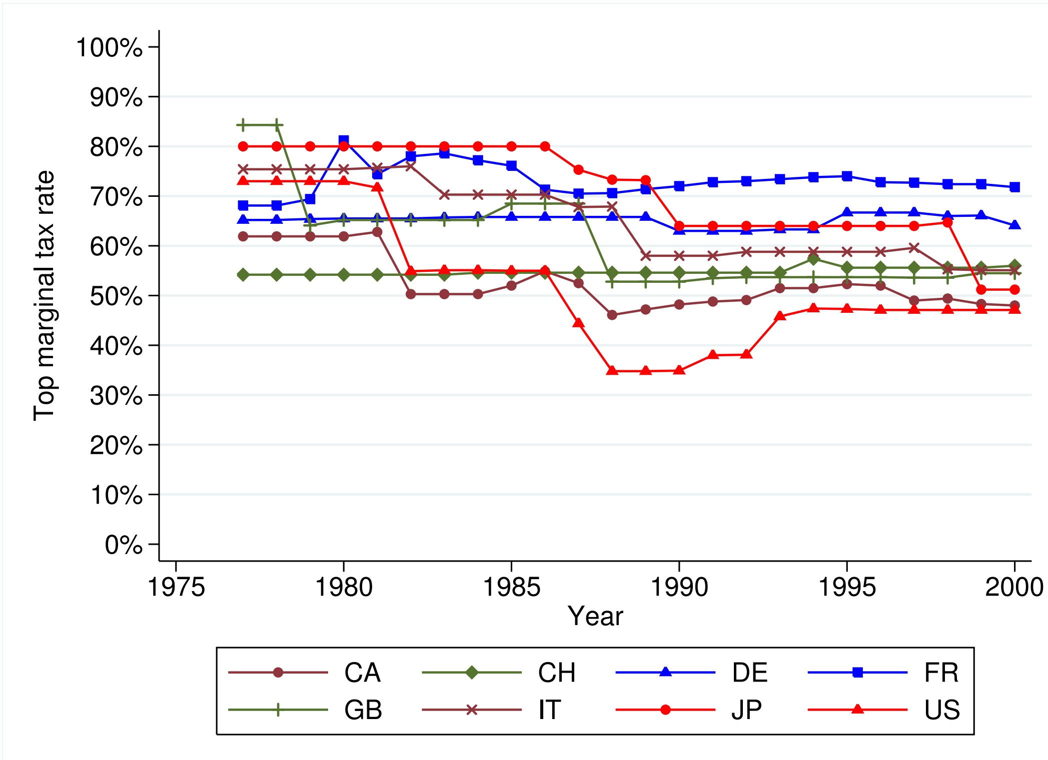
Notes: The correlations between different dynamic measures of the inventor's quaility are computed across inventors for the period 1977-2000. The data includes inventors in 8 countries: Canada, France, Germany, Great Britain, Italy, Japan, Switzerland, and the United States. The sample contains 3,422,865 observations with 1,439,129 unique inventors. Citations-weighted patent number is measure $q1$ from the text as defined in (1). Number of patents is measure $q2$ as defined in (2). Average citations per patent is measure $q3$ as defined in (3). Max citations per patent is measure $q4$ as defined in (4).

Inventor's age: age counted from the first year inventor is observed in the data.
Inventor's technological field: most frequent technological category[4] of inventor's patents.
Country patent stock in year t: number of patents applied by firms in a country in year t.
Country patent stock in inventor's technological category in year t: number of patents applied by firms in a country in year t that belong to inventor's technological category.
Multinational firm: firm whose patents are issued by inventors located in at least two different countries.
Share of innovative activity of a company in a country: number of yearly patents issued by a company in a given country divided by the total number of patents issued in all countries.

[4]Technological field is one of 6 categories from Hall, Jaffe, and Trajtenberg (2001): chemical, computer and communications, drugs and medical, electrical, mechanical, others.

