

# Minimum Capital and Cross-Border Firm Formation in Europe: Online Appendix

MARTIN GELTER\*

This appendix presents details about estimating the number of firms and collecting the minimum capital data that were omitted from the paper for brevity. Section 1 addresses the identification of the number of firms from EU and EEA member states in the UK. Section 2 discusses the evolution of minimum capital over time and provides detailed information about country-level reforms. Section 3 provides further tests for pre-treatment trends.

## **1. Number of cross-incorporated firms in the UK**

To determine the number of firms formed in the UK and controlled by individuals from other EU countries that were founded each year, we generally followed the search strategies used by Becht et al. (2008), Ringe (2013), and Gerner-Beuerle et al. (2018) by using the ORBIS<sup>1</sup> database. While the first two papers use Bureau van Dijk's FAME, the third paper draws data from ORBIS, an extended database covering the whole world and sharing the same data source. The data is sourced from national company registers. Much of the data used here originates at the Companies House for the UK, where they are (or were) openly available online but not prepared in a way that would allow statistical analysis across multiple firms.

The number of pseudo-foreign incorporations is complex to measure because there is no precise definition. Scholars usually try to approximate this figure by looking at companies where all or the majority of directors are citizens or residents of a particular country but not the UK

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\* Professor of Law, Fordham University School of Law; Research Member, European Corporate Governance Institute.

<sup>1</sup> FAME, a database used by a number of other papers, is limited to the UK and Ireland but otherwise equivalent.

(definitions vary). Thus, there is a high likelihood that the company was not founded to do business primarily in the UK but in the country of the directors' nationality.

Becht et al. (2008) differ from the other two papers in that they look at firms where either the majority or all directors were *residents* of a specific other EU member state. Ringe includes companies where at least one director is a German or Austrian *citizen*. Following a method proposed by Becht et al. (2008) as a robustness check, he limits these firms to those sharing their registered office with at least 100 other firms (which indicates using a UK-based agent). Likewise, Gerner-Beuerle et al. (2018) look at the number of incorporations where at least one director is a foreign *citizen* but made further adjustments to narrow down the number as having their residence in another Member State.<sup>2</sup>

We count UK private limited firms where the majority of directors are nationals of other EU Member States and construct a time series of UK incorporations for each country, thus putting together a panel of countries for 1995 to 2020. We include all firms with at least one person on ORBIS's director/manager list with citizenship of one of 31 countries.<sup>3</sup> These jurisdictions are the 27 EU members, the three additional European Economic Area members (Iceland, Liechtenstein, and Norway), and Switzerland.<sup>4</sup> For reasons related to collecting independent variables and political transitions in the early 1990s, our regressions begin in 1995.

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<sup>2</sup> The papers also differ in other respects: While Becht et al. (2008) work with a panel for 1997-2006 that extends beyond the EU, Ringe (2013) only looks at the timelines for firm formations originating in Germany and Austria. Gerner-Beuerle et al. (2018) use only cross-sectional data, but they look at incorporations in all EU Member States.

<sup>3</sup> The search was originally conducted in November 2017, but the data were updated in June 2023.

<sup>4</sup> This country is neither a member of the EU or the EEA but has a bilateral agreement with the EU that gives it access to certain aspects of the common market. Companies having their registered office, central administration or principal place in Switzerland have the right to provide services in EU Member States (and vice versa), but the freedom of establishment does not apply to them. Agreement between the European Community and its Member States, of the one part, and the Swiss Confederation, of the other, on the free movement of persons, 2002 O.J. (L 114) 6, annex I, art. 18 (extending the freedom to provide services to companies).

Crucially, our numbers include both active and inactive firms. Inactive firms are still relevant for the question of whether founders used the option of UK incorporation. Most firms (except those founded during the last years in the dataset) were listed as inactive or dormant by ORBIS at the time of data collection. This supports the argument that incorporating abroad allows founders of non-viable businesses to obtain limited liability, potentially negatively impacting creditors.

