

**Letting Companies Choose Between One-Tier and Two-Tier Board Models:
An Empirical Analysis of European Jurisdictions**

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Abstract: Design of a suitable board structure is a key aspect of good corporate governance. Today, many European countries not only allow modifications in detail but a choice between a one-tier model (i.e. a single board of directors) and a two-tier board model (i.e. a split between management and supervisory board). Yet, empirical research on the actual choices made by companies is rare. This paper aims to fill this gap. It presents original data about the choice of board models from the 14 EU countries that allow such choice. Amongst others, it finds that there are profound country differences in the prevalence for one of the board models, that the availability of choice mainly leads to a decline of the two-tier model, and that two-tier companies tend to be larger, older, more complex and more diverse (e.g., in terms of female or foreign board membership). The paper also discusses the practical and normative implications from our empirical findings.

Keywords: board choice, board of directors, supervisory board, corporate governance, corporate law, EU law, empirical corporate law, firm-level data

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Table of Contents

1. Introduction	3
2. Board models and availability of choice	3
2.1. One-tier, two-tier and possible further models.....	3
2.2. The normative discussion about board models	5
2.3. The spread of board choice in the EU	6
3. Previous empirical research and data collection	9
3.1. Scope of study and previous empirical findings	9
3.2. Collection of firm-level data	11
3.3. Identification of board structures	12
4. Country-based comparison of board choice.....	14
4.1. General country differences in preferences.....	14
4.2. Possible reasons for different preferences.....	17
4.3. Fuzzy-set qualitative comparative analysis	21
5. Time trends: the decline of the two-tier model in choice countries.....	23
5.1. General trend based on time of establishment.....	23
5.2. Analysis considering time of introduction of board choice	25
5.3. Analysis of post-choice companies only.....	26
6. Firm-level regression analysis.....	28
6.1. Explanatory variables	28
6.2. Methodological choices.....	31
6.3. Logistic regression for countries offering a choice between one-tier and two-tier board structure.....	32
6.4. Countries offering three different board structures (Italy, Portugal).....	39
6.5. Overview of results and discussion.....	45
7. Conclusion.....	50

1. Introduction

Many private companies are simply managed by a single person. Yet, for public companies (joint-stock companies), having a suitable board structure is widely seen as a key aspect of good corporate governance. But how should such board structure be designed? From a comparative perspective, a major distinction can be made between (i) a one-tier (or monist) model with a single board of directors and (ii) a two-tier (or dualist) model with a supervisory board and a management/executive board.¹ Conventionally, the law of public companies only allows one of these models. However, there is also a trend to let companies choose their board model. This can be observed in most parts of the world: for example, choice of board models is (with variations in detail) possible in countries as diverse as Algeria, Brazil, Japan, Russia and Vietnam.²

In Europe in particular, half of the EU Member States – thus, 14 countries – allow board choice in their laws of public companies, and there is also such a rule for the special legal form of the European Company (SE) which can be chosen in all 31 countries of the EEA.³ This widespread availability of board choice is, however, largely underexplored in the empirical research on company law and corporate governance;⁴ thus, this paper aims to fill this gap in the literature. Doing so, it will answer questions about the popularity of the respective board models, their main determinants, as well as the desirability of board choice for good corporate governance.

The structure of this paper is as follows: Section 2 explains the different board models and the availability of choice in more detail. Section 3 addresses the previous empirical research and the data collection of this paper. Section 4 presents the empirical findings as regards the general country differences and possible reasons for these different preferences. Section 5 analyses time-trends that show a decline of the two-tier model after the introduction of choice. Section 6 presents regression analysis based on firm-level data. Section 7 concludes.

2. Board models and availability of choice

2.1. *One-tier, two-tier and possible further models*

The historical starting point of corporate governance in most countries has been the one-tier model, i.e. the model with a single board of directors. However, some early companies also had a two-tier structure: for example, it is said the Dutch East India Company (the VOC) already created a ‘sort of supervisory board’ in 1623.⁵ In the following cen-

¹ See Section 2.1, below for details.

² Algeria (Code of Commerce, arts. 610, 642), Russia (Law N 208-FZ, art. 64: for companies with less than fifty shareholders; larger companies need to be two-tier) and Vietnam (Decree 71/2017/ND-CP) provide choice between one-tier and two-tier models, Brazil (Lei 6.404, art. 171) between one-tier and audit model, and Japan between three models (Companies Act, arts 326, 327, also with differentiations according to the size of the company).

³ See Section 2.3, below for details.

⁴ See Section 3.1, below for details.

⁵ W.J.L. Calkoen, *The One-Tier Board in the Changing and Converging World of Corporate Governance: A comparative study of boards in the UK, the US and the Netherlands* (PhD thesis Rotterdam 2011), available at <https://repub.eur.nl/pub/26502/>, at p. 307.

turies, the Netherlands also continued to have some companies with ‘supervisory directors’ though this was not mandatory and the first codified provisions of the 19th century did not specify their rights and duties in any detail.⁶

As far as codified company law is concerned, it was the German law of the late 19th century that first deviated from the one-tier model: first, a law reform from 1861 allowed the establishment of a supervisory board; second, as a substitute for reduced governmental oversight, the supervisory board was made mandatory in 1870; and, finally, a further reform from 1884 excluded the possibility of being both a member of the management and the supervisory board.⁷ Subsequently, this two-tier structure was adopted by law-makers elsewhere in Europe but also further afield, while other countries retained the original one-tier structure.⁸

It may be argued that this stark divide is often blurred in practice. Today, in both models, many large public companies have board committees of non-executive directors which comprise three of the core functions of the supervisory board (audit, remuneration, appointment).⁹ Moreover, it may be suggested that the one-tier model could allow arrangements that resemble the two-tier model. Two options can be distinguished: (i) the company can appoint only non-executive directors to the one-tier board, which leads to a clear split between the board and executives (and then the executives could also meet as a group); or (ii) the company can provide in the articles of association that a separate group of ‘supervisors’ shall be established which monitors the conduct of the board. Yet, neither of these two arrangements would lead to a true two-tier structure as they would not be able to change any of the rules under codified company law that only empower the board of directors (not any group of executives or supervisors created *praeter legem*).

In some company laws, there are, however, explicit variants. For example, some countries have a ‘board of auditors’ (e.g., Italy, Portugal, Japan), which can be seen as vestigial version of the supervisory board as it is only entrusted to check the legality of management but not its business judgment.¹⁰ As with the supervisory board, the origins of this model go back to late 19th century when countries such as Italy and Japan considered adopting the, still ‘softer’, German rules on the supervisory board of the 1870 law but also blended those with the use of auditors in one-tier countries (e.g., under French and UK law).¹¹

⁶ Ibid at pp. 307-321. For the current position in the Netherlands see Section 2.3, below.

⁷ See Holger Fleischer, ‘Einfluss der Societas Europaea auf die Dogmatik des deutschen Gesellschaftsrechts’ (2004) 204 *Archiv für die civilistische Praxis (AcP)* 502, 523-4.

⁸ For a general overview see e.g. OECD Corporate Governance Factbook 2017, available at <https://www.oecd.org/daf/ca/Corporate-Governance-Factbook.pdf>, at p. 93.

⁹ See e.g. Paul Davies and Klaus J. Hopt, ‘Corporate Boards in Europe – Accountability and Convergence’ (2013) 61 *American Journal of Comparative Law* 301, also noting that these committees are often required by law or listing rules or recommended by corporate governance codes.

¹⁰ See e.g. OECD Factbook, above note 8, at 105.

¹¹ See e.g. Guido A. Ferrarini, ‘Corporate Governance Changes in the 20th Century: A View from Italy’, in Klaus J. Hopt, Eddy Wymeersch, Hideki Kanda, and Harald Baum (eds.), *Corporate Governance in Context: Corporations, States, and Markets in Europe, Japan, and the US* (Oxford University Press 2005) 31 at 34; Hiroyuki Kansaku, ‘The Role of Shareholders in Public Companies’, in Holger Fleischer, Hideki Kanda, Kon Sik Kim and Peter Mülbart (eds.), *German and Asian Perspectives on Company Law* (Mohr Siebeck 2016) 243, 247; Bruce Aronson, ‘Japanese corporate law and corporate governance in

Sometimes it is also said that the Nordic countries have a hybrid model as they require a board of directors and an executive body (which sometimes can also be a single person).¹² Yet, in contrast to the two-tier model (and the model with a board of auditors), it is possible that someone is a member of both of these bodies; thus, in our view, this Nordic model is better seen as a variant of the one-tier system¹³ since the latter model can also include a split between executives and non-executives.

2.2. *The normative discussion about board models*

The main idea of the two-tier model is that a clear division of management and supervision leads to better control of management, in particular as it avoids the conflict of interests of executive board members in a one-tier model.¹⁴ It is also said that one-tier boards with both executive and non-executive directors have many practical problems: such boards face the risk of factional disputes,¹⁵ and this could also mean that the executive board members reduce the information they provide to the entire board and implement only brief and superficial board meetings.¹⁶ Finally, from a practical perspective, it can be suggested that the employee co-determination required by some European jurisdictions¹⁷ can more easily be implemented in supervisory board than in boards which combine supervision and management.

The supporters of the one-tier model present the reverse line of reasoning. They stress that it is helpful that in the one-tier model executive and non-executive directors can work together in the same board, in particular as this leads to a faster flow of information and, therefore, non-executive directors being better informed than members of the supervisory board.¹⁸ Having two boards can also create fractional disputes between these two boards, it can lead to legal uncertainty as it may be difficult to clearly distinguish between monitoring and strategy setting,¹⁹ and the supervisory board in particular

historical perspective', in Harwell Wells (ed.), *Research Handbook on the History of Corporate and Company Law* (Elgar 2018) 401, 409-10, discussing the "identity crisis" of the board of auditors given its ambiguous role; Haruhito Takada and Masamichi Yamamoto, 'The "Roesler Model" Corporation' (2018) 45 *Journal of Japanese Law* 45, 56-7. Likewise, the Chinese supervisory board was inspired by the German model, but was given much smaller powers, see Jiangyu Wang, *Company Law in China* (Elgar 2014), 189-191.

¹² E.g., Wolf-Georg Ringe, 'German versus Nordic Board Models: Form, Function, and Convergence' (2016) 65 *Nordic Journal of Business* 27.

¹³ Similar: Klaus J. Hopt, 'Comparative Corporate Governance: The State of the Art and International Regulation' in Andreas M. Fleckner and Klaus J. Hopt (eds.), *Comparative Corporate Governance: A Functional and International Analysis* (Cambridge University Press 2013), 3 at 31 fn. 109.

¹⁴ See e.g. Brian Cheffins, *Company Law* (Oxford University Press 1997) 623 ('clash of roles'); Caspar Rose, 'The New Corporate Vehicle Societas Europaea (SE): Consequences for European Corporate Governance' (2007) 15 *Corporate Governance: An International Review* 112, 115-6.

¹⁵ Peter Böckli 'Konvergenz: Annäherung des monistischen und des dualistischen Führungs- und Aufsichtssystems' in Peter Hommelhoff, Klaus J. Hopt und Axel v. Werder (eds.), *Handbuch Corporate Governance* (CH Beck, 2nd edn, 2009) 268.

¹⁶ Manuel René Theisen and Michael Hölzl, 'Corporate Governance', in Manuel René Theisen and Martin Wenz (eds.), *Die Europäische Aktiengesellschaft* (Schäffer-Poeschel, 2nd edn. 2005) 310-1.

¹⁷ See Section 4.2, below.

¹⁸ See e.g. Theisen and Hölzl, above note 16, at 310.

¹⁹ Böckli, above note 15, at 267-8.

may act too conservatively in rejecting good but risky projects.²⁰ Finally, as a one-tier model is likely to be implemented with fewer persons than a two-tier model, it may also be less expensive for the company.

It is also notable that the two levels may also differ in the extent to which they permit shareholders to influence management. At least in the German version of the two-tier model, the supervisory board is responsible for appointing and removing members of the management,²¹ as well as making other key decisions, e.g. about compensation. Depending on the firm's ownership structure and the relationship of the individuals involved, a two-tier model is more likely to attenuate the direct influence of shareholders on management.

Thus, it seems that there are good arguments for both models. It also leads us to the response that (i) comparative empirical evaluations of different board models should be of interest to legal scholars and policymakers²² and (ii) that providing companies with the choice of board models may be a smart strategy, as both will be discussed in the following.

2.3. *The spread of board choice in the EU*

Figure 1 displays the 'original' and the current models of the board structures of public companies in Europe (with the precise law reforms shown in Table 1, below). It can be seen that, initially, the vast majority of the countries had only allowed one of the board models but that, gradually, the situation has become more liberal.

²⁰ Ann B. Gillette, Thomas H. Noe and Michael J. Rebblo, 'Board Structures Around the World: an Experimental Investigation' (2008) 12 *Review of Finance* 93.

²¹ In other countries, shareholder may also have a say, see Section 4.2, below, for the dismissal decision.

²² As noted by Renée B. Adams, Benjamin E. Hermalin and Michael S. Weisbach., 'The Role of Boards of Directors in Corporate Governance' (2010) 48 *Journal of Economic Literature* 58, 101, most of the existing empirical literature is focussed on Anglo-American one-tier firms only. Empirical research of different board models is rare, see Carsten Jungmann, 'The Effectiveness of Corporate Governance in One-Tier and Two-Tier Board Systems – Evidence from the UK and Germany', (2006) 3 *European Company and Financial Law Review* 426 (not finding a significant difference); for the limited research on the 'choice countries' see Section 3.1, below.

	Original model	change (if any)	Current model	
One tier	Belgium		Belgium	
	Cyprus		Cyprus	
	Greece		Greece	
	Ireland		Ireland	
	Malta		Malta	
	Spain		Spain	
	Sweden		Sweden	
	UK		UK	
	Denmark	→ 1/3/2010 →	Denmark	
	Finland	→ 1/9/1997 →	Finland	
Choice	France	→ 1/2/1967 →	France	
	Luxembourg	→ 31/8/2006 →	Luxembourg	
	Romania	→ 1/12/2006 →	Romania	
	Bulgaria		Bulgaria	
	Lithuania		Lithuania	
	Netherlands	→ 1/1/2013 →	Netherlands	
	Audit model	Italy	→ 1/1/2004 →	Italy
		Portugal	→ 30/6/2006 →	Portugal
		Croatia	→ 1/4/2008 →	Croatia
		Czech Rep.	→ 1/1/2014 →	Czech Rep.
Hungary		→ 1/7/2006 →	Hungary	
Two tier	Slovenia	→ 4/5/2006 →	Slovenia	
	Austria		Austria	
	Estonia		Estonia	
	Germany		Germany	
	Latvia		Latvia	
	Poland		Poland	
	Slovakia		Slovakia	

Figure 1: Overview of board structures of public companies

The following clarifications need to be made: first, Denmark and Finland have been classified as original one-tier countries. Despite the somehow mixed nature of the Nordic model, this model is closer to the one-tier than one of the other models.²³

Second, Bulgaria and Lithuania have been classified as original ‘choice’ countries. This is due to the fact that the first versions of their post-communist company laws from the early 1990s already allowed choice of different board models;²⁴ we did not consider any pre-communist laws as they are unlikely to be a determinant factor for any companies that exist today.