B Additional Summary Statistics from the DID and EPO Data

Figure A1: Evolution of the top marginal tax rates in sample countries



Notes: Based on effective top marginal tax rate data from Piketty et al. (2014), as described in Section 2.4

Table A2: Number of co-inventors by country and industry for top 1% inventors

	Chemical	Computer and Communications	Drugs and Medical	Electrical	Mechanical	Others
CA	2.9	1.8	2.4	2.0	1.0	1.5
CH	1.6	2.1	2.0	1.3	0.5	0.3
DE	3.4	1.9	4.2	2.0	1.8	1.6
FR	2.1	2.2	2.4	1.6	1.2	0.9
GB	2.1	2.0	2.2	1.2	1.0	1.1
IT	2.3	1.7	1.8	1.3	0.8	0.9
JP	3.0	3.4	3.8	3.1	2.4	2.6
US	2.0	2.2	2.1	1.9	1.8	1.6

Notes: This table shows the average number of co-inventors on a patent for the patents of inventors who are in the top 1%. The number of co-inventors is defined as (the number of inventors who are on a given patent - 1). E.g., if an inventor has a patent with another inventor, we will consider that there is one co-inventor on this patent. The sample is the same as for Table 1. The industry categories are defined and constructed in Hall, Jaffe, and Trajtenberg (2001).

Table A3: Number of co-inventors by country and industry for top 5% inventors

	Chemical	Computer and Communications	Drugs and Medical	Electrical	Mechanical	Others
CA	2.4	2.3	2.6	1.6	1.4	1.2
CH	1.9	2.0	2.0	1.3	0.8	1.0
DE	3.1	2.1	4.2	1.9	2.0	1.9
FR	2.2	1.8	2.9	1.5	1.2	1.2
GB	2.1	1.9	2.4	1.4	1.3	1.2
IT	2.2	2.0	2.6	1.7	0.8	0.9
JP	3.2	3.1	3.9	3.1	2.5	2.8
US	2.0	2.4	2.3	1.9	1.6	1.7

Notes: All the notes to Appendix Table A2 apply, except that we consider the number of co-inventors for top 5% inventors.

Table A4: Number of co-inventors by country and industry for top 10% inventors

	Chemical	Computer and Communications	Drugs and Medical	Electrical	Mechanical	Others
CA	2.0	2.2	2.8	1.7	1.5	1.1
CH	1.6	1.6	2.2	1.3	0.9	1.0
DE	2.9	2.1	3.9	1.8	1.9	1.8
FR	2.2	2.0	2.8	1.5	1.4	1.2
GB	1.8	1.8	2.3	1.3	1.3	1.3
IT	2.5	2.0	2.8	1.7	1.0	1.1
JP	3.2	3.0	4.0	3.0	2.6	2.8
US	2.1	2.4	2.5	1.8	1.6	1.6

Notes: All the notes to Appendix Table A2 apply, except that we consider the number of co-inventors for top 10% inventors.

Table A5: Number of co-inventors by country and industry for top 25% inventors

	Chemical	Computer and Communications	Drugs and Medical	Electrical	Mechanical	Others
CA	1.9	2.1	2.6	1.8	1.3	1.1
CH	1.8	1.6	2.3	1.3	1.0	1.0
DE	2.8	2.0	3.5	1.9	2.0	1.8
FR	2.2	1.7	2.7	1.5	1.4	1.3
GB	2.0	1.8	2.7	1.3	1.3	1.3
IT	2.2	1.9	2.9	1.7	1.0	0.9
JP	3.2	2.8	3.9	2.9	2.6	2.8
US	2.1	2.3	2.6	1.8	1.6	1.5

Notes: All the notes to Appendix Table A2 apply, except that we consider the number of co-inventors for top 25% inventors.

Table A6: Missing data in the sample

	Average gap	Number of obs.	Fraction non-missing
Top 1%	2.32	10.68	0.53
Top 1-5%	2.66	7.50	0.49
Top 5-10%	2.95	5.72	0.46
Top 10-25%	3.32	4.16	0.44

Notes: The sample is the same as in Table 1. The first column gives the average number of years between two consecutive observations in the sample, computed for inventors of different qualities. The second column shows the average number of times we observe an inventor in the sample. The last column gives the average fraction of years between beginning and end of the life span in the sample that are non missing for an inventor.

Table A7: Share of patents and citations before move

	Share of patents	Share of citations
Top 1%	0.52	0.44
Top 1-5%	0.55	0.47
Top 5-10%	0.55	0.49
Top 10-25%	0.60	0.55

Notes: The sample is as in Table 1, but restricted to the inventors who ever move. Column 1 shows the share of patents that an inventor already has before an international move. Column 2 shows the share of citations that an inventor already has on the patents received before an international move. For inventors who never move (not included in these calculations) the fractions are naturally equal to 1.