For each firm, we determined the percentage of (current and former) directors/managers with which particular citizenship. Where a director had more than one citizenship, each citizenship was counted proportionately.<sup>5</sup> Compared to residence data, citizenship data have the disadvantage of including firms set up by migrants living in the UK and starting a business there. Gerner-Beuerle, Mucciarelli, Siems, and Schuster (2018) deal with this issue by estimating the proportion of firms based on the United Nations estimates of the number of migrants.<sup>6</sup> Their method is appropriate when looking only at data for one year but not for a panel.

Residency data about directors, which is used by Becht, Mayer, and Wagner (2008), would seem not to suffer from these problems, but these are no longer fully available. Under Chapter 8, Part 10 of the Companies Act 2006, the registrar will not publicly record directors' residential addresses unless the director opts into publication. Consequently, this information, while less vulnerable to immigration trends, is likely incomplete. Given these limitations, we follow Becht et

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<sup>5</sup> E.g., a director with citizenships in countries A and B would count as .5 persons for country A and .5 persons for country B. "Unknown" citizenship status of a director is recorded separately by ORBIS but ignored for the computation of the citizenship coefficient. I.e., a firm where 2 directors are German and 1 has unknown citizenship would still count as a 100% German firm.

<sup>6</sup> Gerner-Beuerle et al. (2018) estimate the number of pseudo-foreign firms by subtracting the number of companies likely established by foreigners based in the UK from the number of firms founded by non-UK nationals. The number of foreigners living in the UK is taken from UN estimates (presumably firms are assigned to nationals in each country in proportion to their number).

al.'s and Ringe's (2013) method of using data based on citizenship and determining whether founders probably used an agent to set up the firm. Following this approach, we count firms using the same address as at least 100 others. This still yields a large number of firms, as there are many addresses shared by thousands of firms, indicating the use of an incorporation agent.<sup>7</sup> Agents of this type are businesses that will register companies in the UK on behalf of non-UK entrepreneurs. In total, 845 addresses meet this criterion (some of which are slightly different versions of the same address), corresponding to 375,797 firms.<sup>8</sup> Figures 1a and 1b below show the timelines from each country in the UK following this method.

## 2. Minimum capital over time

National minimum capital and minimum pay-in requirements are not readily available (especially not over time) and were compiled from multiple sources. A few papers provide overview tables of several countries (e.g., Becht et al. 2008, p. 251; Armour et al. 2017, p. 231), but usually only for one or two points in time. A group of scholars provided a panel of several variables relating to creditor protection for 1990 through 2013 online but normalized minimum capital to € 25,000 = 1.<sup>9</sup> In its annual "Doing Business" reports since 2004, the World Bank also collected minimum capital data (e.g., World Bank 2018).<sup>10</sup> In addition, we consulted many articles and

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<sup>7</sup> To test for the robustness of our estimation, we compared our data to those in Becht et al. (2008), Table 3, Panel A, as well as our own 2017 download of residency data for 1996-2006, which was likewise based on a majority of directors being resident in a specific country (outside the UK). We find a correlation of 0.987 with Becht's data and a 0.928 correlation to our own download. The former number is very close to the correlation of 0.986 reported by Gerner-Beuerle et al. (2018, p. 18) between their data and those of Becht et al. In combination with our use of UN migration data as a control variable, this high correlation provides as reasonable confidence in our identification method.

<sup>8</sup> There are two addresses with more than 20,000 firms, five with more than 10,000 firms, and 50 with more than 1,000 firms.

<sup>9</sup> Armour et al. 2016. The subset of countries includes Belgium, Cyprus, Czech Republic, Estonia, France, Germany, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Slovenia, Spain, Sweden, and Switzerland.

<sup>10</sup> The data are always for the previous year. E.g., "Doing Business in 2005" (World Bank 2005) describes the law as of January 1, 2004.

handbooks to document change over time. Eventually, we corroborated the information by using national legal databases and reviewing the development of the applicable law since (at least) 1995.

Generally, we use minimum capital requirements for the country's private limited company form. During the past twenty years, there has been considerable innovation in the law of business associations. Countries use two primary regulatory techniques to alleviate the perceived burden of minimum capital for new firms. First, several countries reduced or eliminated minimum capital requirements (including those requiring a trivial amount of currency units). Second, several countries introduced simplified forms of private limited companies with no capital requirements at formation. No distributions can be typically made until the capital is filled up from retained earnings.