²³ See Section 2.1, above.

²⁴ For the first post-communist company law in Bulgaria see World Bank, ‘Bulgaria’s Evolving Legal Framework for Private Sector Development’ WPS 906 (1992), available at <http://documents.worldbank.org/curated/en/630061468769498484/pdf/multi0page.pdf>, pp. 20-1.

For Lithuania: Company Law 1990, art. 17 made the supervisory board optional for companies with less than fifty shareholders and 200 employees (similar to the Russian company law); Company Law 1994, art. 18(2) then provided choice for all companies.

Third, the Netherlands can, with some hesitation, also be called a country with original choice.²⁵ The main complication is that Dutch law provides different rules for different types of public companies. Smaller public companies are not restricted in their choice of board model. For larger public companies (to be precise, those companies that fall under the so-called ‘structure regime’) a reform from 1971 required a supervisory board,²⁶ but the reform of 2011 (in force since 2013) then again allowed choice of the one-tier model under certain restrictions (e.g., requiring non-executive directors).

Fourth, Hungary also differentiates between types of public companies: non-listed public companies (Zrts) have complete choice, while for listed public companies (Nyrt) the two-tier structure is the default option which can be replaced by the one-tier model under certain restrictions. Thus, overall, we regard Hungary as a choice country today, while initially it was a two-tier country.

Fifth, Italy and Portugal initially had a system with a ‘board of auditors’ (*collegio sindacale* in Italian; *conselho fiscal* or *fiscal único* in Portugal). However, with the respective law reforms of the 2000s (see Table 1), the one and the two-tier models also became available. Thus, in these two countries, companies can now choose between three board models (the traditional model with a board of auditors, the two-tier model with a management and supervisory board, or the one-tier model with a single board of directors).

Table 1: Relevant domestic laws of ‘choice countries’

Country	Relevant law today	Choice enabled, with precise law and date it came into force
Bulgaria (BG)	Commercial Act (CA), DV, No 48 of 18 June 1991, as amended	n.a.
Croatia (HR)	Companies Act of 23 November 1993 (Text No. 2133), as amended	NN br. 107/2007, in force since 1 April 2008
Czech Republic (CZ)	Business Corporations Act (BCA)	Act No. 90/2012 Coll. on business corporations, in force since 1 January 2014
Denmark (DK)	Companies Act (selskabsloven) (CA)	Amendment, in force since 1 March 2010
Finland (FI)	Companies Act 2006 (Fi. osakeyhtiölaki) (CA)	Act 145/ 1997, in force since 1 September 1997
France (FR)	Commercial Code (as amended)	Loi 66-537 1966-07-24 JORF 26 juillet 1966 rectificatif JORF 19 octobre 1966, in force since 1 February 1967
Hungary (HU)	Civil Code, Third Book of 2013	Act VI on Business Associations 1988 amended by 2006 Act, in force since 1 July 2006

²⁵ But see also Section 5.2, below where we consider the effect of the recent change of Dutch law.

²⁶ For a summary of the legal evolution since the 1970s see Gregory Francesco Maassen, *An International Comparison of Corporate Governance Models* (Spencer Stuart 1999) 145-50. For the prior development see Calkoen, above note 6.

Italy (IT)	Civil Code, 1942 (as amended)	Decreto legislativo 17 gennaio 2003, n. 6, in force since 1 January 2004
Lithuania (LT)	Law of Companies 2000 (as amended)	n.a.
Luxembourg (LU)	Commercial Companies Act of 1915 (as amended)	Law of 25 August 2006, in force since 31 August 2006
Netherlands (NL)	Book 2 of the Civil Code	Royal Decree of 6 June 2011, amending the Civil Code, in force since 1 January 2013 extended choice of the one-tier model to large companies
Portugal (PT)	Commercial Company Act (as amended)	Commercial Company Act, republished by Decree-Law No. 76-A/2006, of 29 March 2006, in force since 30 June 2006
Romania (RO)	Commercial Companies Law no. 31/1990 (LS) (as amended)	Law 441/2006 amending law 31/1990 on commercial companies with effect from 1 December 2006
Slovenia (SI)	Companies Act 2006	Yugoslav Law on Enterprises replaced by 2006 Act, in force since 4 May 2006

Both Figure 1 and Table 1 show that the majority of countries introduced board choice since the mid 2000s. This is no coincidence since this reform was often done in conjunction with the implementation of the law of the European Company (SE, *Societas Europaea*). The SE Regulation, which came into force on 8 October 2004, explicitly allows SEs to have ‘either a supervisory organ and a management organ (two-tier system) or an administrative organ (one-tier system) depending on the form adopted in the statutes’.²⁷ Thus, SEs from any country of the EEA (the 28 Member States as well as Iceland, Liechtenstein and Norway) can benefit from board choice.

However, it also needs to be considered that incorporation as an SE has high requirements, for example, a minimum share capital of EUR 120,000 and the need for two or more existing companies from different EEA countries (which would then merge, form a holding company etc.). Thus, less than 0.5% of the about 900,000 public companies established in the EU have the legal form of an SE; we will therefore only consider the SE at a supplementary level in this paper.

3. Previous empirical research and data collection

3.1. Scope of study and previous empirical findings

This paper empirically examines the board structures of public companies in the 14 Member States that provide board choice today, as well as the board structures of the SEs in all 31 EEA countries. We used Orbis (discussed in the next section) for this data collection with Table 2 showing the corresponding types of companies.

²⁷ Council Regulation (EC) No 2157/2001 of 8 October 2001 on the Statute for a European company (SE), art. 38(b).

Table 2: Forms of companies and previous empirical research

Country	Type of public company (as shown in Orbis)	Dominant in LSE 2013 ²⁸	Dominant in EFES 2017 ²⁹	Other empirical studies
Bulgaria	Public limited company – AD and EAD	one-tier	two-tier (ca. 81%)	one-tier ³⁰
Croatia	Joint stock company - d.d.	two-tier	two-tier (ca. 100%)	
Czech Republic	Joint stock company - A.S.	-	two-tier (ca. 87%)	
Denmark	Limited company - A/S	one-tier	two-tier (ca. 95%) ³¹	one-tier ³²
Finland	Public limited company – OYJ	one-tier	two-tier (ca. 85%) ³³	
France	Limited company – SA ³⁴	one-tier	one-tier (ca. 73%)	one-tier ³⁵
Hungary	Public limited company - ZRT and NYRT	two-tier	two-tier (ca. 100%)	
Italy	Joint stock company – SPA	one-tier	two-tier (ca. 98%) ³⁶	board of auditors ³⁷
Lithuania	Joint stock company – ab	one-tier	two-tier (ca. 71%)	split ³⁸
Luxembourg	Limited company by shares – SA	one-tier	one-tier (ca 75%)	
Netherlands	Public limited liability company – NV	two-tier	two-tier (ca. 81%)	25% one-tier 1995 ³⁹

²⁸ LSE Enterprise, ‘Study on Directors’ Duties and Liability’ (2013), available at http://ec.europa.eu/internal_market/company/docs/board/2013-study-analysis_en.pdf at p. 8.

²⁹ ESEF, ‘Annual Economic Survey of Employee Share Ownership in European Countries’ (2017), <http://www.efesonline.org/Annual%20Economic%20Survey/2017/Survey%202017.pdf> (based on 2,402 large listed companies) at p. 95.

³⁰ Mirosław Mateev, ‘Corporate governance problem and its implications for transition economies’ (2008) 5 *Corporate Ownership & Control* 335: sample from 2004 of large companies – for listed companies: 19 one-tier and 13 two-tier; for unlisted companies: 22 one-tier and 11 two-tier.

³¹ Presumably this is meant to include the Nordic ‘hybrid model’ (but see Sections 2.1 and 2.3, above).

³² Ringe, above note 12, at 38: only very few companies have adopted the two-tier model.

³³ Presumably this is meant to include the Nordic ‘hybrid model’ (but see Sections 2.1 and 2.3, above).

³⁴ We did not to include the SAS, as it is functionally more equivalent to the form of a private company.

³⁵ François Belot, Edith Ginglinger, Myron B. Slovin and Marie E. Sushka, ‘Freedom of choice between unitary and two-tier boards: An empirical analysis’ (2014) 112 *Journal of Financial Economics* 364: SBF 250 companies – 75 % one-tier; Benedicte Millet-Reyes and Ronald Zha, ‘A Comparison Between One-Tier and Two-Tier Board Structures in France’ (2010) 21 *Journal of International Financial Management and Accounting* 279 (data for 2004): 174 companies, 66% one-tier; for 1033 publicly traded companies: 91.7% one-tier. A further small-scale study of 95 French firms found that members of the supervisory board have less financial expertise than one-tier board members: Thomas Jeanjean and Hervé Stolowy, ‘Determinants of Board Members’ Financial Expertise – Empirical Evidence from France (2008) 44 *International Journal of Accounting* 378.

³⁶ Presumably this is also meant to include the board-of-auditors model.

³⁷ Carlo Bellavite Pellegrini and Emiliano Sironi, ‘Does a one-tier board affect firms’ performances? Evidences from Italian unlisted enterprises’ (2017) 48 *Small Business Economics* 213: data for 2013 with 46,280 companies: 168 one-tier, 113 two-tier, remainder board of auditors. See also Carlo Bellavite Pellegrini, Laura Pellegrini and Emiliano Sironi, ‘Alternative vs. traditional corporate governance systems in Italy: an empirical analysis’ (2010) 8 *Problems and Perspectives in Management* 4.

³⁸ Asta Aleliūnaitė and Česlovas Christauskas, ‘Corporate governance of Lithuanian listed companies; (2013) *Folia Pomeranae Universitatis Technologiae Stetinensis. Oeconomica* 73: analysis of 46 listed companies, 21 have supervisory boards.

Portugal	Public limited company – SA	one-tier	one-tier (ca. 64%) ⁴⁰	board of auditors ⁴¹
Romania	Joint stock company – SA	two-tier	one-tier (ca. 83%)	
Slovenia	Joint stock company - d.d.	two-tier	two-tier (ca. 90%)	
SE for all EEA countries		-	-	two-tier ⁴²

Table 2 lists some prior studies that have considered the choice of board systems. However, these studies have severe limitations, even as far as the description of the dominant board model is concerned: the information in the LSE study is based on mere speculation about the dominant model (with no data collected), the EFES study only covers large listed companies and the remaining studies are also very limited in their coverage. It is therefore no surprise that these prior studies reach contradictory findings for seven of the 14 countries (Bulgaria, Denmark, Finland, Italy, Lithuania, Portugal, and Romania – see the final three columns in Table 2).

Only few of the prior studies have also engaged in any sophisticated analysis of the corresponding data on board choice: the two French studies cited in Table 2 find that there is a relationship between board choice and stock performance, while the Italian study finds that choice of the one-tier model leads to reduced firm performance.⁴³ With respect to the SE, a recent study finds that there is no economic effect related to board choice, while an older study found that transformation into a one-tier SE had a negative effect.⁴⁴

3.2. Collection of firm-level data

The data analysed in this paper were collected with the database Orbis (Bureau van Dijk). The main search was conducted on 16 July 2018 for the public companies of the 14 countries with board choice (see Table 2, above). A large number of data items were downloaded for each of the countries. Information relevant for the board (or boards) of directors concerned the items ‘job title (in English)’, ‘job title (in local language)’, ‘type of role’, and ‘board, committee or department’, subsequently used to identify the board structure (see next sub-section), as well as a number of further items.⁴⁵ In addition, we

³⁹ Maassen, above note 26, at 146: 7,076 all companies; 1,824 two-tier; 7,453 one-tier.

⁴⁰ But this study includes no category for the board-of-auditors model.

⁴¹ CMVM, ‘Relatório Anual sobre o Governo das Sociedades Cotadas em Portugal’ (2014), available at <http://www.cmvm.pt/pt/EstatisticasEstudosEPublicacoes/Publicacoes/governosocietadescotadas/Documents/Relat%C3%B3rio%20Governo%20Sociedades%202014.pdf>, at p. 9: for listed companies: 31 board of auditors; 11 one-tier; 1 two-tier.

⁴² SE Companies (March 2018), available at <http://www.worker-participation.eu/content/download/6230/103998/file/SE-FactsFigures-2018-03-13%20Bologna.pdf>, as well as Lars Hornuf, Abdul Mohamed, and Armin Schwienbacher, ‘The Economic Impact of Forming a European Company’ (2016), available at <https://ssrn.com/abstract=2837009> (based on 118 observations); Felix Lamp, ‘Value Creation and Value Destruction in the Societas Europaea: Evidence from the New Legal Form’ (2011), available at <https://ssrn.com/abstract=1728162> (based on 47 observations).

⁴³ See Belot et al. and Millet-Reyes and Zha, above note 35; Pellegrini and Sironi, above note 37.

⁴⁴ See Hornuf et al. and Lamp, above note 42.

⁴⁵ Namely: ‘number of current directors/managers’, ‘current or previous’, also a shareholder’, ‘gender’ and ‘countries of nationalities’.

downloaded information about the companies and their shareholders⁴⁶ and selected items in the category ‘financial data’.⁴⁷ With respect to latter data, we also computed further variables which will use in some of our analysis.⁴⁸

The Orbis search led to 236,501 companies for the 14 countries. A problem was that this included many companies whose data had not been updated in many years, possibly because these companies have already been dissolved. Orbis has the category of ‘active companies’ but this still includes some firms with data not being updated in years or even decades. Thus, we decided to consider all companies with information where the last available year was 2015 or later, which also eliminated all ‘inactive’ and ‘dissolved’ firms (while there remained some firms that are shown to be in insolvency or dormant). This led to a reduction by 82,445 firms and, thus, 154,056 companies.

Subsequently, we removed companies for which we could not establish any meaningful information about their board structure, in particular if there was a lack of data for current directors. This reduced the number of companies by 6,788; thus, this paper is based on the information about 147,268 companies. As this latter reduction concerns less than 5% of the companies, we also believe that our data remain unbiased (or indeed it may be the case that many of these 6,788 companies have also been dissolved).

For the SEs from all EEA countries, the problem is that Orbis does not code the legal form of an ‘SE’ as separate legal form in all EU countries, while merely searching for all companies that have ‘SE’ in the name would lead to false positives. Thus, we decided to employ the widely used ECDB database for SEs⁴⁹ as a starting point. This database covers 3,017 companies (as of 25 May 2018) and it includes information about the board structure. However, as the ECDB database contains little further firm-level information, we then also searched Orbis for these companies and managed to collect firm-level data for almost 90% of these SEs. Thus, our SE data cover 2,630 companies.

3.3. Identification of board structures

The identification of the board structures of the public companies from the 14 choice countries had to overcome a number of problems (while for the SEs we could simply use the information from ECDB, as indicated in the previous section). Orbis does not code the board structure explicitly. We therefore had to rely on the information provided by Orbis about the function of each (currently listed as active) director or manager. The

⁴⁶ Namely: ‘date of incorporation’, ‘type of entity’, ‘consolidation code’, ‘NACE Rev. 2, core code (4 digits)’, ‘main exchange’, ‘bvd independence indicator’, ‘no of shareholders’ and then for the shareholders ‘Country ISO Code’, and ‘Direct %’ (latest available date).