Table A8: Range of industries by inventor category

	cat	nclass	icl	subcat
Top 1%	2.9	8.2	20.7	5.1
Top 1-5%	2.3	5.2	10.8	3.7
Top 5-10%	2.0	3.9	7.1	2.9
Top 10-25%	1.7	2.8	4.5	2.3

Notes: The sample is the same as in Table 1. The table shows average number of industries in which inventors from different quality percentiles issue patents. The industry categories, "cat" and "subcat" are defined and constructed in Hall, Jaffe, and Trajtenberg (2001). "nclass" represents 3-digit technology categories assigned by the USPTO. "icl" is a finer set of categories that correspond to the international patent classification.

Table A9: Average gap between application and grant year by industry, pre 1994 reform

Total	Chem	Comp	Drugs	Electric	Mechan	Others
2.0	1.9	2.4	2.2	2.0	1.9	1.9

Notes: The table reports the average number of years between the patent's application and grant year (in years), for all patents applied for before the year of the "Patent Term and Publication Reform Act' of 1994. The abbreviations in the successive columns respectively stand for: Total, Chemicals, Computers and Communication, Drugs and Medical, Electrical, Mechanical and Others. The sample is the benchmark sample from Table 1.

Table A10: Patent breadth and breadth of impact measures by inventor quality

	Breadth of impact	Patent breadth
Top 1%	20.15	500.50
Top 1-5%	12.16	225.48
Top 5-10%	8.52	142.71
Top 10-25%	5.72	88.31

Notes: The sample is the same as in Table 1. The table reports the averages of the two inventor quality measures "breadth of impact" and "patent breadth" for different rankings of inventors according to our benchmark quality definition ($q1$ in the text, i.e., citations-weighted patents). Breadth of impact is the number of technology classes that build on an inventor's patents. Formally, we take the set of patents of an inventor until time $t-1$ and count the number of technological classes which contain patents that ever cite those patents. Patent breadth is the dynamic claims-adjusted patent stock, i.e., the number of claims on all patents received by the inventor by time $t-1$ (constructed exactly as our benchmark measure $q1$, but using claims instead of citations). See the detailed description in the main text, Section 6.1.

Table A11: Summary Statistics from the European Patent data

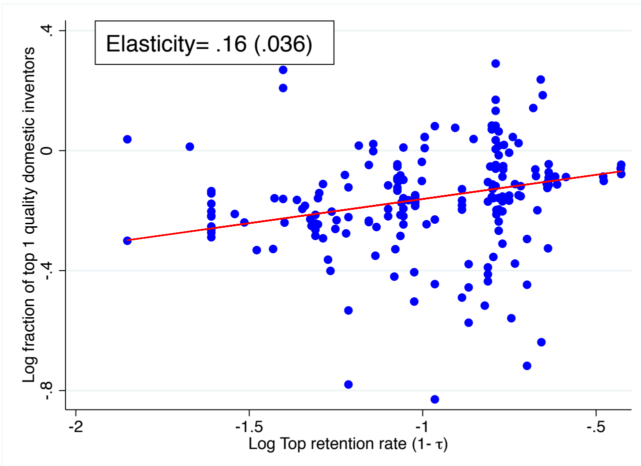
Variable	Average
Patents of Superstar (Top 1%) Inventors	46.3
Patents of Superstar (Top 5%) Inventors	23.1
Patents of Non-superstar (Below Top 5%) Inventors	2.2
Average patents per year while in sample	1.5
Max citations per patent of Superstar (Top 1%) Inventors	34.1
Max citations per patent of Superstar (Top 5%) Inventors	23.2
Max citations per patent of Non-superstar (Below Top 5%) Inventors	4.5
Number of Patents (per country per year)	5,011
Number of Inventors (per country per year)	7,797
Number of immigrants (per country per year)	30.5
# of immigrants per year to the U.S.	150.4
# of immigrants per year to CA	14.7
# of immigrants per year to CH	35.6
# of immigrants per year to DE	56.3
# of immigrants per year to FR	31.7
# of immigrants per year to GB	39.1
# of immigrants per year to IT	13.5
# of immigrants per year to JP	19.7
% Superstar (Top 1%) Inventors who move over life in sample	3.7%
% Superstar (Top 5%) Inventors who move over life in sample	2.6%
% Non-superstar (Below 5%) Inventors who move over life in sample	0.2%
Average duration of stay in years conditional on move (sample)	4.9
% of inventors who are employees	94%
Average years between first and last patent in sample	6.9

Notes: Summary statistics are based on the European Patent Office data set described in Section 7 for the period 1977-2007. The data includes inventors in 8 countries: Canada, France, Germany, Great Britain, Italy, Japan, Switzerland, and the United States. The sample contains 3,147,044 observations with 1,916,402 unique inventors.