Our data on firm formations are on an annual basis. When a country introduced a change during the year, we computed a weighted average of capital figures before and after the reform based on the number of days they were in force. It was counted only for the first full year except if it came into force during the year's first three months. Countries stipulating a separate minimum pay-in requirement (distinct from minimum capital) exhibit some variability when the payment finally must be made. Contributions required up to one year after firm formation<sup>11</sup> were counted as having to be paid in full. From a founder's perspective, the rationale is that payment within such a relatively short period can be considered analogous to payment before firm formation. Sometimes, minimum pay-in amounts differ between cash contributions and contributions in kind (the latter typically must be made in full). We used the lowest possible amount required to form a limited liability business entity using cash only.

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<sup>11</sup> See, e.g., art. 146(2) of the Latvian Commercial Code.

Standardizing the variables for the analysis was also necessary, given that the two sums are in various currencies. The figures were first converted into US dollars using the exchange rate reported by the World Bank for the respective year. In a cross-country statistical analysis, using absolute figures while ignoring the income level and purchasing power of the sums in question in the respective country would be problematic. For example, the same amount in USD would likely be easier to afford for an aspiring Swiss entrepreneur compared to a person in Bulgaria who is similarly positioned. For further analysis, we divide the minimum capital and minimum pay-in amount by the country's GDP per capita in purchasing power parities, as reported by the World Bank.<sup>12</sup>

The timelines for standardized minimum capital and minimum pay-in amounts for each country (as well as the number of cross-incorporations in the UK) are shown in Figures 1a and 1b. The ratio has a general downward trend since capital amounts were rarely adjusted for inflation and economic growth.

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<sup>12</sup> In the case of Liechtenstein, where this figure was not available, the GDP/PPP for Switzerland was used.

**Table 1: Relevant reforms of minimum capital and minimum pay-in requirements from 1995 to 2020**

The table omits reforms that were solely adjustments to the Euro and other currency reforms (e.g., because of hyperinflation) and did not result in substantive changes to these requirements. The introduction of special “capital-less” legal forms was included when these were open to all founders and not, e.g., limited to individuals in a certain age bracket.

Country	Legal form(s)	Change	In force	Source
Austria	Gesellschaft mit beschränkter Haftung	Introduction of “formation-privileged capital” (effective minimum capital of EUR 10,000 and pay-in of EUR 5,000) in the first ten years	March 1, 2014	Bundesgesetzblatt I 13/2014
Belgium	Société privée à responsabilité limitée / Besloten vennootschap	Introduction of SPRL-Starter without minimum capital (previously EUR 18,550 and pay-in of EUR 6,200)	June 1, 2010	Belgisch Staatsblad / Moniteur Belge of January 26, 2010
		New company law (no minimum capital)	May 1, 2019	Belgisch Staatsblad / Moniteur Belge of April 4, 2019
Bulgaria	Druzhestvo s Ogranichena Otvornost	Reduction of minimum capital from 5,000 lev to 2 lev.	October 19, 2009	Official Journal No. 82 of 2009
Croatia	Društvo s Ograničenom Odgovornošću	Increase of minimum capital and minimum pay-in from DM 5,000 / 2,500 to 20,000 / 10,000 kuna	January 1, 2004	Official Journal No. 118/2003
		Reduction of minimum capital to 10 kuna with no minimum pay-in	January 1, 2013	Official Journal No. 118/2003
Cyprus	Private company	No minimum capital requirement		
Czech Republic	Společnost s ručením omezeným	Increase of minimum capital and minimum pay-in from CZK 100,000 / 50,000 to CZK 200,000 / 100,000	January 1, 2001	Law 370/2000 of September 14, 2000
		Elimination of minimum capital requirement	January 1, 2014	Law 90/2012 of January 25, 2012
Denmark	Anpartsselskab	New law of private limited companies with reduction of minimum capital (and pay-in) from DKK 200,000 to 125,000	June 1, 1996	Law No. 378 of May 22, 1996
		Reduction of minimum capital to DKK 80,000	January 3, 2010	Law No. 470 of June 12, 2009
	Iværksætterselskaber	Creation of special variation of legal form without minimum capital requirement	January 1, 2014	Law No. 616 of June 12, 2013
	Anpartsselskab / Iværksætterselskaber	Abolition of special legal form and reduction of regular minimum capital to DKK 40,000	April 15, 2019	Law No. 445 of April 13, 2019