⁴⁷ Namely: RoE and RoA (both using Net income (%)) for the last ten years, ‘operating revenue (turnover)’ and ‘operating P/L [= EBIT]’ for the final four years and the first year, and ‘total assets’, ‘number of employees’, ‘tangible fixed assets’, ‘cash & cash equivalents’, ‘shareholder funds’ for the latest available year and the first year.

⁴⁸ Namely: leverage = 1 – shareholder’s equity / total assets [NA if total assets =< 0; censored at 0 and 1]; cash ratio = cash / total assets [NA if total assets =< 0; censored at 0 and 1]; average RoA and RoE (not counting NA years) and the respective standard deviations, mean of operating revenue for the last three years (not counting NAs), PPE turnover = tangible fixed assets / operating revenue [NA if tangible <0 or operating revenue <= 0], sales growth = turnover_each_year / turnover_previous_year [averaging first differences between 4 years, ignoring NA values], and EBIT margin average = EBIT / turnover [average for three years, ignoring NA years].

⁴⁹ <http://ecdb.worker-participation.eu>.

exact way in which directors are classified by Orbis differs slightly between countries, but it is highly consistent within each country. Moreover, the data about some firms from countries (e.g. Portugal) include many positions with no relevance to board structure. In some case, mere executives are listed in the database. There is also some inconsistent reporting in terms of availability of original names and ambiguous English translations (e.g. in Italy the *Organismo di vigilanza*, which is a mere board committee, is occasionally translated as supervisory board).

Given the large number of companies in our sample, we wrote an R function to convert the director-specific information into a firm-level estimate of the company's board model.⁵⁰ We developed a number of identification procedures, which we checked by comparing the results to online information about a number of sample companies in each country. Moreover, the total numbers had to be plausible in light of the existing literature. In the end, we selected the following (relatively simple) procedure, which turned out to be most reliable (except in three jurisdiction, as explained below): We treated all companies that have directors classified as belonging to a supervisory board as two-tier companies, with all other companies treated as following the one-tier model. In retrospect, this algorithm may seem obvious, but given the idiosyncrasies of how directors' functions are coded, the decision was by no means trivial. For example, in some countries there are considerable numbers of firms that have both members of a 'board of directors' and an 'executive board', which could theoretically have represented a two-tier structure (but turned out not to). Moreover, some countries often report members of various administrative and advisory boards, as well as presidents and vice presidents. Sometimes directors were reported to have multiple functions, from which we extracted the ones relevant to board structure.

The Czech Republic turned out to be an exception in how directors were coded by Orbis, meaning that a simple search for supervisory board members would underestimate the number of two-tier companies; thus, here we revised the identification procedure for this country only. Companies that have an administrative board but no supervisory board are treated as one-tier, while all other companies were classified as belonging to the traditional Czech two-tier model. The reason is that in most Czech companies, supervisory board members are listed as belonging to a 'board of directors', whereas executive board members are listed as administrative board members. Some companies do report having supervisory board members, which is why we also coded these firms as two-tier.

For Italy and Portugal, we had to consider that the choice is between three models: one-tier, two-tier and board of auditors.⁵¹ Classification of firms was difficult because both members of actual audit committees and members of the board of auditors would be shown as audit committee members in the abbreviation of their function. However, we were able to distinguish them because their job descriptions differ. Hand-checking sample companies, the following identification procedure turned out to be most reliable: In Italy, a functionary was classified as being a member of the *collegio sindacale* if either the words 'Board of Auditors' or both the word 'statutory' and 'auditor' appeared in her

⁵⁰ In total, the R function to create a useful dataset from the Orbis export tables, classify the firms by board structure, and calculate certain averages of current and former directors, as well as analyse the firms' share ownership structure has almost 300 lines of code.

⁵¹ See Sections 2.1 and 2.3, above.

English job description. Analogously, in Portugal, the string ‘fiscal’ had to appear in the job description field. Individuals with the string ‘control’ in their job description were determined to be indicative of the one-tier model in Italy, whereas the same was true if the words ‘*Comissão de Auditoria*’ or ‘*revisor oficial de contas*’ appeared in Portuguese firms, even if these individuals were classified as audit committee members in the function field. The presence of supervisory board members was considered to be indicative of the two-tier model, unless the firm also had members of the board of auditors as described above. In both countries, a number of firms were eliminated because we could not classify them with reasonable certainty.

4. Country-based comparison of board choice

4.1. General country differences in preferences

Table 3 and Figure 2 present the general preference for one of the two – and for Italy and Portugal, one of the three – board models.

Table 3: Number of firms by board structure

Country	One-Tier	Two-Tier	Board of Auditors	Total number of companies	Percentage of listed companies
Bulgaria	8,539	57	n/a	8,596	2.58%
Croatia	20	635	n/a	655	22.75%
Czech Republic	4,115	13,070	n/a	17,185	0.08%
Denmark	35,316	31	n/a	35,347	0.43%
Finland	239	7	n/a	246	58.94%
France	14,962	93	n/a	15,055	3.93%
Hungary	4,191	1,576	n/a	5,767	0.66%
Italy	80	208	23,891	24,179	1.17%
Lithuania	265	15	n/a	280	10.71%
Luxembourg	7,025	28	n/a	7,053	0.95%
Netherlands	2,726	550	n/a	3,276	4.79%
Portugal	24	4	22,367	22,395	0.23%
Romania	3,161	3,583	n/a	6,744	5.10%
Slovenia	110	380	n/a	490	7.14%

In addition to variations in the choice of board models, Table 3 shows that the total number of public companies varies considerably between the countries. In some countries, we have data for less than 1,000 public companies (Croatia, Finland, Lithuania, Slovenia), while in other countries there are more than 10,000 companies (Czech Republic, Denmark, France, Italy, Portugal). These discrepancies are likely to reflect the size of the respective economies as well as different preferences of small and medium-sized businesses in the use of the form of a private or public company.⁵² These preferences may also be due to the substance of the underlying legal rules: for example, in

⁵² The fact that different types of firms are comprised in our data will also be addressed in the subsequent analysis, e.g. in Sections 4.2 and 6, below.

many countries the rules for private and public companies differ in the fundamental question whether company law is set of default or mandatory rules.⁵³

Finland is the exception however, which also explains the low number of Finnish public companies: here, separate forms for public and private companies were only introduced in 1997 and the rules for both forms are largely identical;⁵⁴ however, due to requirements of EU law, minimum capital requirements are considerably higher for public companies.⁵⁵ Thus, in Finland the only reason for choosing the form of a public company is to be able to get listed on a stock exchange. It is therefore also no surprise that almost 60% of Finnish public companies are listed companies, while in most of the other countries of our study only few public companies are publicly traded (see Table 3).

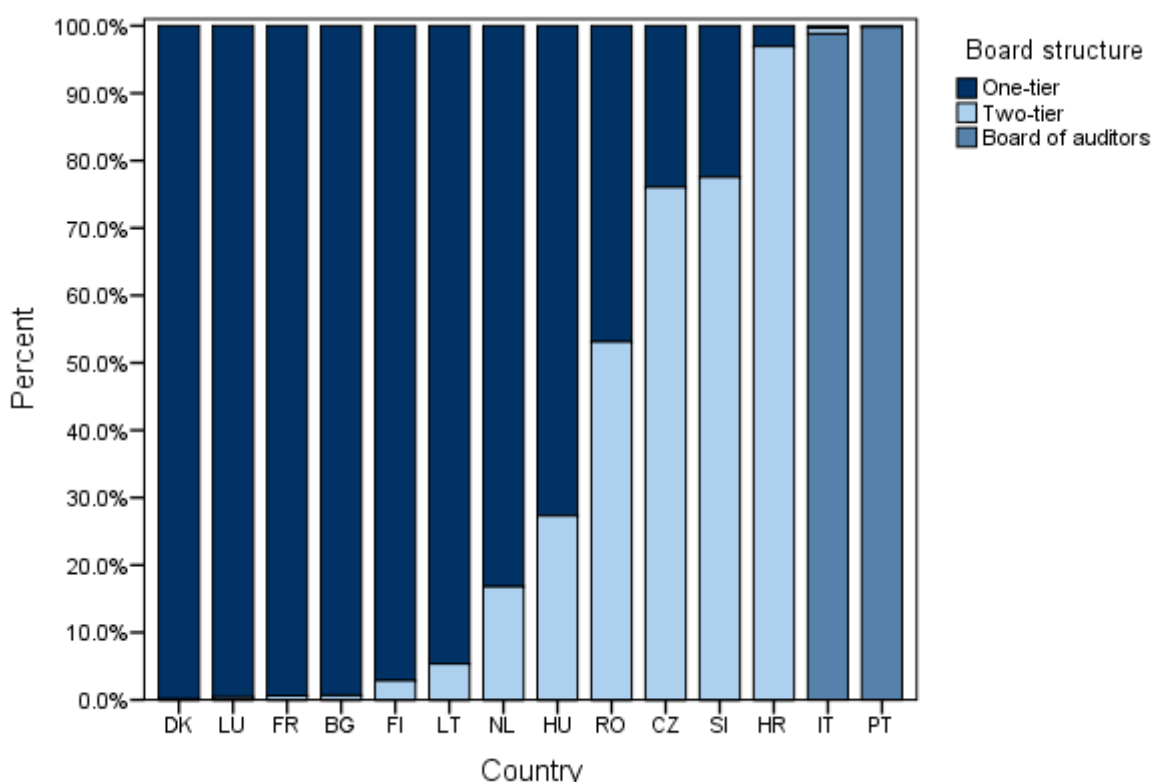


Figure 2: Preference for board models in public companies

For the purposes of comparing the ‘pure’ preferences, it is helpful to present the percentage of the total number of public companies for each of the countries: Figure 2 shows that, despite the availability of choice, some countries have a clearly dominant model: in Bulgaria, Denmark, France, Luxembourg and Portugal more than 99% of the companies choose the same board model. There is somewhat more diversity in Croatia,

⁵³ Eddy Wymeersch, ‘Comparative Study of the Company Types in Selected EU States’ (2009) 6 *European Company and Financial Law Review* 71.

⁵⁴ Manne Airaksinen and Tom Berglund, ‘Corporate Governance in Finland’ in Per Lekvall (ed.), *The Nordic Corporate Governance Model* (SNS Förlag 2014) 168.

⁵⁵ 80,000 EUR as compared to 2,500 EUR; EU law only requires minimum capital for public companies, now in Directive (EU) 2017/1132 of the European Parliament and of the Council of 14 June 2017 relating to certain aspects of company law, art. 45 (previously in the 2nd Company Law Directive).

Finland, Italy and Lithuania with one model that is more than 90% but less than 99% dominant. By contrast, the Czech Republic, Hungary, the Netherlands, Romania and Slovenia have a more balanced choice with no model used by more than 90% of the firms (and thus possibly a ‘true competition’ between the different models).

In substance, it follows from Figure 2 that there is considerable diversity in the preference for either the one-tier or the two-tier model, while the board-of-auditors model has remained dominant in Italy and Portugal. This result may be read as confirmation of the view that, perhaps, one and two-tier model are not so different after all and there is no clear benefit in choosing either of them.⁵⁶ Yet, the subsequent analysis of this section will also identify that there are indeed a number of substantive reasons that account for the preferences for these models.

Comparing the number of countries with above 50% preference for either the one-tier or for the two-tier model, one-tier has an advantage of 8:4. This may reflect the preference of small and medium-sized businesses for the simpler one-tier structure. If we focus on the 2,280 companies (1.5% of our data, see also Table 3) that are listed, two-tier gains more support in almost all of the countries, with Hungary and the Netherlands now being predominantly two-tier countries (with 76.3% and 70.1%).⁵⁷ The main anomaly is Romania, where the two-tier model is more popular for unlisted than for listed companies (55.1% compared to 16.3%).⁵⁸ In Italy and Portugal, the board-of-auditors model remains most popular for listed companies; yet, here the one-tier and the two-tier models also gain more support than for all companies (23.6% and 13.7% for Italy; 15.7% and 5.9% for Portugal).

Considering the SE data for the same 14 countries, we face the problem that in most of them only very few SEs have been established. Only four of the countries have more than ten SEs. Here the general preference is the same as in Figure 1: in the Czech Republic (the place where more than half of all SEs have been established⁵⁹) two-tier leads with 97%, while in the Netherlands, France and Luxembourg one-tier leads with 58%, 76% and 80%. These latter figures are lower than the ones for domestic public companies (see Figure 1); thus they may reflect the international nature of these SEs. Yet, these differences should also not be over-interpreted as they are only based on small numbers of companies (e.g., in France 4 two-tier SEs and 13 one-tier SEs).

⁵⁶ See Sections 2.1 and 2.2, above.

⁵⁷ Also, note the different rules for large companies in both countries, Section 2.3, above.

⁵⁸ For a possible explanation, see Section 6.5, below.

⁵⁹ For an analysis of this phenomenon, see Horst Eidenmüller and Jan Lasák, ‘The Czech Societas Europaea Puzzle’ (2012) 12 *Journal of Corporate Law Studies* 237.

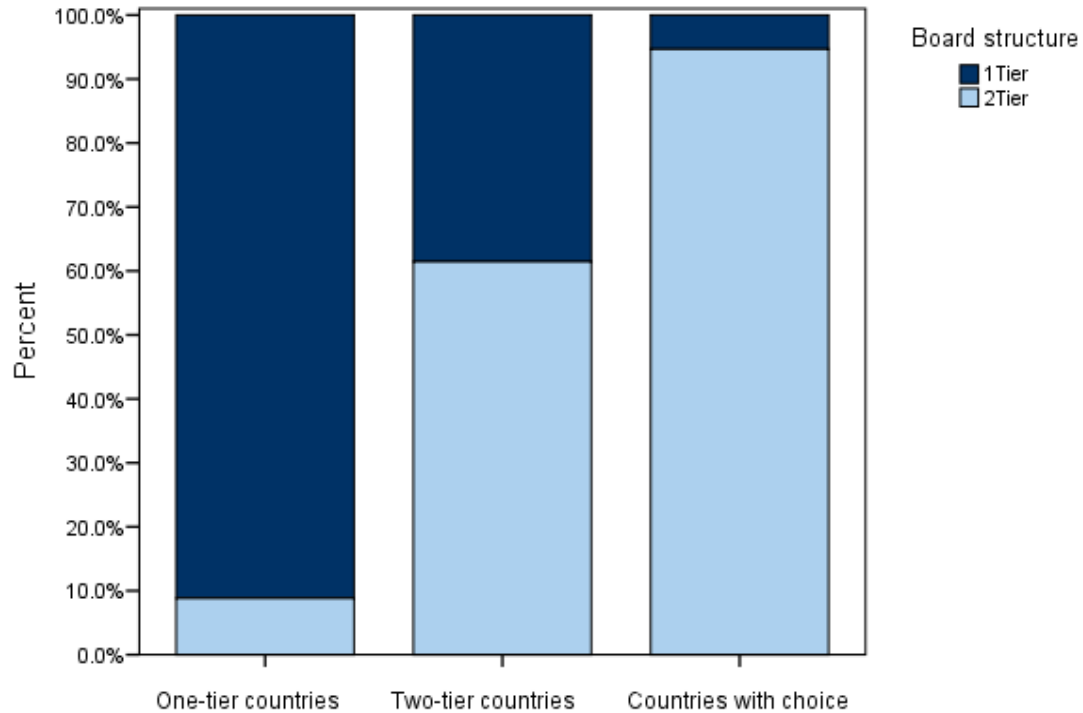


Figure 3: Board structures of SEs divided by domestic board models

The bar chart of Figure 3 displays the board choice of SEs for all 31 EEA countries, based on the classification of their current domestic board models.⁶⁰ It can be seen that only 10% of SEs from one-tier countries have chosen two-tier for the SE, while 40% of SEs from two-tier countries apparently find the one-tier structure more attractive.⁶¹ A possible interpretation is that for these latter companies the ability to choose the one-tier model has been one of the reasons why the legal form of the SE has been chosen in the first place,⁶² i.e. there seems to be some desire of two-tier companies to switch to the one-tier model.⁶³

4.2. Possible reasons for different preferences

What could account for the different preferences of the 14 countries shown in Figure 2, above? Many details about the operation of boards are a matter of business practice at the firm-level.⁶⁴ As far as the country-level is concerned, it is possible that idiosyncratic reasons play a role in some of the countries: for example, it has been noted that the Danish Corporate Governance Committee publicly expressed a preference for the traditional

⁶⁰ See Section 2.1, above.