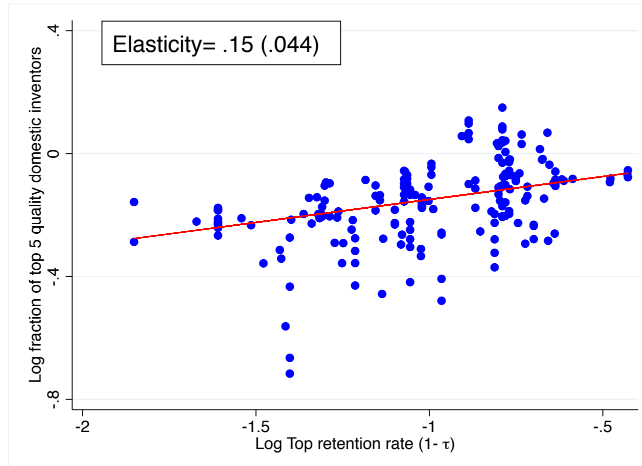
C Supplementary Stylized Macro Facts

Figure A2: Top $(1-\tau)$ and % of domestic inventors of all qualities

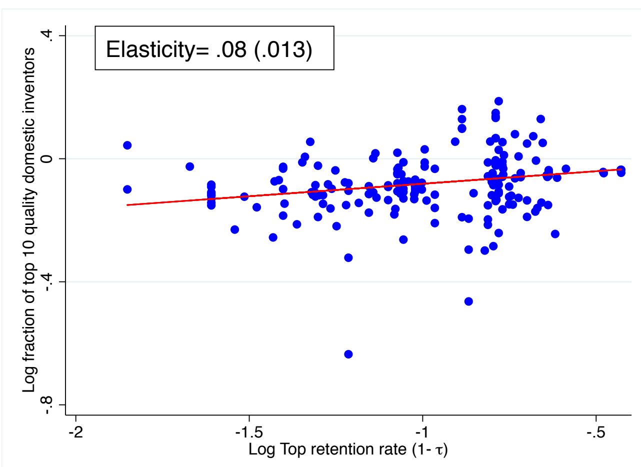
(a) Fraction of top 1% inventors in home country



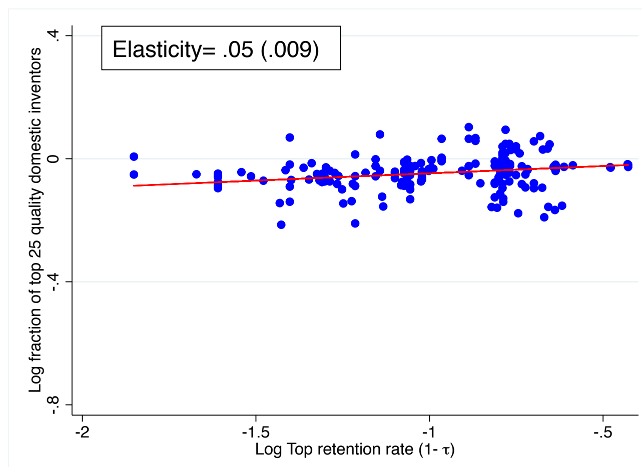
(b) Fraction of top 1-5% inventors in home country



(c) Fraction of top 5-10% inventors in home country



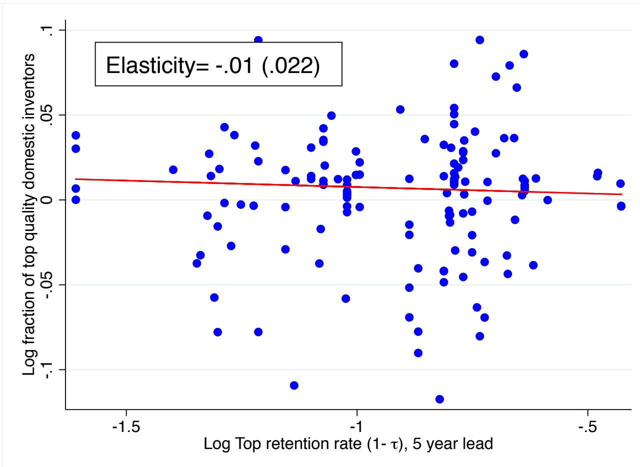
(d) Fraction of top 10-25% inventors in home country