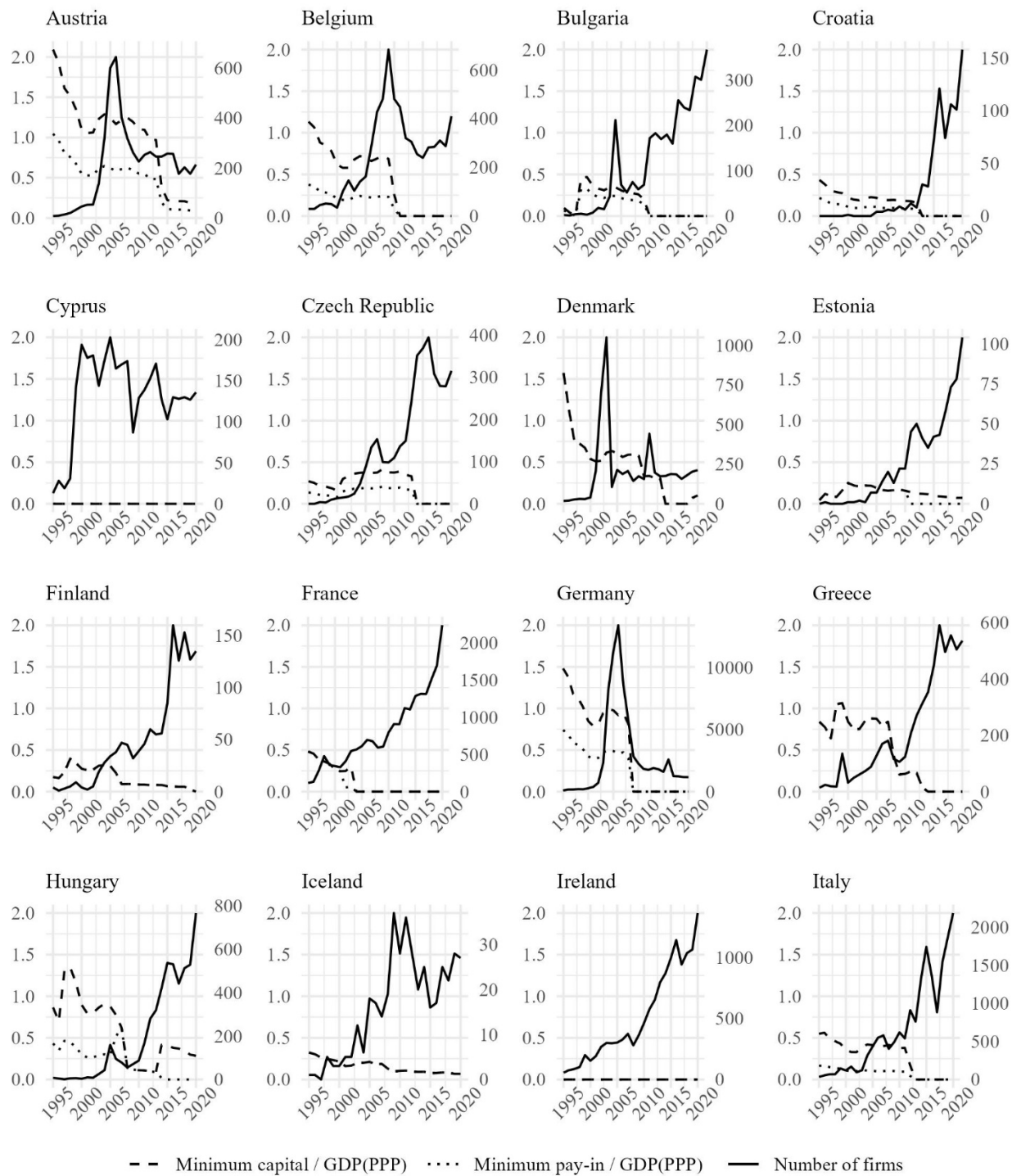
Estonia	Osäühing	Introduction of commercial code with transitional provisions initially requiring capital of 10,000 kroons	September 1, 1995	Official Journal I 1995, 26, 355
		Transitional provisions expire and increase minimum capital from 10,000 to 40,000 kroons	September 1, 1999	
		Reduction of minimum capital to EUR 2,500, allowing founders not to contribute if capital is smaller than EUR 25,000	January 1, 2011	Official Journal I 2010, 20, 103 and Official Journal I 2010, 77, 589
Finland	Yksityinen osakeyhtiö / Privat aktiebolag	Increase of minimum capital and pay-in from FIM 15,000 to FIM 50,000	September 1, 1997	Law 145/197
		Reduction to EUR 2,500	September 1, 2006	Law 624/2006
		Elimination of minimum capital	July 1, 2019	Law 184/2019
France	Société à responsabilité limitée	Elimination of minimum capital	January 1, 2004	Loi n° 2001-420 du 15 mai 2001
Germany	Gesellschaft mit beschränkter Haftung / Unternehmersgesellschaft (haftungsbeschränkt)	Introduction of special legal form without minimum capital requirement	November 1, 2008	BGBI. I 2008 S. 2026
Greece	Etaireía periorisménis	Increase of minimum capital and pay-in from 3,000,000 to 6,000,000 drachmas	February 17, 1998	Law 2579/1998
		Reduction from EUR 18,000 to EUR 4,500	May 1, 2008	Law 3661/2008
		Reduction from EUR 4,500 to EUR 2,400	December 12, 2012	Legislative Act, Official Gazette 240 of December 12, 2012
	Idiotiki kefalaiouchiki etairéia	Introduction of special legal form without minimum capital requirement		Law 4072/2012 and Law 4155/2013
Hungary	Korlátolt felelősségű társaság	Increase of minimum capital from HUF 1,000,000 to 3,000,000 and pay-in from HUF 500,000 to 1,000,000	April 18, 1997	144 <sup>th</sup> Law of 1997
		All contributions must be paid within a year (i.e. pay-in of HUF 3,000,000)	July 1, 2006	4 <sup>th</sup> Law of 2006
		Reduction to HUF 500,000	September 1, 2007	41 <sup>st</sup> Law of 2007