⁶¹ The two-tier preference for the ‘choice countries’ is entirely driven by the Czech Republic, as indicated in the preceding paragraph.

⁶² As also confirmed by Hornuf et al., above note 42.

⁶³ See also Section 5, below.

⁶⁴ See e.g. Heidrick & Struggles, ‘Towards Dynamic Corporate Governance 2014’, available at <http://www.heidrick.com/~media/Publications%20and%20Reports/European-Corporate-Governance-Report-2014-Towards-Dynamic-Governance.pdf>.

one-tier model as ‘constructive and value-creating’.⁶⁵ And in Finland, a report by the Chamber of Commerce has been sceptical about the two-tier model, for example, referring to supervisory board members as overpaid and lacking the expertise and motivation to fulfil their supervisory role.⁶⁶

As regards legal requirements, it needs to be repeated that only few of our firms are listed; thus, rules that mainly or only apply to listed firms (e.g., about independent directors, board committees, gender diversity, executive remuneration, compliance with corporate governance codes) are unlikely to be a relevant factor in our case. It also needs to be clarified that, in the present section of this paper, we are interested in the question why some board models are more or less popular in a given country: thus, rules which are identical or similar for different board structures within the same country (e.g., typically, how directors’ duties are defined and enforced) are also not relevant here.

Table 4: Legal variation in countries with board choice – selected topics

Country ⁶⁷	Minimum members for two-tier boards:		Minimum members for one-tier board (or audit model)	Special provisions about executives in one-tier model	Shareholders can dismiss management board in two-tier model	Employee co-determination ⁶⁸		
	super- visory	man- age- ment				Avail able	Max.	Thres hold
Bulgaria ⁶⁹	3	1	3	No	No	No	0	-
Croatia ⁷⁰	3	1	3	Yes	No	Yes	0.1	1
Czech Rep. ⁷¹	1	1	1	Yes	Yes	Yes	0	50
Denmark ⁷²	3	1	3	Yes	No	Yes	0.33	35
Finland ⁷³	3	1	1	No	Yes	Yes	0.2	150
France ⁷⁴	3	1	3	Yes	Yes	Yes	0.1	1000
Hungary ⁷⁵	3	1	1	No	Yes	Yes	0.33	200
Italy ⁷⁶	3	2	4	No	No	No	0	-

⁶⁵ Ringe, above note 12, at 38 referring to Committee on Corporate Governance, ‘Recommendations on Corporate Governance 2014’.

⁶⁶ Leena Linnainmaa, ‘Hallintoneuvosto ei tehosta omistajaohjausta’ 2014’, available at <https://kauppakamari.fi/2014/01/28/hallintoneuvosto-ei-tehosta-omistajaohjausta/>.

⁶⁷ For the relevant laws see Table 1, above.

⁶⁸ Sources: Hornuf et al, above note 42, and <https://www.worker-participation.eu/National-Industrial-Relations/Countries>.

⁶⁹ Relevant provisions for first five items: arts. 242, 241, 244, n/a, arts. 221 and 233 Commercial Act.

⁷⁰ Relevant provisions for first five items: arts 254, 239, 272b, 272.1, 244 Companies Act.

⁷¹ Relevant provisions for first five items: arts. 448, 439, 457, 463, 438 Business Corporations Act.

⁷² Relevant provision for first five items: art. 111 Companies Act.

⁷³ Relevant provisions for first five items: ch. 6, ss.23, 8, 8, n/a/, 13 Companies Act.

⁷⁴ Relevant provisions for first five items: Arts. L225-69, L225-58 (at least for small companies), L225-17, L225-56, L225-61 Commercial Code.

⁷⁵ Relevant provisions for first five items: arts 3:26 and 3:121, 3:77 (but 3 for listed companies, art3:282), 3:77 (but 5 for listed companies, art3:282), n/a, 3:120 Civil Code.

⁷⁶ Relevant provisions for first five items: arts. 2409-duodecies, 2409-nonies, 2397 (and 2409-otiesdecies: 1 director & 3 committee members), n/a, 2409-terdecies Civil Code.

Lithuania ⁷⁷	3	1	3	Yes	No	No	0	-
Luxembourg ⁷⁸	3	1	3	Yes	Yes	Yes	0.33	1000
Netherlands ⁷⁹	1	1	1	No	Yes	Yes	0.33	100
Portugal ⁸⁰	3	1	2	No	Yes	No	0	-
Romania ⁸¹	3	1	1	Yes	Yes	No	0	-
Slovenia ⁸²	3	1	3	Yes	No	Yes	0.5	50

Table 4 outlines some of the core differences in company law and employee co-determination that could potentially be relevant.⁸³ The first three columns are based on the possibility that needing to find and pay more members for the board (or boards) may be seen as a burden.⁸⁴ The subsequent two variables consider that the design of boards model may dilute the ‘pure’ versions of the one-tier and two-tier model.⁸⁵ Thus, first, the next column is about special provisions which address executives in the one-tier model as this can weaken the initial appeal of just having a single board.⁸⁶

Second, it is possible that the two-tier model is designed in a way that the supervisory board is rather weak (and, thus in some respects, rather like the hybrid board-of-auditors model). Specifically, the two-tier model may be more burdensome than the one-tier model if it means that shareholders cannot appoint or dismiss the members of the management board. While traditionally the two-tier model left this question to the articles of association, a reform of German law from 1937 mandated that only the supervisory board had the power to appoint and dismiss members of the management board.⁸⁷ Today, appointment of the management board is usually entrusted to the supervisory board (only in the Czech Republic, Hungary, Finland and the Netherlands it still depends on the articles); thus, here we code whether shareholders can dismiss the members of the

⁷⁷ Relevant provisions for first five items: arts 31, 32, 33, 37, 33(10) Law of Companies.

⁷⁸ Relevant provisions for first five items: arts. 442-14, 441-2, 441-2, 441-11, 442-5 Commercial Companies Act.

⁷⁹ Relevant provisions for first five items: arts 140 (but 3 for large companies, art 158), n/a, n/a, n/a, 147 Civil Code.

⁸⁰ Relevant provisions for first five items: arts 413, 424, 390 (one director & single auditor), n/a, 430 Commercial Company Act.

⁸¹ Relevant provisions for first five items: arts. 153.6, 153 (but 3 if audited), 137 (but 3 if audited), 143, 153.2 Commercial Companies Law.

⁸² Relevant provisions for first five items: arts. 254, 265, 254, 290 and 268 Companies Law.

⁸³ For discussion of further legal variations see e.g. Hanjo Hamann, ‘Unpacking the Board A Comparative and Empirical Perspective on Groups in Corporate Decision-Making’ (2014) 11 *Berkeley Business Law Journal* 1; Valérie Tandeau de Marsac and Yann Paclot, ‘Relations between company supervisory bodies and the management’, Study for the European Parliament 2012, available at http://www.europarl.europa.eu/meetdocs/2009_2014/documents/juri/dv/pe462454_/pe462454_en.pdf; OECD Factbook, above note 8, at 93-113.

⁸⁴ By contrast, provisions on the maximum number of board members are likely to be relevant for only very large companies and thus not the general preferences at the country-level.

⁸⁵ For the general difference between board models see Section 2.1, above.

⁸⁶ This was a contentious issue when Germany was required to introduce the one-tier model for the SE, see e.g. Ansgar Schönborn, *Die monistische Societas Europaea in Deutschland im Vergleich zum englischen Recht* (Nomos 2007).

⁸⁷ Companies Act (AktG) 1937, s. 75(1). On the political context and the objective of reducing the influence of shareholders, see Thilo Kuntz, ‘German corporate law in the 20th century’, in Harwell Wells (ed.), *Research Handbook on the History of Corporate and Company Law* (Elgar 2018) 205, 216-8.

management board without involvement of the supervisory board (be it by law or by provision in the articles of association).⁸⁸

Finally, Table 4 considers that it could be relevant that employee co-determination can more easily be implemented in supervisory boards than in boards which combine supervision and management.⁸⁹

Table 5: Firm-level variations for public companies – selected mean data

Country	Number of directors	Number of employees	Number of shareholders	Foreign shareholders (in %)	Largest shareholder (in %)	Shareholder-directors (in %)	Foreign directors (in %)	Operating revenue	Total assets
Bulgaria	3.37	82.02	2.68	12.53	75.12	0.28	0.05	7095	17645
Croatia	6.84	318.59	4.39	9.27	62.34	0.15	0.04	49305	76033
Czech Rep.	2.43	96.29	0.49	17.03	97.41	0.14	0.04	12139	38323
Denmark	4.81	83.29	1.79	8.81	79.33	0.20	0.05	115971	54212
Finland	26.59	2287.77	24.78	9.00	42.60	0.09	0.08	885034	2246458
France	9.42	496.51	2.53	7.57	70.35	0.08	0.03	171013	251048
Hungary	6.18	127.87	1.24	14.90	86.07	0.19	0.03	25834	59328
Italy	9.36	243.42	9.17	8.31	66.48	0.32	0.02	90358	140059
Lithuania	4.29	293.00	2.22	22.90	69.87	0.11	0.03	65513	236995
Luxembourg	3.82	283.64	1.84	46.77	78.49	0.20	0.29	127700	181830
Netherlands	5.37	1636.68	2.11	20.43	86.70	0.01	0.08	1898296	466732
Portugal	5.21	82.14	1.67	12.84	72.54	0.08	0.03	17728	44161
Romania	5.54	114.42	3.83	14.92	74.80	0.19	0.08	11818	18854
Slovenia	6.11	331.66	3.56	11.59	63.18	0.13	0.04	65448	189027
Total	5.83	182.74	3.10	12.29	75.69	0.18	0.05	75174	102215

Further reasons for variations in preferences may be due to the fact that there are different types of firms incorporated as public companies in the 14 countries. Table 5 reports some of the descriptive statistics of the firm-level data.⁹⁰ For example, it could matter here that the size-related categories (number of directors, employees, or shareholders, revenue, assets etc.) may be a determinant for two-tier boards, or that particular groups of shareholders (concentrated, foreign etc.) may steer the board choice in a particular direction.⁹¹

⁸⁸ By contrast, other topics related to the dismissal of directors (e.g. whether a good reason is needed) are likely to be similar for different board models within the same country.

⁸⁹ See Section 4.2, above.

⁹⁰ As collected from Orbis, see Section 3.2, above.

⁹¹ This will also be analysed in the firm-level based regression analysis in Section 6, below.

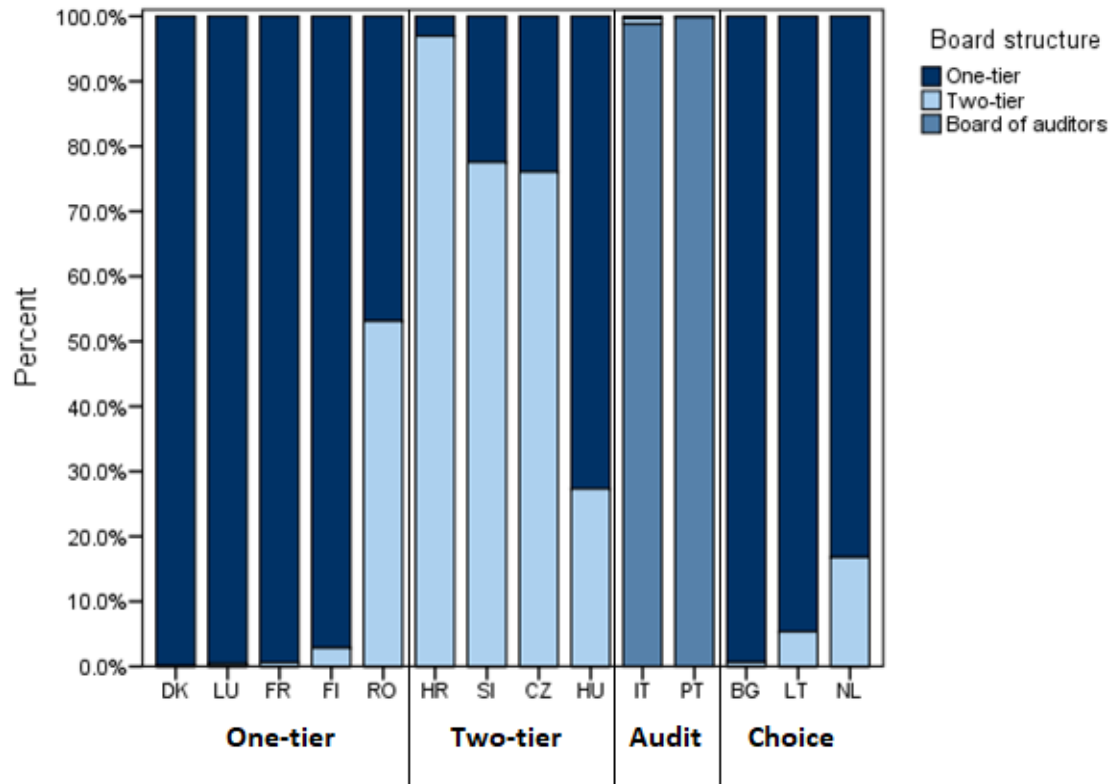


Figure 4: Preference for board models by traditional model

A further possible reason for the country differences is that the traditional board model of a country, which allows choice today, may still reflect the preferences of the companies established in this country. Thus, Figure 4 regroups the country differences (see Figure 2) according to the traditional models,⁹² which indeed seems to show that, to some extent, these traditional models matter.