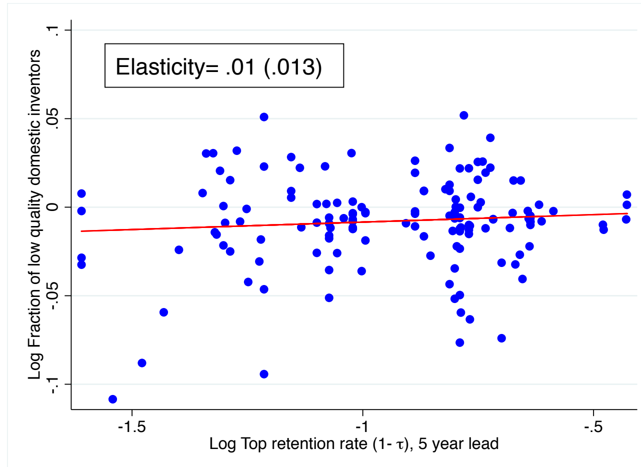
Notes: For each outcome variable at the country-year level, we regress its log on the country's yearly patent stock, GDP per capita, country fixed effects, year fixed effects, and the log retention rate, weighted by the number of inventors in that country and year. The elasticities are reported in each panel with standard errors clustered at the country level. Each dot represents the adjusted log outcome variable, where we have filtered out all covariates– except for the log retention rate– from the aforementioned regression. The regression lines of the adjusted variables on the log retention rate are depicted in red. In panel (a), the outcome is the fraction of top 1% inventors working in their home country (number of top 1% inventors working in their home country divided by the total number of top 1% inventors from that country). Panel (b) considers the fraction of top 1-5% inventors working in their home country. Panel (c) considers the fraction of top 5-10% inventors working in their home country. Panel (d) considers the fraction of top 10-25% inventors working in their home country.

Figure A3: Lead top $(1-\tau)$ and % of domestic and foreign inventors 1977-2000

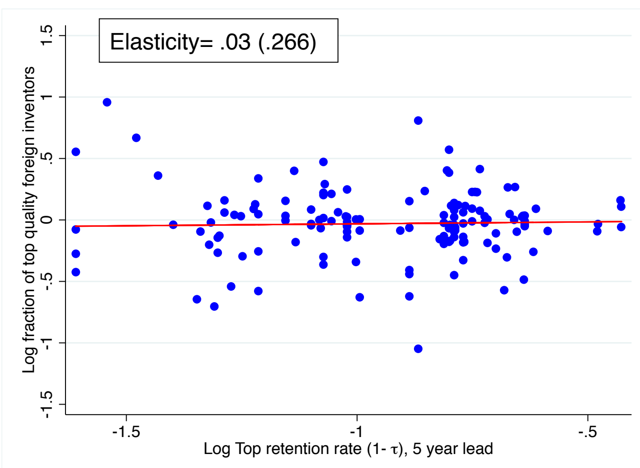
(a) Fraction of top quality inventors in home country



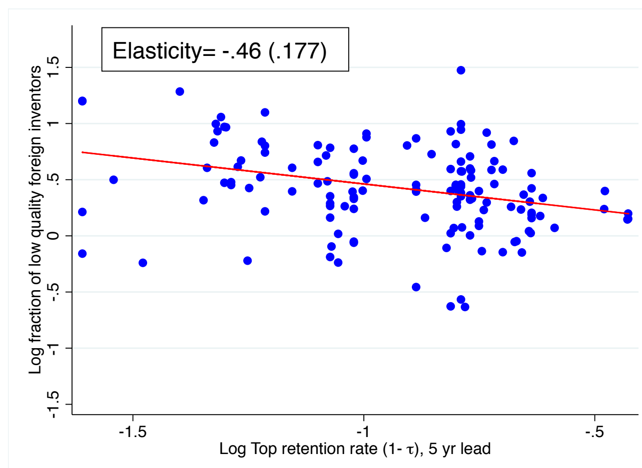
(b) Fraction of low quality inventors in home country



(c) Fraction of top quality foreign inventors



(d) Fraction of low quality foreign inventors



Notes: For each outcome variable at the country-year level, we regress its log on the country's yearly patent stock, GDP per capita, country fixed effects, year fixed effects, and the 5-year lead log retention rate weighted by the number of inventors in that country and year. We use the 5-year lead of the top tax rate since in our sample, top tax rate changes of more than 2 percentage points occur on average every 5 years. The elasticities are reported in each panel with standard errors clustered at the country level. Each dot represents the adjusted log outcome variable, where we have filtered out all covariates– except for the log retention rate– from the aforementioned regression. The regression lines of the adjusted variables on the lead log retention rate are depicted in red. In panel (a), the outcome is the fraction of top 25% inventors working in their home country (number of top 25% inventors working in their home country divided by the total number of top 25% inventors from that country). Panel (b) considers the fraction of low quality bottom 50% inventors who work in their home country. Panel (c) considers the fraction of top quality foreign inventors (the number of top 25% foreign inventors over the number of inventors residing in the country). Panel (d) considers the fraction of low quality bottom 50% foreign inventors. The lead top retention rate does not appear to be significantly positively correlated with domestic or foreign inventors' migration (the relation is even negative for low quality foreign inventors in Panel (d)).