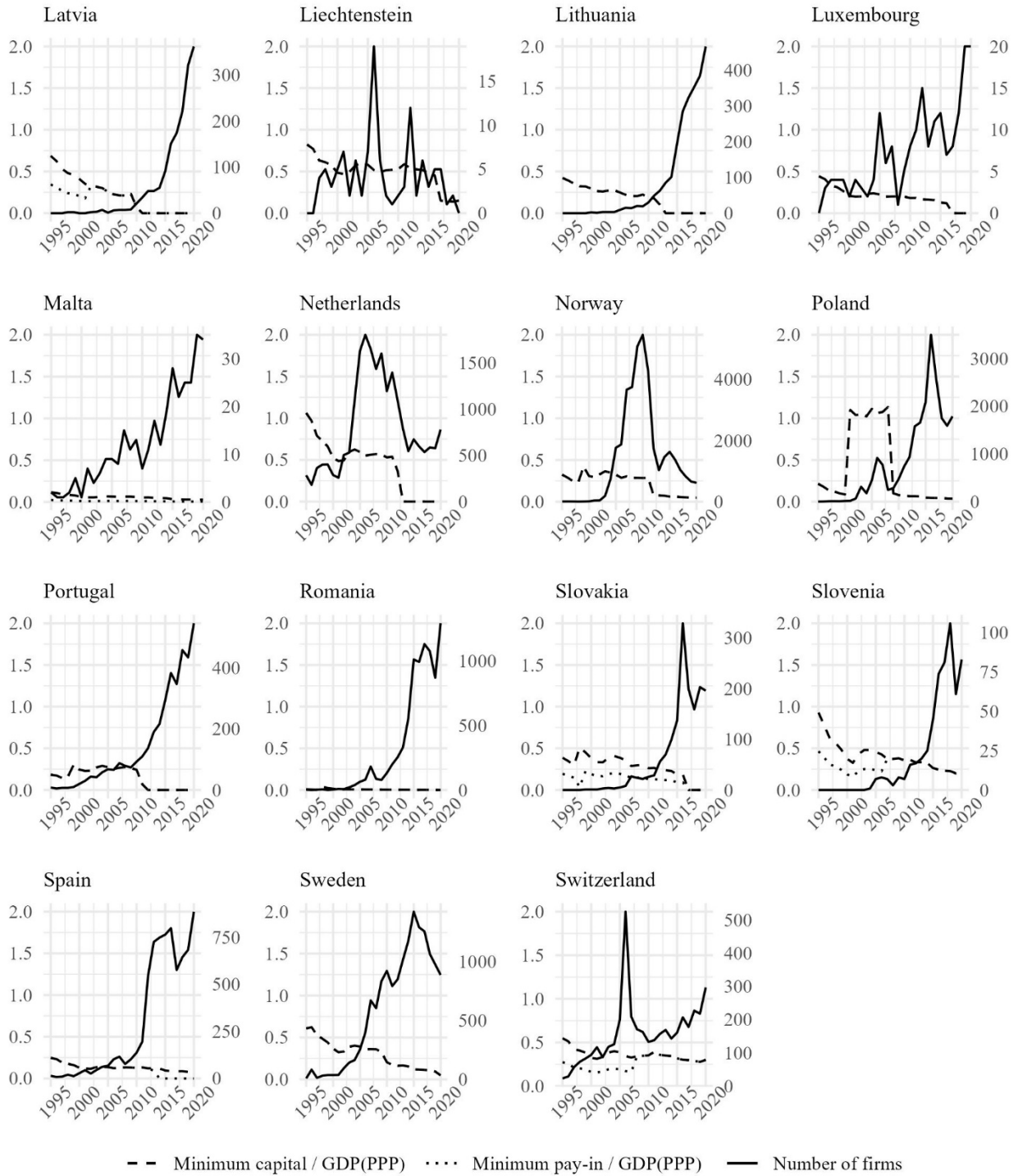
		Increase of minimum capital to HUF 3,000,000, with no minimum pay-in requirement (limitation of dividends until capital is reached)	March 15, 2014	5 <sup>th</sup> Law of 2013 (New Civil Code)
Iceland	Einkahlutafélag	No reform (capital and pay-in of ISK 500,000)		
Ireland	Private Company Limited by Shares	No minimum capital requirement		
Italy	Società a responsabilità limitata	Reduction of minimum pay-in from 30% to 25% (EUR 2,500 in case of minimum capital)	January 1, 2004	Legislative decree, January 17, 2003, n. 6
	Società a responsabilità limitata (a capitale ridotto)	Creation of a special legal form with capital below EUR 10,000 (subsequently integrated into regular law in 2013)	June 23, 2012	Legislative decree, June 22, 2003, n. 83
Latvia	Sabiedrība ar ierobežotu atbildību	Elimination of prior minimum capital of 2,000 lats	May 1, 2010	Law of April 15, 2010, Official Journal 68 of April 29, 2010
Liechtenstein	Gesellschaft mit beschränkter Haftung	Reduction of minimum capital (and pay-in) from CHF 30,000 to CHF 10,000	January 1, 2017	LGBl 2016 Nr. 402
Lithuania	Uždaroji akcinė bendrovė	Elimination of the former minimum capital of 10,000 litas	September 1, 2012	Law of June 29, 2012, XI-2159
Luxembourg	Société à responsabilité limitée simplifiée	Introduction of legal form with minimum capital below EUR 12,000	January 16, 2017	Law of July 23, 2016
Malta	Private limited liability company	No change (minimum capital of EUR 1164.69 and pay-in of EUR 232.94)		
Netherlands	Besloten vennootschap	Modified legal form (Flex-BV) minimum capital (and pay-in) of EUR 18,000	October 1, 2012	Flex BV Act, Stb 2012, 299
Norway	Aksjeselskap	Increase of minimum capital (and pay-in) from NOK 50,000 to NOK 100,000	January 1, 1999	Law 1997-06-13-44
		Reduction to NOK 30,000	January 1, 2012	Law 2011-12-16-63
Poland	Spółka z ograniczoną odpowiedzialnością	Increase of minimum capital (and pay-in) from 40 million old to 50,000 new Złoty	January 1, 2001	Official Journal 2000, Nr. 94, art. 1037
		Reduction to PLN 5,000	January 8, 2009	Official Journal 2008, Nr. 217, art. 1381
Portugal	Sociedade por quotas de responsabilidade limitada	Abolition of minimum capital of EUR 5,000	April 7, 2011	Decree law no 33/2011