4.3. Fuzzy-set qualitative comparative analysis

At the country level, we just have 14 observations. Thus, inferential statistics are not feasible for this part of the analysis. However, it is possible to use the method of a fuzzy-set qualitative comparative analysis (fsQCA), a technique that formalises the logic of Boolean algebra, which was specifically designed to analyse such ‘dual digit’ data and which has become a popular tool in corporate governance research.⁹³

For the purposes of fsQCA we have to scale all data from 0 to 1. This has been done for the outcome variable based on the percentages of Figure 2 for the choice of the two-tier model. Given the low number of observation, only a selection of possible conditions could be considered. Thus, we included: (i) a condition on ‘entrenched two-tier’ consid-

⁹² See Section 2.3, above.

⁹³ See e.g., Ilir Haxhi and Ruth V Aguilera, ‘An Institutional Configurational Approach to Cross-National Diversity in Corporate Governance’ (2017) 54 *Journal of Management Studies* 261; Roberto García-Castro, Ruth V Aguilera, and Miguel A. Ariño, ‘Bundles of Firm Corporate Governance Practices: A Fuzzy Set Analysis’ (2013) 21 *Corporate Governance: An International Review* 390. For an application to legal research see TT Arvind and Lindsay Stirton, ‘Explaining the Reception of the Code Napoleon in Germany: A Fuzzy-Set Qualitative Comparative Analysis’ (2010) 30 *Legal Studies* 1.

ering the traditional board model of the country and length of time choice has been available;⁹⁴ (ii) a binary condition for Italy and Portugal given the availability of a ‘third model’; (iii) as a representative condition from the firm-level data (other conditions were also tested) the data on the largest shareholder;⁹⁵ (iv) whether a country allows a two-tier model with relatively few directors as compared to the one-tier model;⁹⁶ (v) and (vi) two binary conditions which reflect the abovementioned rules on ‘special provisions about executives in one-tier model’ and ‘shareholders can dismiss management board in two-tier model’;⁹⁷ and (vii) a condition on strong employee co-determination.⁹⁸

Table 6: Determinants for high preference of two-tier model⁹⁹

	Pathways			
	1	2	3	4
Entrenched two-tier structure	●			
No third model				
Shareholder structure		●		
Few persons needed			●	
One tier burden				
Shareholder power remains			●	●
Strong co-determination				●
Consistency	0.47	0.36	0.19	0.32
Raw Coverage	0.91	0.37	0.19	0.27
Unique Coverage	0.27	0.00	0.00	0.00
Cases with >0.5 membership	5	1	2	0
Overall Solution Consistency	0.34			
Overall Solution Coverage	0.91			

The resulting pathways of Table 6 show that entrenchment of the two-tier model is, on its own, the pathway with the highest consistency and coverage. Thus, there is fairly strong path dependence in the choice of the board structure. Partly, this may be due to

⁹⁴ Coded as: 1 = traditional two-tier, only recent choice (with recent defined as 2010s); 0.75 = traditional two-tier, medium-term choice (defined as 1995-2009); 0.5 = long-term choice (i.e. for France, Bulgaria and Lithuania); 0.25 = traditional one-tier/board of auditors, medium-term choice; 0 = traditional one-tier/board of auditors, only recent choice. Note for Netherlands: 0.5 for small companies and 1 for large companies = coded as 0.75 overall.

⁹⁵ Coded as: 1 for the lowest level of concentration (Finland), then 0.5 (Croatia, Italia, Slovenia), then 0.25 (Bulgaria, France, Lithuania, Portugal, Romania), and 0 for the highest level of concentration (Czech Republic, Denmark, Hungary, Luxembourg, Netherlands).

⁹⁶ Coded as: 1 for countries without a significant burden in this regard (Bulgaria, Croatia, Denmark, France, Italy, Lithuania, Luxembourg, Slovenia), 0.5 for countries with some burden (Czech Republic, Netherlands, Portugal) and 0 for a significant burden (Finland, Hungary, Romania).

⁹⁷ Coded as in Table 3, above.

⁹⁸ Coded as 1 for co-determination unless threshold 100 or higher or 10% or lower participation rate when it was coded as 0.5; 0 for countries without co-determination.

⁹⁹ Based on parsimonious solution as intermediate and complex solutions produce no clear results. We have chosen the default consistency threshold of 0.8 and the recommended threshold for the number of observations of 1, cf. generally Charles Ragin, *User's Guide to Fuzzy-Set / Qualitative Comparative Analysis* (University of Arizona 2008) 46.

companies which were established at a time prior to the law reform which introduced board choice, but there are also likely to be further factors at play, such as the role of lawyers and other advisors, the availability of case law, standard articles of association etc.,¹⁰⁰ which make businesses choose the traditional board model.¹⁰¹

In the second pathway, the condition on shareholder structure is also relevant on its own, though with lower consistency and coverage. Relatively low shareholder concentration is likely to be more prevalent in larger companies, which can indeed be expected to be more inclined towards the two-tier model as it offers a more structured way of corporate governance.¹⁰² It may also be likely that companies with more shareholders prefer a structure with a supervisory board as this board can represent the interests of both majority and minority shareholders in its supervision of the management.

Three of the legal variables show in the final two pathways, though with fairly low coverage.¹⁰³ Thus, while any relevance here should not be over-interpreted, these two pathways also have a degree of plausibility. It makes sense that small companies with often only one or few shareholders want to reduce costs by both needing few persons for the board(s) and having a desire of not weakening the power of the shareholders. The combination of remaining shareholder power with strong co-determination is also plausible given that larger companies may want to choose the two-tier model in order to remain powerful vis-a-vis both employees and directors.¹⁰⁴

5. Time trends: the decline of the two-tier model in choice countries

5.1. General trend based on time of establishment

It could be hypothesised that introducing board choice leads to a form of market segmentation with some former one-tier companies choosing the, now available, two-tier model and some former two-tier companies choosing the, now available, one-tier model. However, the findings discussed in this section point towards a different outcome, namely that choice leads to a gradual decline of the two-tier model.

¹⁰⁰ Such network effects are frequently noted in the discussion about regulatory competition in corporate law; see e.g. Brett H. McDonnell, 'Getting Stuck Between Bottom and Top: State Competition for Corporate Charters in The Presence of Network Effects' (2003) 31 *Hofstra Law Review* 681.

¹⁰¹ See also Section 5, below, which examines pre- and post-choice companies separately.

¹⁰² See also the firm-level analysis in Section 6, below.

¹⁰³ Indeed, if we merge the four legal conditions into one, only the first two pathways remain.

¹⁰⁴ But see also Section 6.5, below .

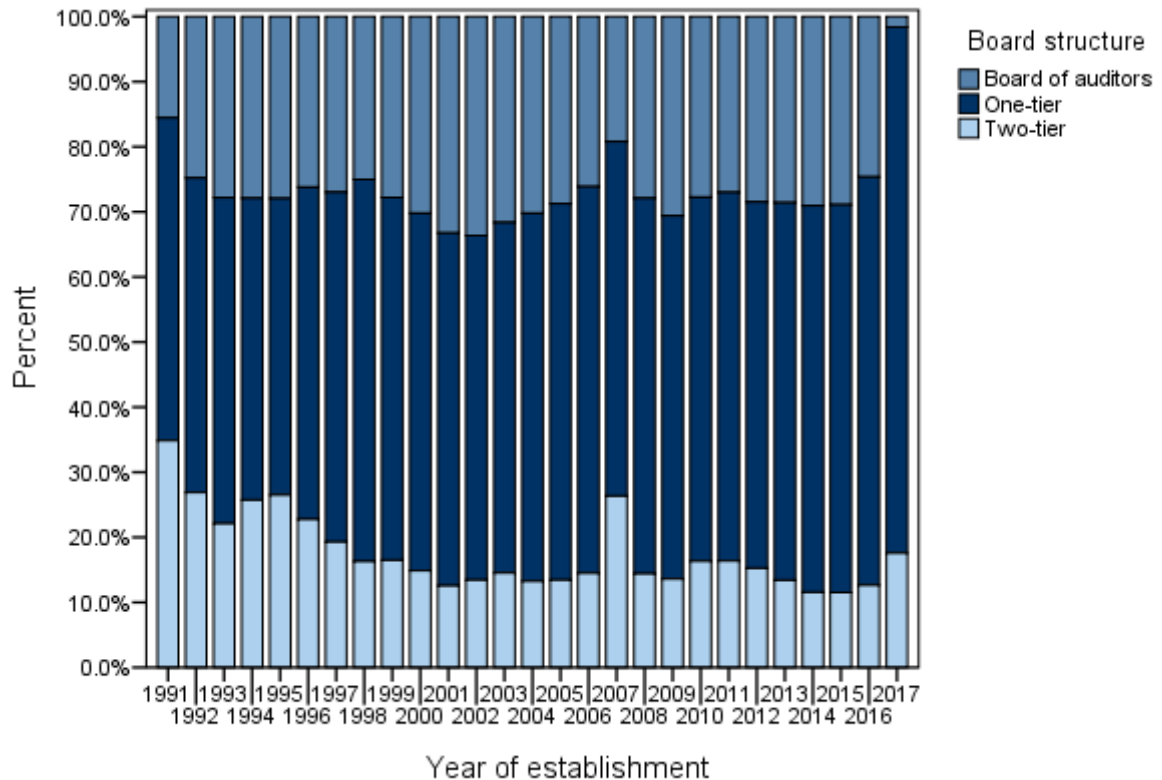


Figure 6: Popularity of board models aggregated for firms established between 1991 and 2017 in all 14 ‘choice countries’

The information about companies in Orbis includes the category ‘time of incorporation’ and those can then be presented as a yearly time-series. Figure 6 has done so for the 14 countries with choice of board structure today, starting with the early 1990s given the fact that many countries in Central and Eastern Europe only then re-introduced the company as a legal form. This series shows a general decline of the two-tier model from around 30% in the early 1990s to 15% today.

However, a number of caveats are necessary. Figure 6 is based on the aggregate of all countries. This means, for example, that variations in the number of companies established in a particular country may drive some of the trends. Notably, it can be seen that the popularity of the board-of-auditors model varies considerably in percentage terms; yet, given the dominance of this model in Italy and Portugal, this is more likely to reflect increases and decreases in the number of new Italian and Portuguese companies than companies choosing one of the other board models. However, it can also be shown that if we exclude the board of auditors from this data, we also have a decline of the two-tier model (from around 35-40% in the early 1990s to around 20% today).

A further issue to note is that the ‘time of incorporation’ (as called by Orbis) is often not the time a business was incorporated as a public company, but the establishment in another legal form. For example, this can be seen in the Orbis data of some Central and Eastern European companies as it displays some ‘incorporation dates’ which precede the re-introduction of the company as a legal form, but also in other countries (e.g., the data for the Postal Services of Portugal – CTT Correios de Portugal, S.A. – refer to the year 1520 as the time of incorporation, though this entity was only transformed into a public company in 1991).

Finally, Figure 6 only shows a general time trend without considering different points in time board choice was introduced in the respective countries. This latter differentiation will therefore be done in the following.

5.2. Analysis considering time of introduction of board choice

If we split the dataset according to the time choice was introduced or facilitated in each of the countries,¹⁰⁵ we have 52,728 post-choice companies: 36,420 of those have implemented the one-tier, 2,934 the two-tier, and 13,374 the board-of-audit model. Thus, post-choice, the one-tier model is 12 times more popular than the two-tier model. By contrast, according to the corresponding aggregate pre-choice data, the one-tier model is only 2.5 times more popular than the two-tier one. Thus, this shows a decline of the two-tier model; yet, we also need to address the countries individually in order to see how far specific countries may drive this result.

Table 7: Change in popularity of board structures for companies established before and after introduction of board choice

		One-tier	Two-tier	Board of auditors
Traditional one-tier countries	Denmark	0.0%	0.0%	-
	Finland	1.1%	-1.1%	-
	Luxembourg	-0.2%	0.2%	-
	Romania	20.0%	-20.0%	-
Traditional two-tier countries	Croatia	4.0%	-4.0%	-
	Czech Republic	31.3%	-31.3%	-
	Hungary	29.5%	-29.5%	-
	Netherlands ¹⁰⁶	15.9%	-15.9%	-
	Slovenia	27.6%	-27.6%	-
Traditional audit countries	Italy	0.0%	0.2%	-0.1%
	Portugal	-0.2%	0.0%	0.2%

Table 7 confirms the decline of the two-tier model for the traditional two-tier countries as the new one-tier model has gained considerable attraction in most of them (averaging the percentages of the five countries leads to an increase in one-tier of 21.66% and a corresponding decrease in two-tier). By contrast, the introduction of the two-tier model had none or little effect in the traditional one-tier and board-of-audit countries (with Romania being the anomaly that one-tier is even more popular for companies established post-choice, i.e. when choice was introduced more pre-choice companies switched to the two-tier model than new companies choosing it in subsequent years¹⁰⁷).

¹⁰⁵ See Figure 1 and Table 1 in Section 2.3, above, for the law reforms. In Sections 5.2 and 5.3 we omit the three countries without recent change, i.e. Bulgaria, France, and Lithuania. We include the Netherlands here as it facilitated board choice in 2013 (though it was also available for smaller companies previously).

¹⁰⁶ See the previous footnote.

¹⁰⁷ For a possible explanation see Section 6.5, below.

Moreover, examining pre- and post-choice companies at aggregate levels, it can be calculated that 10% of the *pre-choice* companies have deviated from the traditional board model of their country (to be precise, 9,320 of 94,287 companies), while this number is 20% for post-choice companies (see the data in the next sub-section). This lower proportion for pre-choice companies is plausible as changing the board model involves at least some switching costs. Examining these 9,320 companies that have adopted a new board structure in more detail could be potentially revealing, for example, as to whether these companies have benefitted from this decision, as compared to other pre-choice companies. However, we also need to repeat (see previous sub-section) that the Orbis information about the year of establishment may refer to the establishment of the business in a legal form different from that of a public company. Thus, some of the pre-choice companies may only have become public companies after board choice was introduced. This is different for the *post-choice* companies. Here, we can be sure that these companies were indeed established as public companies after board choice was introduced; thus, they will be analysed further in the following.

5.3. Analysis of post-choice companies only

The companies for which we can be sure that they were established after the introduction of board choice are particularly interesting as they enable us to scrutinise companies that could freely and without switching costs decide about their preferred board model.

Table 8: Do post-choice companies choose the traditional or the new model?

		Choice of	
		traditional model	new model
Board structure	One-tier	7,563	5,226
	Two-tier	2,194	578
	Board of auditors	13,374	-
Total		23,131	5,804
		79.94%	20.06%

Table 8 shows, as already noted, how far post-choice companies choose either the traditional or the new model. In addition, it is indicated that 5,226 out of 5,804 (so about 90%) post-choice companies which choose a model different from the traditional model of their countries decide on the one-tier model. Thus, this provides further confirmation that choice usually goes to the detriment of the two-tier model.

With respect to these 5,226 ‘new’ two-tier companies, it is then also interesting to examine whether their data on the time of establishment reflect a continuing time-trend in favour of the one-tier model post-choice; in other words: does the introduction of choice in the five traditional two-tier countries (Table 7) mean that the use of the two-tier model declines further in the post-choice years?