D Additional Material for the Case Studies in Section 4

In the synthetic cohort approach used in Sections 4.2 and 4.3, we compare the treatment country with a synthetic country that is obtained following Abadie et al. (2010). The synthetic country is constructed to minimize the distance between the treatment and the synthetic country's pre-reform characteristics. The characteristics we match are the average pre-reform value of the outcome variable, the average pre-reform number of patents per year in the country, and the average pre-reform GDP per capita. Table A12 reports resulting weights for the analysis in the main text.

For the U.S., the outcome variables are the number of foreign inventors of top and lower quality (top 1% and top 10-25%) in the U.S., normalized by a base year (1986). The normalization is necessary because the U.S. is the largest country in the sample and it would not make sense to match levels. For Denmark, the outcome variable is just the share of foreign inventors normalized by a base year (1985), since we use the PCT data that does not contain inventor quality information, but which has a higher representation of Denmark, as explained in the main text in Section 4.3. For Denmark it makes sense to consider the fraction of foreigners since the reform preferentially affected foreigners. For the U.S., the reform was not targeted towards foreigners only.

Table A12: Weights for the Synthetic Control Analysis

	U.S.		Denmark
Country	Top 1%	Top 25%	
Canada	.220	.245	.120
France	0	0	0
Germany	-	0	0
Great Britain	-	.416	0
Italy	.262	.124	0
Japan	.085	.216	0
Switzerland	.433	0	.818
United States	-	-	0
Australia	-	-	0
Ireland	-	-	0
New Zealand	-	-	0
Portugal	-	-	.062
Spain	-	-	0

Notes: Weights obtained for the synthetic country analysis as described in Abadie et al. (2010). The first two columns consider the U.S. Tax Reform Act from Section 4.2, and are represented, respectively, in the two panels of Figure 8. The last column considers Denmark's 1992 Tax Reform from Section 4.3, represented in Figure 9. As explained in the main text, the U.S. case study is based on the benchmark DID, while the Danish case study is based on the PCT data. See Section 2.3 for a detailed description of these two datasets.

E Additional Micro Results

E.1 Heckman Selection Model on Industries with long Patent/Product life cycles

We should expect the effective increase in the term of patent protection to be particularly important for industries (technology classes) with a longer product/patent lifecycle. We proxy for the lifecycle of products/patents in an industry using information on patent renewals from the USPTO. In order to maintain patent protection, patent assignees are required to pay maintenance fees, which for USPTO patents are due approximately every fourth year. If patents in an industry are renewed a lot, it should indicate that new inventions become obsolete slower and that the product/patent lifecycle is longer. Hence we first compute the average number of renewals of patents in an industry and then classify a technology class as having a long lifecycle if it has a higher than median average number of renewals of patents. We also considered other measures of lifecycle, which yield the same results: 1) share of patents that are renewed at least once, and 2) share of patents that are renewed three times (i.e., the maximum number of times).

As Table A13 shows, restricting the sample to the industries with a long lifecycle yields, as expected, an even stronger coefficient on the post reform dummy in the first stage, selection equation.

Table A13: Heckman Selection model on Canada-U.S, on industries with long patent life cycles

	(1) Probit	(2) Selection
US log retention rate × Top 1	0.879**	0.880**
	(0.361)	(0.361)
US log retention rate × Top 1 - 5	0.354	0.352
	(0.237)	(0.237)
US log retention rate × Top 5 - 10	-0.0796	-0.0844
	(0.214)	(0.214)
US log retention rate × Top 10 - 25	-0.319*	-0.326*
	(0.190)	(0.190)
US log retention rate × Below top 25	-0.447**	-0.455**
	(0.178)	(0.178)
First stage		
Post reform (1994) dummy		0.152***
		(0.0396)
Observations	316262	634381

Notes: See the notes to Table 11. The sample is here restricted to industries with a long product/patent life cycle, as explained in Appendix E.1. The probit and selection models yield very similar coefficients on the interaction of top 1% inventors and the U.S. top retention rate, which gives us further confidence that our results are not driven by selection, as we already concluded from the results in Table 11. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$