Romania	Societate cu răspundere limitată	Abolition of minimum capital of 200 leis	November 5, 2020	Law No 223 of October 30, 2020
Slovakia	Spoločnosť s ručením obmedzeným;	Increase of minimum capital and minimum pay-in from SKK 100,000 / 50,000 to SKK 200,000 / 100,000	February 2, 1998	Law of November 5, 991, Official Journal 513/1991; 14 <sup>th</sup> amendment 11/1998
	Jednoduchá spoločnosť na akcie	Introduces simplified stock corporation (SAS) without minimum capital	January 1, 2017	Law 289/2015
Slovenia	Družba z omejeno odgovornostjo	No reform (minimum capital and pay-in of EUR 7,500)		
Spain	Sociedad de responsabilidad limitada	Introduction of “successive formation,” which avoids a pay-in requirement but retains a minimum capital of EUR 3,000	September 29, 2013	Law 14/2013 of September 27, 2013
Sweden	Privat aktieföretag	Reduction of minimum capital (and pay-in) from SKR 100,000 to 50,000	April 1, 2010	Law 2010:89
		Reduction to SKR 25,000	January 1, 2020	Law 2019:1264
Switzerland	Gesellschaft mit beschränkter Haftung	Increase of minimum pay-in requirement from SFR 10,000 to full minimum capital of SFR 20,000	January 1, 2008	Official Journal (AS) 2007 4791