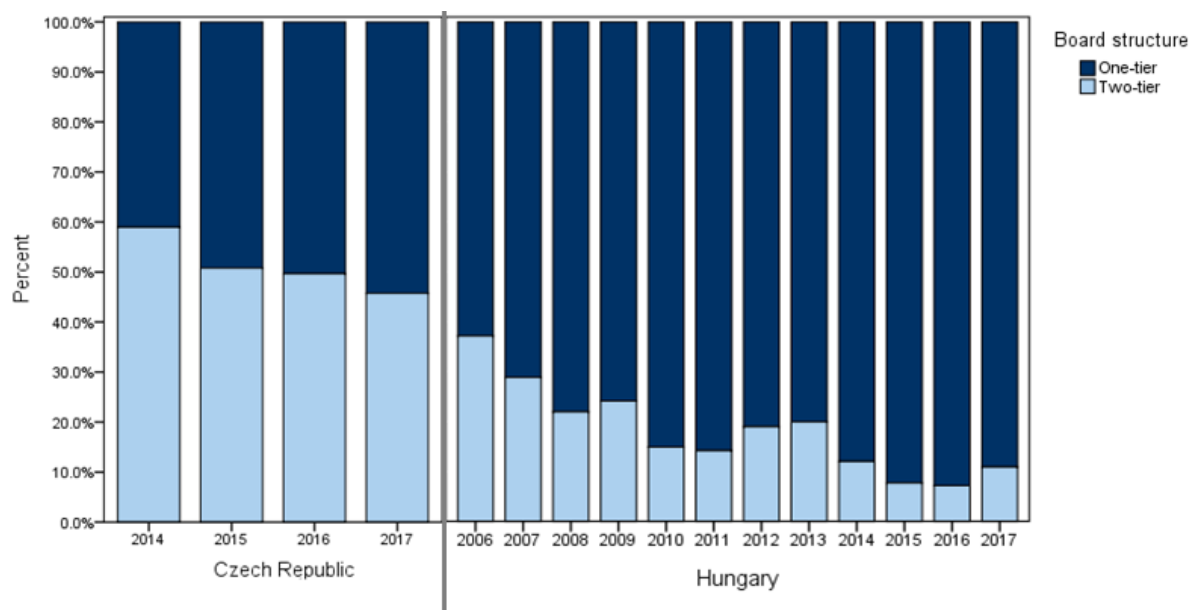


Figure 6: Board models of newly established companies by year of establishment following the introduction of the one-tier model in Czech Republic and Hungary

The time-series of Figure 6 show that in the Czech Republic and Hungary we can indeed observe that post-choice the one-tier model further advances and the two-tier model further declines. We also created similar charts for the other traditional two-tier countries (Croatia, Slovenia, Netherlands); here the time trends are inconsistent – yet, in Croatia and Slovenia there are only few newly established public companies per year anyway (sometimes only single-digit figures); and with respect to the Netherlands, the recent reform was only relevant for large public companies (while smaller public companies already had choice prior to the reform).¹⁰⁸

To conclude, the country-based analysis of Section 4 found that path dependence is a major determinant for country differences in the preference for a particular board model. However, this Section 5 has then also shown that, empirically speaking, introducing board choice does matter as it leads to a gradual decline of the two-tier model. Should this latter finding be interpreted in a normative way in favour of the one-tier and against the two-tier model? We suggest that, without further analysis, this would be premature as it is well possible that the remaining two-tier companies benefit from this board structure (e.g., due to a greater need for structured supervision in larger companies). However, we do recommend that countries which only allow a two-tier structure should introduce an optional one-tier structure as the foregoing analysis indicates a clear demand for a one-tier structure across all countries.

¹⁰⁸ See Section 2.3, above.

6. Firm-level regression analysis

6.1. Explanatory variables

Orbis provides detailed company information relating among other things, to each company's governance, ownership, and financial performance. We use those in order to find out whether certain company characteristics explain or at least correlate with a firm's choice of board structure. In addition to firm-level variables provided by Orbis, we computed a series of additional variables based on the same Orbis output we used to determine whether a company uses a particular board model, specifically certain aggregated characteristics of the company's directors and shareholders. Table 9 shows our variables. Based on residual analysis, some of the variables were transformed to a logarithmic scale to improve the regression fit.

Table 9: Variables included in our regressions

Group	Variable	Explanation
(1)	<i>Number of shareholders</i>	number of shareholders (log scale)
	<i>Foreign shareholders</i>	share ¹⁰⁹ of foreign stock ownership
	<i>Largest shareholder</i>	ownership share of largest shareholder
	<i>Shareholder-directors</i>	share of all current directors and managers that are also shareholders
	<i>Female directors</i>	share of all current directors and managers that are female
	<i>Foreign directors</i>	share of all current directors and managers that do not hold the citizenship of the firm's country of registration
	<i>Directors with two-tier background</i>	weighted index of directors and managers coming from countries favouring a particular board structure
	<i>Shareholders with two-tier background</i>	weighted index of shareholders coming from countries favouring a particular board structure
(2)	<i>Industry</i>	industry classification based on NACE
	<i>Listing</i>	public trading status (dummy variable)
	<i>Age of company</i>	log of the age of the company in years (in 2018) plus 1
	<i>Company independence</i>	independence category according to Orbis
(3)	<i>Number of employees</i>	log of the number of employees plus 1
	<i>Assets</i>	log of total assets plus 1, censored at 0
	<i>Operating revenue</i>	log of the average operating revenue of the past three years plus 1, censored at 0
(4)	<i>Leverage</i>	1 – (equity / total assets)
	<i>Cash ratio</i>	cash / total assets
	<i>ROA average</i>	average return on assets of the past three years
(5)	<i>Post-choice establishment</i>	dummy variable indicating whether company was formed after choice of board structure became available
	<i>Co-determination required</i>	dummy variable whether the number of employees exceeds the legal threshold for employee representation on the (supervisory) board

¹⁰⁹ All variables representing a share or percentage are scaled between 0 and 1.

Broadly speaking, we can classify these variables into five categories, namely (1) governance-related variables, (2) variables describing the firm and its business, (3) variables indicating the firm's size, (4) variables on the firm's profitability and financial structure, and (5) law-related variables.

Most of the variables in category (1) are not directly provided by Orbis on the firm-level, but on the individual director level. We therefore had to compute them for each firm first. The (log of) the number of shareholders could be linked to a particular board structure, for example, because a larger number of shareholders might be better served by a particular choice (e.g. because of more severe agency problems and a stronger need for monitoring). Likewise, the largest shareholder variable is a proxy for ownership concentration.¹¹⁰ The variables relating to whether directors/managers are shareholders and their nationality and gender could conceivably be connected to the quality of the firm's governance and the level of agency cost as well.

The variables *directors with two-tier background* and *shareholders with two-tier background* are indices of whether directors/managers and shareholders respectively are nationals of jurisdictions favouring a particular board structure.¹¹¹ Our hypothesis motivating the creation of these variables was that board members or shareholders might favour board structures familiar from their home jurisdiction, and therefore lobby for their adoption when active in other countries. The indices range between -1 and +1. Directors and managers are weighted equally in the construction of the index, whereas shareholders are weighted by their ownership stake. Individuals from one-tier jurisdiction contribute to the index negatively, individuals from a two-tier jurisdiction positively.

In category (2), *industry* is a factor variable that translates into a set of dummies when included in the regression. It is based on the NACE classification provided by Orbis, whose categories are shown in Table 10.

Table 10: NACE industry classification

Category	Industries
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air-conditioning supply
E	Water supply, sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities

¹¹⁰ We also computed a Herfindahl-Hirschman Index analogue to measure ownership concentration, but did not include it in the reported regression because it typically led to strong multicollinearity with Orbis' independence classification (coded as *Company independence*) as well as with the size of the largest shareholder.

¹¹¹ For this purpose, we coded the available board structures of the 100 most frequent countries as regards both foreign directors and foreign shareholders in our dataset (121 countries in total).

L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies

A is our reference category in the regressions, whereas T and U are omitted from the regressions because they do not appear among the firms in our dataset.

We then have a dummy variable indicating the firm's listing status (we do not look at listings at different stock exchanges), as well as the log of the firm's age, where we use the 'date of incorporation' given by Orbis (which can also refer to the establishment in another legal form, as explained¹¹²).

The factor variable coded as *company independence* is based on the corresponding Orbis classification. Categories A, B, C and D are sometimes qualified with signs, which indicate the level of certainty among Orbis staff regarding the classification, but not substantive differences. We therefore consolidated firms in the five groups shown in Table 11. In the regression, U is the reference category.

Table 11: Orbis independence classification

Category	Description
A	Company with known recorded shareholders none of which having more than 25% of direct or total ownership
B	Company with a known recorded shareholder none of which with an ownership percentage (direct, total or calculated total) over 50%, , but having one or more shareholders with an ownership percentage above 25%
C	Company with a recorded shareholder with a total or a calculated total ownership over 50%
D	Company with a recorded shareholder with a direct ownership of over 50%
U	Unknown

Variables in categories (3) and (4) are based on the firm's financial statements and are available for a smaller set of firms, as is one of the variables in category (5). The (log of the) number employees, total assets and average operating revenue are proxies of the firm's size. In countries with smaller datasets these three variables sometimes are col-linear as shown by a variance inflation factor (VIF test). We did not remove them from the regressions to maintain comparability of regressions between countries. The level of the firm's leverage is included to investigate whether creditors might prefer particular board structures. The cash ratio is included because it may be indicative of agency cost

¹¹² See Section 5.1 above.

in light of Jensen free cash flow theory.¹¹³ Finally, the (average) return on assets allows us to look at whether firms with particular ownership structure are more likely to be profitable. Given that our data are cross-sectional, we do of course not make any causal claims on this issue.

The *post-choice establishment* dummy in category (5) is intended to look at whether firms founded after the possibility between different board structures were introduced are more likely to make use of the new option. We would expect the coefficient to be positive in countries that originally only allowed a one-tier structure, and negative in countries with a traditional two-tier structure (disregarding countries without recent change in the law).¹¹⁴ Finally, the *co-determination required* dummy is again only available for firms with accounting data. It is 1 when the number of employees exceeds the threshold for employee participation in this country. We omit it in countries without employee representation. The hypothesis here might be that firms use board structure choice to avoid having employees on the board in a structure where such representatives appear particularly undesirable to shareholders or management.

6.2. Methodological choices

For each country (except for Italy and Portugal, which we discuss separately, see Section 6.4, below) we ran a series of logistic regressions with the board structure as the dependent variable (positive coefficients indicate a preference for the two-tier structure). In each country, we used an iterative approach and added variables in several steps. After each steps, we tested the models for multicollinearity and analysed residuals to understand the quality of the model fit. Obviously, these aspects are not the same in each country. The models we decided to report in the end constitute a compromise between feasibility of the model and model fit in each country on the one hand, and the provision of comparable model across countries. For some variables residual analysis led to the use of the application of the logarithm to the variable (which led to the necessity of censoring them at 0 and adding 1). In a few cases, it might have been possible to add polynomials, which we omitted.

We decided to report a ‘small’ regression (Table 12) and a ‘large’ regression (Table 13) for each country, with the former excluding accounting variables (or variables derived from accounting information indirectly) that is not available for all firms. Sample size is thus often considerably larger in Table 12.

One challenge is that the absolute number of observations using a particular board structure is extremely small in some jurisdictions – see Table 3 in Section 4.1, above. The low absolute number of two-tier boards in several countries, as well as the low number of one-tier boards in Croatia creates several problems. Some variables will exhibit ‘perfect separation’, i.e. because no firms in a particular category of a factor or dummy variable will use a particular structure. To the extent that regression models will even report coefficient of such variables,¹¹⁵ the values will not be meaningful. In some cases we de-

¹¹³ Michael C. Jensen, ‘Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers’ (1986) 76 *American Economic Review* 323.

¹¹⁴ See Section 5.2 above, for this definition of pre-/post-choice countries.

¹¹⁵ E.g. in R; by contrast, STATA typically drops such variables entirely, along with a number of observations. Yet, R and Stata logit models still tend to produce almost identical results.

cided to drop such variables out of the regression, e.g. for *foreign directors* in Finland, which is zero for all two-tier firms in the country. Generally, separation or situations close to separation may result in biased estimates when in a maximum likelihood regression model. In such cases, regular logistic regression often produces fitted values of probabilities of 0 or 1 for many observations in the sample.¹¹⁶ Relatedly, logistic regression has been shown to underestimate the probability of very rare events, even when the sample size overall is large.¹¹⁷

One method that addresses this problem is Firth's bias-reduced logistic regression, which is also known as penalised maximum likelihood estimation (PMLE), which uses a penalty function to correct for the bias against such rare events in the maximum likelihood estimate.¹¹⁸ We used PMLE in countries where one board structure was so rare that most 'regular' logistic models produced fitted values of 0 or 1 for more than a handful of observations. In some cases, where models still did not converge, we further dropped problematic variables, especially the industry dummies. In cases where we produced converging models for regular logit (using varying software packages), coefficients tended to be very close to the PMLE estimates, and statistical significance was apparently not affected except on the margins.

6.3. *Logistic regression for countries offering a choice between one-tier and two-tier board structure*

Tables 12 and 13 report the logistic regressions results. We also report results following Firth's PMLE method in the same tables, as the interpretation of the coefficients is the same. Table 12 excludes accounting variables as well as the co-determination variable, which we do have for firms where Orbis does not include the number of employees (this figure is typically only available for firms with accounting data). Table 13 reports the full set of variables, but with reduced sample sizes.

¹¹⁶ On this problem, see Georg Heinze and Michael Schemper, 'A solution to the problem of separation in logistic regression' (2002) 21 *Statistics in Medicine* 2409.

¹¹⁷ Gary King and Langche Zeng, 'Logistic Regression in Rare Events Data' (2001) 9 *Political Analysis* 137-163; Sujuan Gao and Jingzhao Shen, 'Asymptotic properties of a double penalized maximum likelihood estimator in logistic regression' (2007) 77 *Statistics & Probability Letters* 925.

¹¹⁸ David Firth, 'Bias reduction in maximum likelihood estimates' (1993) 80 *Biometrika* 27; Heinze and Schemper, above note 116, p. 2412.