Table A14: Corporate and capital gains taxation

	(1)	(2)
Log Retention Rate × Top 1	0.885***	1.048***
	(0.219)	(0.338)
Log Retention Rate × Top 1-5	0.426***	0.614**
	(0.143)	(0.242)
Log Retention Rate × Top 5-10	0.148	0.0496
	(0.122)	(0.230)
Log Retention Rate × Top 10-25	-0.150	-0.266
	(0.0994)	(0.217)
Log Retention Rate × Below Top 25	-0.403***	-0.695***
	(0.133)	(0.253)
Log Retention Rate for the corporate tax	-0.0409	
	(0.131)	
Log Retention Rate for the capital gains tax		0.0593
		(0.189)
Quality× Country FE	YES	YES
Quality × Country FE × Year	YES	YES
Quality×Country FE×Year×Field FE	YES	YES
Domestic elasticity	.019	.029
s.e	(.0051)	(.0086)
Foreign elasticity	.674	.929
s.e	(.178)	(.285)
Observations	7981840	5185568

Notes: Columns (1) and (2) contain the same covariates as column 4 of Table 4 in the main text. Column (1) adds the corporate log retention rate (one minus the corporate tax rate) as a control for the full sample period 1977-2000. Column (2) instead adds the log retention rate for capital gains (one minus the capital gains tax rate) as a control, for the period 1990-2000 (due to the limited availability of capital gains tax data). Tax rates on long term capital gains can sometimes be different for substantial and non-substantial shareholdings. Whenever these tax rates differ – e.g., in Germany where the tax rate is higher if the individual has more than 1% of the company's equity– we apply the tax rate on substantial shareholdings. The data on capital gains tax were collected and kindly provided to us by Jacob Martin (Jacob and Jacob, 2013). Data on corporate taxes mostly come from the World Tax database for the period 1975-1980 and from the OECD Tax database for the period 1980-2000. The corporate tax in the UK for the period 1976-1977 comes from HM Revenue and Customs. For Canada in 1979, it comes from (Bond and Chennells, 2000). For France in 1979 it comes from (Cahill, 2007). Finally, for Japan in the period 1981-1989, the data were obtained from the World Tax Database.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$

Table A15: Excluding all movers to the U.S.

		(1)	(2)	(3)	(4)
Log Retention Rate × Top 1		2.151***	2.633***	2.800***	2.773***
		(0.833)	(0.823)	(0.845)	(0.845)
Log Retention Rate × Top 1-5		1.678**	2.080***	2.243***	2.198***
		(0.707)	(0.696)	(0.723)	(0.727)
Log Retention Rate × Top 5-10		1.571**	1.898***	2.056***	1.996***
		(0.699)	(0.685)	(0.715)	(0.719)
Log Retention Rate × Top 10-25		1.295*	1.501**	1.655**	1.592**
		(0.668)	(0.652)	(0.684)	(0.689)
Log Retention Rate × Below Top 25		0.778	0.617	0.758	0.706
		(0.674)	(0.654)	(0.687)	(0.691)
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	.003	.004	.004	.004
	s.e	(.003)	(.003)	(.003)	(.003)
	Foreign elasticity	.58	.73	.74	.78
	s.e	(.527)	(.530)	(.527)	(.519)
Control: Top 10-25	Domestic elasticity	.004	.006	.005	.006
	s.e	(.003)	(.003)	(.003)	(.003)
	Foreign elasticity	.85	1.13	1.14	1.18
	s.e	(.504)	(.510)	(.504)	(.501)
Control: Below Top 25	Domestic elasticity	.01	.01	.01	.01
	s.e	(.003)	(.003)	(.003)	(.003)
	Foreign elasticity	1.37	2.01	2.03	2.06
	s.e	(.511)	(.518)	(.515)	(.510)
Observations		8590472	8562680	8562680	8562680

Notes: The sample is the same as in Table 5 in the main text, but excluding all inventors who ever move to the U.S. See the notes to Table 5. We see that the coefficients on the top retention rate for top 1% superstar inventors increase. Due to the lower number of overall moves, the elasticity of domestic top 1% superstar inventors is somewhat smaller, while that of foreign top 1% superstar inventors is larger (recall the relation between the estimated coefficients and the probability of remaining in one's country as described in the text in Section 5.1, equations (9) and (10)). $^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$

Table A16: Robustness Checks: Non-employees, other OECD countries, and country-level rankings