**Figure 1a: Minimum capital and minimum pay-in ratio to GDP per capita (PPP) and number of cross-incorporations into the UK per year**



**Figure 1b: Minimum capital and minimum pay-in ratio to GDP per capita (PPP) and number of cross-incorporations into the UK per year**



### 3. Further testing for pre-treatment trends

A fundamental principle of difference-in-differences regression is the parallel trend assumption. Cross-incorporation trends should be similar in the treatment and control groups before the respective reform, implying that they would have likely continued absent a reform. To that end, the regressions reported in Table 2 below include indicator variables for five years before and after each reform. Model (1) looks at reforms moving from non-trivial (or high) to no or only a trivial minimum capital, and Model (2) examines reforms where a “high” minimum capital was eliminated. To show the impact of reforms rather than of having a certain level of minimum capital, we reduce the samples to actual treatment and control groups: Model (1) omits all countries that never had a non-trivial minimum capital from 1995 to 2020 (Cyprus, Ireland, Malta, Romania). Model (2) includes only countries with a high minimum capital in at least part of this period (Austria, Belgium, Denmark, Germany, Hungary, Netherlands, and Poland). The size of the panel in Model (2) is strongly reduced. Nevertheless, we can see no significant differences between treatment and control countries before the reform, which supports that parallel trend assumption. In years following the removal of high minimum capital, we see statistically significant negative coefficients, meaning that eliminating high minimum capital results in a reduction in corporate outward mobility, as expected based on the previous results, although with a delay of two years.