Table 12: Logistic regression with dependent variable 'two-tier model' (# indicates Firth's biased-reduced logistic regression)

	Bulgaria#	Croatia#	Czech Rep.	Denmark#	Finland#	France	Hungary	Lithuania	Luxembourg#	Netherlands	Romania	Slovenia
(Intercept)	-2.91 (2.16)	2.02 (2.06)	-1.14 (0.95)	-10.87*** (1.90)	-0.71 (2.71)	-34.87 (1540.71)	-3.70*** (0.58)	-5.86 (3.80)	-9.33*** (2.39)	18.09 (1686.14)	2.01 (1.55)	17.46 (2713.21)
Number of share- holders (log scale)	0.87* (0.36)	-0.65 (0.61)	2.73*** (0.48)	0.38 (0.36)	-1.24 (0.63)	0.80*** (0.18)	1.14*** (0.20)	1.14 (1.18)	0.17 (0.33)	0.19 (0.17)	0.34*** (0.07)	0.54 (0.32)
Foreign shareholders	1.03* (0.50)	-0.65 (0.79)	0.06 (0.11)	-0.64 (0.57)	-0.19 (1.46)	0.75 (0.56)	-0.78*** (0.15)	0.61 (1.04)	0.57 (0.50)	-0.01 (0.22)	-0.30* (0.12)	-0.62 (0.63)
Largest shareholder	-0.58 (0.91)	0.29 (1.58)	-0.50 (0.68)	1.24 (0.93)	-0.84 (2.17)	0.38 (0.97)	0.52 (0.31)	3.64 (4.25)	1.17 (1.24)	-1.83** (0.59)	-0.72*** (0.18)	-1.27 (0.92)
Shareholder- directors	-2.92*** (0.88)	-0.53 (1.21)	-0.99*** (0.07)	-3.26** (1.10)	-6.32 (4.30)	-3.12** (1.10)	-3.57*** (0.25)	-6.25 (3.59)	-2.47** (0.96)	-1.07 (0.95)	-1.38*** (0.11)	-1.74** (0.53)
Female directors	0.22 (0.59)	1.94 (1.30)	-0.33*** (0.09)	1.23 (0.75)	1.45 (2.15)	0.13 (1.01)	0.48** (0.15)	0.98 (2.09)	-1.25 (1.27)	0.95* (0.48)	2.02*** (0.11)	-0.32 (0.60)
Foreign directors	1.26 (0.95)		-0.19 (0.17)	2.81*** (0.72)		0.83 (1.09)	-0.33 (0.36)	1.50 (2.84)	2.18*** (0.66)	-0.86** (0.33)	-2.07*** (0.24)	3.68 (2.13)
Directors with back- ground	0.54 (0.97)	1.90 (1.29)	0.40* (0.20)	1.49* (0.59)	4.63 (2.94)	0.61 (0.74)	0.48 (0.29)	2.90 (2.33)	0.71 (0.47)	0.75** (0.24)	0.03 (0.27)	-0.17 (0.95)
Shareholders with background	0.24 (0.47)	-1.29 (1.07)	0.10 (0.11)	-0.49 (0.48)	-0.62 (1.54)	0.55 (0.64)	0.34* (0.15)	1.09 (0.98)	1.09* (0.45)	0.13 (0.23)	0.30* (0.14)	0.26 (0.82)
Industry B	0.15 (1.31)		-0.14 (0.55)	1.31 (1.90)		14.23 (1225.65)	0.25 (0.88)			-15.89 (1686.14)	-1.16*** (0.28)	-0.63 (1.55)
Industry C	-1.73 (1.09)		-0.19 (0.23)	-0.15 (1.40)		14.84 (1225.65)	-0.22 (0.22)			-15.86 (1686.14)	-1.05*** (0.13)	0.17 (0.87)
Industry D	0.75 (1.19)		0.11 (0.34)	-0.59 (1.99)		14.42 (1225.65)	0.23 (0.33)			-15.48 (1686.14)	-1.24*** (0.20)	16.24 (2785.53)
Industry E	0.78 (1.75)		-0.14 (0.34)	0.45 (1.91)		15.62 (1225.65)	1.40*** (0.37)			-0.12 (1795.31)	-1.41*** (0.18)	15.74 (1475.62)
Industry F	-0.43		-0.24	-1.74		15.42	-0.41			-14.61	-0.70***	-0.39

	(1.22)		(0.24)	(1.89)		(1225.65)	(0.28)			(1686.14)	(0.13)	(0.94)
Industry G	-3.47		-0.43*	-0.06		15.10	-0.44			-16.40	-0.69***	-0.06
	(1.87)		(0.22)	(1.38)		(1225.65)	(0.24)			(1686.14)	(0.14)	(0.96)
Industry H	-0.63		0.69	-1.14		14.12	1.01***			-15.86	-0.84***	1.15
	(1.37)		(0.36)	(1.87)		(1225.65)	(0.31)			(1686.14)	(0.16)	(1.36)
Industry I	-1.20		-0.37	-0.17		16.09	0.21			-15.22	-0.87***	-0.03
	(1.35)		(0.29)	(1.89)		(1225.65)	(0.37)			(1686.14)	(0.17)	(1.04)
Industry J	0.18		-0.25	0.30		14.67	-0.18			-15.99	-0.54**	0.14
	(1.31)		(0.26)	(1.43)		(1225.65)	(0.25)			(1686.14)	(0.20)	(1.05)
Industry K	1.93		0.16	0.01		14.52	1.31***			-16.39	-1.19***	0.09
	(1.04)		(0.27)	(1.39)		(1225.65)	(0.22)			(1686.14)	(0.25)	(0.93)
Industry L	-2.85		-0.17	-0.40		15.57	-0.70**			-16.46	-0.96***	0.75
	(1.64)		(0.22)	(1.45)		(1225.65)	(0.23)			(1686.14)	(0.14)	(1.26)
Industry M	-0.40		-0.36	0.74		15.62	-0.52*			-16.96	-0.52**	0.29
	(1.28)		(0.22)	(1.39)		(1225.65)	(0.23)			(1686.14)	(0.16)	(0.95)
Industry N	-2.78		-0.10	-0.31		14.48	-0.13			-15.73	-0.96***	-1.35
	(2.03)		(0.27)	(1.55)		(1225.65)	(0.28)			(1686.14)	(0.21)	(1.13)
Industry O	7.04**		12.41	0.78		-2.32	3.19**				1.10	
	(2.61)		(509.60)	(2.67)		(4917.41)	(1.05)				(1.07)	
Industry P	2.59		-0.15	1.48		16.61	0.06			0.64	0.15	16.59
	(1.90)		(0.53)	(1.91)		(1225.65)	(0.54)			(2932.72)	(0.52)	(3956.18)
Industry Q	-1.17		1.40**	1.26		16.53	0.24			-15.29	-2.00***	15.69
	(1.77)		(0.51)	(1.90)		(1225.65)	(0.48)			(1686.14)	(0.40)	(2256.15)
Industry R	0.40		0.06	0.10		15.39	0.38			-14.55	-0.74*	15.88
	(1.72)		(0.32)	(1.98)		(1225.65)	(0.44)			(1686.14)	(0.37)	(1728.87)
Industry S	1.22		0.12	1.41		-0.79	0.35			-16.82	-0.40	-18.96
	(1.40)		(0.68)	(1.88)		(2113.18)	(0.53)			(1686.14)	(0.50)	(2144.13)
Listing	2.95***	0.48	11.16	3.71***	2.40	3.61***	0.59	4.60***	3.65***	0.08	-2.50***	0.83
	(0.39)	(0.66)	(172.28)	(0.83)	(1.53)	(0.47)	(0.51)	(1.17)	(0.72)	(0.43)	(0.17)	(0.70)
Age of company	1.54***	-0.06	0.41***	0.54*	0.16	-0.35	0.71***	-0.28	0.79	0.56***	0.20*	-0.02
(log scale)	(0.27)	(0.40)	(0.07)	(0.25)	(0.55)	(0.19)	(0.11)	(0.43)	(0.41)	(0.12)	(0.09)	(0.44)

Company independence A	-8.87*** (1.79)	2.66* (1.29)	0.68 (0.79)	0.96 (1.08)	-0.21 (1.83)	13.43 (933.59)	-0.16 (0.42)		0.52 (1.74)	-2.74*** (0.80)	-1.37 (1.51)	-16.02 (2713.21)
Company independence B	-8.88*** (1.76)	2.82* (1.24)	0.38 (0.60)	-1.12 (1.43)	-0.55 (1.84)	12.87 (933.59)	0.68 (0.38)	-0.79 (1.47)	-1.21 (1.71)	-2.54*** (0.76)	-1.64 (1.51)	-16.18 (2713.21)
Company independence C	-6.47*** (1.82)	1.75 (1.76)	2.49* (1.08)	1.11 (1.16)	0.76 (2.11)	13.43 (933.59)	2.00*** (0.44)		0.53 (1.60)	-2.94*** (0.76)	-1.93 (1.53)	-16.40 (2713.21)
Company independence D	-7.42*** (1.68)	1.80 (1.04)	0.60 (0.35)	1.06 (0.96)	-0.61 (1.81)	13.46 (933.59)	0.94*** (0.14)	-2.44 (2.39)	-0.60 (1.45)	-2.57*** (0.65)	-1.57 (1.51)	-15.57 (2713.21)
Post-choice establishment		-0.64 (0.90)	-0.61*** (0.13)	2.00** (0.64)	-0.29 (1.05)		-0.36* (0.16)		0.78 (0.63)	0.63 (0.36)	-0.37** (0.13)	-0.73 (0.69)
AIC	714.53	164.91	7401.05	551.26	92.58	571.40	3307.51	77.11	332.01	962.71	7600.73	378.62
BIC	945.69	230.38	7636.36	837.87	144.28	792.58	3521.24	116.16	436.13	1119.23	7831.62	505.08
Log Likelihood	-324.26	-67.45	-3666.5	-241.63	-31.29	-252.70	-1619.76	-25.55	-150.00	-448.36	-3766.37	-156.31
Num. obs.	8143	581	7487	33849	232	6018	3968	149	4952	848	6574	341

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 13: Logistic regression with dependent variable 'two-tier model' (# indicates Firth's biased-reduced logistic regression)

	Bulgaria#	Croatia#	Czech Rep.	Denmark#	Finland#	France	Hungary	Lithuania	Luxembourg#	Netherlands	Romania	Slovenia
(Intercept)	0.43 (3.48)	2.00 (2.77)	1.03 (1.42)	-7.21* (3.02)	10.11 (5.67)	-38.99 (2976.59)	-5.03*** (0.77)	-8.30 (6.55)	-0.77 (3.74)	15.03 (2677.70)	3.40* (1.65)	2.69 (2.64)
Number of share- holders (log scale)	-0.83 (0.59)	-0.91 (0.61)	0.96 (0.56)	-0.91 (0.53)	-0.95 (0.77)	0.19 (0.31)	1.13*** (0.24)	1.42 (1.79)	-0.25 (0.46)	0.06 (0.26)	0.53*** (0.08)	0.37 (0.39)
Foreign shareholders	0.10 (0.84)	-0.70 (0.82)	-0.01 (0.19)	-2.69** (1.00)	1.43 (1.86)	0.48 (0.70)	-0.81*** (0.18)	0.05 (1.50)	0.42 (0.76)	0.71 (0.47)	0.26 (0.14)	-1.18 (0.83)
Largest shareholder	-2.86 (1.50)	0.23 (1.59)	0.29 (0.90)	-0.33 (1.10)	-5.17 (3.26)	-0.81 (1.25)	0.54 (0.37)	2.01 (6.65)	1.46 (1.73)	-1.09 (1.00)	-0.38 (0.20)	-2.71* (1.12)
Shareholder- directors	-2.20 (1.25)	0.57 (1.43)	-0.98*** (0.14)	3.56* (1.49)	-7.39 (4.39)	-1.62 (1.33)	-3.60*** (0.33)	-10.66 (5.49)	0.08 (1.61)	-0.43 (2.00)	-2.05*** (0.13)	-1.43* (0.66)
Female directors	-0.27 (0.92)	1.31 (1.22)	-0.31 (0.18)	0.33 (1.47)	-1.34 (2.90)	1.44 (1.31)	0.38 (0.20)	-3.79 (3.57)	-3.01 (2.52)	1.86 (1.12)	1.86*** (0.12)	-0.24 (0.73)
Foreign directors	1.65 (1.38)		-0.13 (0.33)	6.70*** (1.17)		1.18 (1.43)	0.53 (0.46)	3.06 (3.32)	2.58* (1.02)	-2.32*** (0.68)	-1.89*** (0.25)	11.84* (4.68)
Directors with back- ground	1.94 (1.48)	1.51 (1.35)	0.65 (0.40)	2.73** (0.88)	10.22 (5.43)	1.20 (0.97)	0.60 (0.36)	3.97 (3.45)	2.26** (0.76)	0.71 (0.45)	-0.09 (0.29)	-0.49 (1.16)
Shareholders with background	0.38 (0.86)	-1.09 (1.06)	0.12 (0.19)	-1.43 (0.87)	-1.27 (1.56)	0.64 (0.79)	0.29 (0.19)	-0.85 (1.42)	-1.18 (0.69)	0.45 (0.46)	0.33* (0.15)	0.21 (1.11)
Industry B	0.52 (1.59)		-0.71 (0.73)	0.81 (2.14)		15.19 (2236.09)	-0.24 (1.12)			-17.32 (2677.70)	-0.71* (0.33)	-0.76 (1.66)
Industry C	-1.67 (1.44)		-0.50 (0.34)	-1.16 (1.57)		15.89 (2236.09)	-0.58* (0.25)			-16.72 (2677.70)	-0.61*** (0.14)	0.14 (1.00)
Industry D	-0.80 (1.62)		-0.25 (0.48)	-0.29 (2.16)		15.65 (2236.09)	0.55 (0.41)			-17.97 (2677.70)	-0.64** (0.23)	15.33 (3956.18)
Industry E	0.51 (1.96)		-0.25 (0.55)	0.71 (1.96)		15.65 (2236.09)	1.14* (0.45)			-1.16 (2867.64)	-0.85*** (0.21)	15.29 (1537.49)

Industry F	-0.09 (1.49)	-0.42 (0.37)	-1.39 (1.83)	15.82 (2236.09)	-0.23 (0.33)	-15.68 (2677.70)	-0.36* (0.15)	-0.57 (1.06)				
Industry G	-2.27 (1.89)	-0.55 (0.34)	-1.39 (1.63)	16.09 (2236.09)	-0.34 (0.27)	-17.20 (2677.70)	-0.59*** (0.15)	-0.22 (1.07)				
Industry H	-1.98 (1.69)	0.28 (0.48)	-2.00 (1.95)	14.97 (2236.09)	0.67 (0.37)	-17.48 (2677.70)	-0.63*** (0.18)	1.15 (1.50)				
Industry I	-2.35 (1.76)	-0.88* (0.43)	-0.45 (1.91)	16.66 (2236.09)	-0.03 (0.43)	-16.59 (2677.70)	-0.64*** (0.19)	-0.12 (1.24)				
Industry J	-2.14 (1.86)	-0.34 (0.40)	-1.98 (1.92)	15.66 (2236.09)	0.04 (0.28)	-16.41 (2677.70)	-0.42 (0.23)	-0.25 (1.19)				
Industry K	-1.23 (1.53)	0.37 (0.54)	-3.00 (1.87)	0.53 (2399.56)	1.59*** (0.29)	-17.39 (2677.70)	-1.17*** (0.28)	-0.52 (1.27)				
Industry L	-2.04 (1.91)	-0.41 (0.35)	-0.91 (1.88)	16.52 (2236.09)	0.29 (0.28)	-16.82 (2677.70)	-0.98*** (0.16)	1.32 (1.53)				
Industry M	-0.20 (1.57)	-0.31 (0.35)	-1.21 (1.70)	16.63 (2236.09)	0.01 (0.27)	-17.84 (2677.70)	-0.54** (0.18)	0.14 (1.08)				
Industry N	-2.76 (2.28)	-0.19 (0.44)	-2.09 (2.09)	16.41 (2236.09)	-0.10 (0.32)	-16.60 (2677.70)	-1.18*** (0.23)	-1.89 (1.27)				
Industry O	7.62** (2.95)	12.77 (829.39)	-0.84 (2.67)	-2.83 (11828.61)	2.66* (1.34)		2.69 (1.45)					
Industry P	2.46 (1.98)	0.84 (1.10)	2.30 (2.17)	19.31 (2236.09)	0.84 (0.60)	-0.30 (4777.18)	0.17 (0.60)	17.23 (3956.18)				
Industry Q	-0.84 (1.89)	0.87 (0.69)	1.19 (2.04)	17.31 (2236.09)	0.36 (0.52)	-0.63 (3829.56)	-1.98*** (0.44)	14.81 (2702.22)				
Industry R	0.48 (1.77)	-0.13 (0.47)	-2.21 (2.60)	16.98 (2236.09)	0.89 (0.49)	-0.41 (3002.82)	-0.57 (0.44)	15.76 (1790.83)				
Industry S	-0.02 (1.92)	0.56 (1.15)	1.49 (2.04)	-0.74 (3976.34)	0.21 (0.62)	-16.80 (2677.70)	-0.14 (0.52)	-18.68 (2210.88)				
Listing	4.76*** (0.68)	0.47 (0.69)	11.45 (459.32)	3.57** (1.13)	2.23 (1.85)	3.55*** (0.65)	0.12 (0.68)	5.98** (2.18)	1.36 (1.26)	-0.92 (0.67)	-1.88*** (0.18)	0.96 (0.83)