		(1)	(2)	(3)
Log Retention Rate × Top 1		1.404***	1.266***	1.381***
		(0.489)	(0.456)	(0.489)
Log Retention Rate × Top 1-5		0.950**	0.846**	0.963**
		(0.457)	(0.429)	(0.456)
Log Retention Rate × Top 5-10		0.654	0.486	0.724
		(0.456)	(0.428)	(0.455)
Log Retention Rate × Top 10-25		0.396	0.268	0.386
		(0.447)	(0.422)	(0.449)
Log Retention Rate × Below Top 25		0.166	0.156	0.247
		(0.449)	(0.423)	(0.451)
Quality× Country FE		YES	YES	YES
Quality × Country FE × Year		YES	YES	YES
Quality×Country FE×Year×Field FE		YES	YES	YES
Control: Top 5-10	Domestic elasticity	.016	.022	.015
	s.e	(.0051)	(.0051)	(.0046)
	Foreign elasticity	.628	.661	.560
	s.e	(.185)	(.157)	(.188)
Control: Top 10-25	Domestic elasticity	.024	.03	.02
	s.e	(.0051)	(.0051)	(.0046)
	Foreign elasticity	.843	.843	.85
	s.e	(.182)	(.155)	(.188)
Control: Below Top 25	Domestic elasticity	.028	.032	.025
	s.e	(.0056)	(.0057)	(.0051)
	Foreign elasticity	1.037	.937	.969
	s.e	(.203)	(.17)	(.205)
Observations		8616336	15458826	8616336

Notes: All columns contain the same covariates as column 4 of Table 5 in the main text. Recall that in Table 5, we restricted the sample to inventors that are employees of a company. In Column (1) we now also incorporate inventors that are not employees. The elasticities of domestic top 1% superstar inventors are only slightly reduced, while those of foreign superstar top 1% inventors are essentially unchanged. In Table 5 we also restricted the sample to the 8 major patenting countries, (Canada, France, Germany, Italy, Japan, Switzerland, the US and the UK). In Column (2) we now include 18 OECD countries for which we have collected data on tax rates for the period 1977-2000, which adds to the sample Australia, Denmark, Finland, Spain, Ireland, Netherlands, New Zealand, Norway, Portugal, and Sweden. Their inclusion barely moves the results at all, since these countries are not well-represented in the DID. In column (3) we use country-level ranking instead of the regional ranking to assign a ranking to inventors based on the quality distribution, as explained in Section 2.3. The results are very consistent with the benchmark results using regional rankings. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$

Table A17: European Patent Office data: Excluding all movers to the U.S.

		(1)	(2)	(3)	(4)
Log Retention Rate × Top 1		1.129***	1.641***	1.527***	1.500***
		(0.419)	(0.422)	(0.441)	(0.444)
Log Retention Rate × Top 1-5		1.270***	1.662***	1.534***	1.484***
		(0.287)	(0.285)	(0.309)	(0.312)
Log Retention Rate × Top 5-10		0.778***	1.049***	0.904***	0.850***
		(0.258)	(0.252)	(0.276)	(0.278)
Log Retention Rate × Top 10-25		0.509**	0.548**	0.379	0.326
		(0.252)	(0.245)	(0.276)	(0.278)
Log Retention Rate × Below Top 25		0.123	-0.259	-0.474	-0.525
		(0.305)	(0.293)	(0.322)	(0.324)
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	.002	.005	.005	.005
	s.e	(.004)	(.004)	(.004)	(.004)
	Foreign elasticity	.35	.59	.62	.65
	s.e	(.392)	(.392)	(.396)	(.396)
Control: Top 10-25	Domestic elasticity	.01	.01	.01	.01
	s.e	(.004)	(.004)	(.004)	(.004)
	Foreign elasticity	.62	1.09	1.14	1.17
	s.e	(.380)	(.382)	(.386)	(.389)
Control: Below Top 25	Domestic elasticity	.01	.02	.02	.02
	s.e	(.004)	(.004)	(.004)	(.004)
	Foreign elasticity	1.00	1.90	2.00	2.02
	s.e	(.42)	(.42)	(.42)	(.43)
Observations		8431945	8431945	8431945	8431945

Notes: The sample is the same as for Table 13 in the main text, but excludes all inventors who ever move to the U.S. See the notes to Table 13. The elasticities of domestic top 1% superstar inventors are essentially unchanged, while those of foreign superstar top 1% inventors are increased relative to the benchmark results in column 1 of Table 13. $^{*}p < 0.1, ^{**} p < 0.05, ^{***} p < 0.01$.

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