**Table 2: Testing for pre-treatment trends**

	Dependent variable: log(number of firms)	
	Elimination of non-trivial minimum capital	Elimination of high minimum capital
	(1)	(2)
Year - 5	0.195 (-0.331, 0.716)	-0.411 (-1.459, 0.927)
Year - 4	0.275 (-0.231, 0.782)	-0.444 (-1.000, 0.537)
Year - 3	0.388 (-0.105, 0.875)	-0.315 (-0.882, 0.749)
Year - 2	0.320 (-0.224, 0.849)	-0.470 (-1.340, 0.884)
Year - 1	0.245 (-0.348, 0.846)	-0.543 (-1.421, 0.916)
Year 0	0.236 (-0.267, 0.750)	-1.041 (-1.776, 0.267)
Year + 1	0.190 (-0.277, 0.649)	-0.964 (-1.662, 0.266)
Year + 2	0.232 (-0.234, 0.697)	-1.041** (-1.467, -0.181)
Year + 3	0.182 (-0.279, 0.647)	-1.087** (-1.738, -0.089)
Year + 4	0.109 (-0.383, 0.611)	-0.965** (-1.814, -0.066)
Year + 5	0.163 (-0.307, 0.650)	-0.852* (-1.662, 0.003)
Country fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	702	182
R <sup>2</sup>	0.871	0.835
Adjusted R <sup>2</sup>	0.858	0.785
Residual Std. Error	0.820 (df = 639)	0.785 (df = 139)

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Model (1) includes all countries with a non-trivial minimum capital from 1995-2020 (i.e., all except for Cyprus, Ireland, Malta and Romania). Model (2) includes only countries with high minimum capital at any time during this period, i.e., Austria, Belgium, Denmark, Germany, Hungary, the Netherlands, and Poland. Numbers in parentheses are 95% confidence intervals using wild bootstrap clustering by country. The bootstrap was performed using the *fwildclusterboot* package in R (equivalent to the *boottest* method in Stata). In Model 2, Webb weights were used instead of Rademacher weights because of the small number of clusters (MacKinnon and Webb 2018). The bootstrap does not produce standard errors because this would assume asymptotic normality of the coefficients (Roodman et al. 2019). All models include country- and year-fixed effects. The dependent variable is the number of cross-incorporations in the UK from each country each year.

## References

- Armour, John, Deakin, Simon, and Siems, Mathias. 2016. “CBR Extended Creditor Protection Index 1990-2013.” Cambridge Center for Business Research, <https://www.repository.cam.ac.uk/handle/1810/256566>.
- Armour, John, Fleischer, Holger, Knapp, Vanessa, and Winner, Martin. 2017. “Brexit and Corporate Citizenship.” *European Business Organization Law Review* 18(2): 225-249. <https://doi.org/10.1007/s40804-017-0072-4>.
- Becht, Marco, Mayer, Colin, and Wagner, Hannes F. 2008. “Where do firms incorporate? Deregulation and the cost of entry”, *Journal of Corporate Finance* 14(3): 241-56. <https://doi.org/10.1016/j.jcorpfin.2008.04.002>.
- Gerner-Beuerle, Carsten, Mucciarelli, Federico, Schuster, Edmund, and Siems, Mathias. 2018. “Why do businesses incorporate in other EU Member States? An empirical analysis of the role of conflict of laws rules.” *International Review of Law and Economics* 56 (December): 14-27. <http://doi.org/10.1016/j.irl.2018.05.002>.
- MacKinnon, James G., and Webb, Matthew D. 2018. “The wild bootstrap for few (treated) clusters.” *The Econometrics Journal* 21(2): 114-135. <https://doi.org/10.1111/ectj.12107>.
- Ringe, Wolf-Georg. 2013. “Corporate Mobility in the European Union – a Flash in the Pan? An empirical study on the success of lawmaking and regulatory competition.” *European Company and Financial Law Review* 10(1): 230-267. <https://doi.org/10.1515/ecfr-2013-0230>.
- Roodman, David, Nielsen, Morten Ørregard, MacKinnon, James G., & Webb, Matthew D. 2019. “Fast and wild: Bootstrap inference in Stata using boottest.” *The Stata Journal*, 19(1): 4–60. <https://doi.org/10.1177/1536867X19830877>.
- World Bank. 2005. *Doing Business in 2005: Removing Obstacles to Growth*. Washington DC: World Bank Publications.
- World Bank. 2018. *Doing Business 2018: Reforming to create jobs*. Washington DC: World Bank Publications.