Age of company (log scale)	0.24 (0.33)	0.04 (0.42)	-0.01 (0.14)	-0.18 (0.35)	-0.63 (0.69)	-0.31 (0.26)	0.38** (0.14)	0.40 (0.61)	-0.97 (0.74)	0.63** (0.21)	0.33*** (0.10)	-0.30 (0.55)
Company independ- ence A	-8.79** (3.00)	2.19 (1.26)	-0.25 (1.16)	-0.46 (1.91)	-1.16 (2.47)	14.76 (1964.68)	-0.35 (0.49)		-3.73 (2.33)	1.54 (1.18)	-0.29 (1.60)	
Company independ- ence B	-8.93** (2.77)	2.84* (1.31)	-0.15 (0.92)	0.36 (1.71)	-0.94 (2.46)	14.07 (1964.68)	0.61 (0.48)	-0.50 (1.99)	-4.97* (2.15)	0.91 (1.11)	-0.53 (1.60)	0.18 (0.59)
Company independ- ence C	-6.08* (2.86)	2.39 (1.88)	12.65 (286.73)	3.00 (1.60)	1.42 (2.80)	14.95 (1964.68)	0.90 (0.49)		-4.20* (2.00)	0.52 (1.23)	-0.39 (1.62)	-0.38 (0.87)
Company independ- ence D	-7.28** (2.60)	1.66 (1.01)	-0.75 (0.75)	1.73 (1.51)	0.71 (2.62)	15.09 (1964.68)	0.37* (0.18)	-2.15 (3.44)	-5.13** (1.85)	0.61 (1.03)	-0.38 (1.60)	0.99 (0.72)
Number of employ- ees	0.45 (0.25)	-0.22 (0.26)	0.14 (0.08)	0.78** (0.24)	-0.12 (0.49)	0.17 (0.19)	0.36*** (0.07)		-0.06 (0.26)	0.07 (0.13)	-0.14*** (0.03)	0.24 (0.25)
Assets	0.44* (0.18)	-0.18 (0.19)	0.15** (0.05)	0.03 (0.21)	-0.43 (0.41)	0.36* (0.17)	0.10* (0.04)	0.76 (0.83)	0.17 (0.15)	0.05 (0.11)	-0.46*** (0.03)	0.16 (0.17)
Operating revenue	-0.15 (0.17)	0.35 (0.23)	-0.07 (0.05)	-0.14 (0.12)	0.11 (0.42)	-0.23 (0.17)	0.01 (0.05)	-0.69 (0.69)	0.22 (0.17)	-0.01 (0.11)	0.02 (0.02)	-0.26 (0.20)
Leverage	0.16 (0.70)	-2.47** (0.86)	-0.18 (0.19)	-1.69 (1.15)	-4.89 (2.56)	0.42 (0.86)	-0.32 (0.21)	-0.95 (3.26)	-2.33 (1.22)	-0.57 (0.60)	0.08 (0.10)	0.02 (0.74)
Cash ratio	0.11 (1.35)	0.44 (2.84)	0.28 (0.29)	-0.01 (1.59)	-7.33 (4.10)	0.55 (1.03)	0.91** (0.28)	-11.64 (8.43)	-3.24 (2.15)	0.38 (0.81)	-0.83*** (0.20)	0.48 (1.70)
ROA average	-0.05** (0.02)	-0.02 (0.03)	-0.01 (0.00)	-0.04* (0.02)	-0.00 (0.03)	-0.02 (0.01)	-0.01* (0.00)	0.09 (0.07)	-0.04* (0.02)	-0.02 (0.01)	0.02*** (0.00)	-0.00 (0.02)
Post-choice estab- lishment		-0.20 (0.95)	-0.78* (0.32)	0.21 (1.20)	-0.23 (1.13)		0.08 (0.21)		0.53 (0.95)	1.18 (0.69)	-0.42** (0.15)	-0.95 (0.89)
Co-determination required		1.11 (1.12)	0.08 (0.22)	0.31 (0.81)	2.29 (1.54)	0.15 (0.60)	0.51* (0.21)		0.41 (1.18)	0.63 (0.51)		0.52 (0.62)
AIC	355.31	155.16	2494.68	196.12	81.19	419.72	2220.95	74.54	127.50	397.64	6472.51	316.21
BIC	613.29	249.53	2741.53	466.67	152.62	665.89	2460.39	124.87	232.14	549.84	6743.17	458.24
Log Likelihood	-138.66	-55.58	-1206.3	-57.06	-18.59	-169.86	-1069.47	-19.27	-40.75	-158.82	-3196.26	-119.10
Num. obs.	5513	539	3043	5425	190	3478	2540	121	699	332	6416	282

***p < 0.001, **p < 0.01, *p < 0.05

Overall, it can be seen that the significant coefficients vary considerably between countries, which is not surprising given the different number of observations and their impact on statistical power. We will discuss the substance of the results after presenting the regression analysis for the two countries that offer three different board structures.

6.4. *Countries offering three different board structures (Italy, Portugal)*

Board structure choices in Italy and Portugal cannot be captured with a simple logit or probit regression because there are three options. The most straightforward choice of model in such cases is the computationally simple multinomial logit model. However, this model rests on the ‘independence of irrelevant alternatives’ (IIA) assumption, which says that the addition of a third alternative does not affect the relative odds of selecting either of the two original options.¹¹⁹ After testing some initial models with a Hausman test,¹²⁰ we determined that multinomial logit is not appropriate. Quite intuitively, the choice between the one-tier and two-tier model would be affected if the board-of-auditors model would be made available.

There are various methods to deal with this issue, which tend to be computationally not very tractable. While a nested logit model might be theoretically attractive in situations such as ours, typically it will require a separate set of variables for the different steps in the regression. We ultimately used two separate estimations strategies, namely a multinomial probit model and a simple ‘nested dichotomies’ strategy consisting of two separate binary logit models. A difficulty in both cases is that in Portugal there are very few observations for the non-traditional models, especially the two-tier model. When we include accounting data or the number of employees, all such observations drop from the model because of missing values.

Table 13 reports two multinomial probit models for Italy analogous to the simple logit models reported for the other countries above, and Table 15 does so for Portugal. We also explain the alternative of using ‘nested dichotomies’ which could only be applied for Italy in Table 14.

¹¹⁹ E.g. Jeffrey M. Wooldridge, *Econometric Analysis of Cross-Sectional and Panel Data* (Cambridge, MA: MIT Press, 2002), p. 502; William H. Greene, *Econometric Analysis* (New York: Pearson, 8th ed. 2018), pp. 834-5.

¹²⁰ On the test, see, e.g. J. Scott Long, *Regression Models for Categorical and Limited Dependent Variables* (Thousand Oaks: Sage Publications 1997), p. 184; Greene, *ibid.*, p. 835.

Table 13: Multinomial probit models for Italy

	(1)		(2)	
	One-Tier	Two-Tier	One-Tier	Two-Tier
(Intercept)	-7.275*** (0.693)	-4.392*** (0.337)	-10.99*** (1.187)	-4.735*** (0.499)
Number of share- holders (log scale)	0.324*** (0.0810)	0.196*** (0.0436)	0.130 (0.133)	0.196*** (0.0503)
Foreign share- holders	-0.0837 (0.388)	0.540*** (0.149)	-0.259 (0.393)	0.435** (0.168)
Largest share- holder	1.350*** (0.399)	0.273 (0.163)	0.963 (0.534)	0.216 (0.182)
Female directors	0.918 (0.479)	0.189 (0.205)	1.421 (0.731)	0.220 (0.238)
Foreign directors	0.835 (1.286)	-0.161 (0.574)	1.604 (1.532)	0.254 (0.607)
Directors with background	-0.654 (1.108)	1.142* (0.495)	-1.181 (1.320)	0.758 (0.532)
Shareholders with background	-0.541 (0.422)	0.119 (0.169)	0.0190 (0.509)	0.243 (0.186)
Listing	3.688*** (0.203)	2.196*** (0.143)	3.184*** (0.300)	2.180*** (0.181)
Age of company (log scale)	0.274 (0.146)	0.0879 (0.0822)	0.0174 (0.176)	0.0437 (0.0948)
Post-choice estab- lishment	0.130 (0.318)	0.281 (0.145)	0.235 (0.377)	0.245 (0.164)
Number of em- ployees			0.0592 (0.0805)	0.0254 (0.0429)
Assets			0.290* (0.118)	0.0620 (0.0424)
Operating reve- nue			0.129 (0.130)	-0.0201 (0.0439)
Leverage			-0.0359 (0.554)	0.0357 (0.207)
Cash ratio			0.223 (1.036)	-0.226 (0.380)
ROA average			-0.0150 (0.0143)	-0.00540 (0.00623)
AIC	2678.1		2139.9	
BIC	2856.1		2408.9	
Log Likelihood	-1317.1		-1036.0	
Num. obs.	24099		20145	

An alternative to modelling a choice between more than two alternatives is the use of ‘nested dichotomies’, which are constructed when the choices can be understood as ‘successive binary division of the levels of the response factor.’¹²¹ In our case, this means that firms are first confronted with the decision between the traditional ‘board of auditors’ structure and one of the new structures transplanted from abroad. Only subsequently firms that have opted for a new structure decide about which one. Each step is modelled with a separate logit regression. We report these regressions for Italy in Table 14. Note that the second step only includes those firms that do not use the traditional model. Regression coefficients therefore cannot be generalised to the wider population of firms.

Table 14: Nested dichotomies method with two separate logistic regressions for Italy

	Non-traditional board	2-Tier v. 1-Tier	Non-traditional board	2-Tier v. 1-Tier
(Intercept)	-18.85 (270.28)	24.92 (6522.64)	-20.81 (493.43)	37.02 (6522.64)
Number of shareholders (log scale)	0.39*** (0.07)	-0.42 (0.24)	0.35*** (0.08)	-0.16 (0.37)
Foreign shareholders	0.72** (0.26)	1.34 (0.91)	0.50 (0.29)	2.66* (1.23)
Largest shareholder	0.19 (0.45)	-4.91** (1.83)	0.14 (0.52)	-1.73 (2.23)
Shareholder-directors	-1.41*** (0.30)	6.66** (2.52)	-1.06** (0.35)	5.16 (3.74)
Female directors	0.87* (0.37)	0.53 (1.94)	0.79 (0.45)	-1.20 (3.53)
Foreign directors	0.25 (0.92)	0.89 (4.56)	0.92 (0.99)	-0.51 (5.76)
Directors with background	1.78* (0.82)	3.56 (3.24)	1.04 (0.90)	3.65 (4.69)
Shareholders with back-ground	0.07 (0.28)	0.27 (0.98)	0.43 (0.32)	-0.54 (1.46)
Industry A	0.63 (1.47)	-10.18 (9224.40)	0.66 (1.52)	-14.28 (9224.40)
Industry B	0.58 (1.38)	0.49 (7955.85)	-0.16 (1.51)	2.71 (7891.62)
Industry C	0.55 (1.08)	-19.88 (6522.64)	0.07 (1.14)	-20.99 (6522.64)
Industry D	0.98 (1.13)	-21.24 (6522.64)	0.71 (1.20)	-19.55 (6522.64)
Industry E	1.02 (1.14)	-2.76 (6863.75)	0.73 (1.20)	-3.58 (6851.01)
Industry F	0.85 (1.11)	-18.58 (6522.64)	0.30 (1.19)	-17.65 (6522.64)
Industry G	0.55	-19.29	0.22	-19.38

¹²¹ John Fox and Sanford Weisberg, *An R Companion to Applied Regression* (Los Angeles: SAGE Publications, 2nd ed. 2011), p. 264. Note that this method is distinct from a ‘nested logit’ model, which was not workable with our dataset.

	(1.10)	(6522.64)	(1.15)	(6522.64)
Industry H	0.56	-17.54	0.26	-16.95
	(1.12)	(6522.64)	(1.18)	(6522.64)
Industry I	0.20	-19.76	0.11	-21.66
	(1.23)	(6522.64)	(1.29)	(6522.64)
Industry J	1.45	-20.80	1.17	-23.32
	(1.10)	(6522.64)	(1.16)	(6522.64)
Industry K	0.51	-18.61	-0.14	-17.40
	(1.11)	(6522.64)	(1.21)	(6522.64)
Industry L	0.75	-19.28	1.08	-21.36
	(1.10)	(6522.64)	(1.17)	(6522.64)
Industry M	0.85	-19.18	0.45	-15.99
	(1.10)	(6522.64)	(1.17)	(6522.64)
Industry N	0.91	-2.29	0.64	-3.07
	(1.14)	(6800.32)	(1.20)	(6813.91)
Industry O	0.38	-37.51	0.32	-36.55
	(1.66)	(9224.40)	(1.88)	(9224.40)
Industry P	-11.09		-12.07	
	(450.00)		(808.52)	
Industry Q	-0.46	-2.59	-0.77	-7.25
	(1.48)	(9224.40)	(1.52)	(9224.40)
Industry R	1.32	-19.33	1.11	-21.20
	(1.14)	(6522.64)	(1.22)	(6522.64)
Listing	3.68***	-3.61***	3.41***	-0.85
	(0.19)	(0.79)	(0.24)	(1.10)
Age of company	0.33*	0.01	0.20	0.43
(log scale)	(0.14)	(0.33)	(0.16)	(0.47)
Company independence A	11.53		12.49	
	(270.28)		(493.43)	
Company independence B	11.41	0.34	12.22	-0.42
	(270.28)	(0.79)	(493.43)	(1.06)
Company independence C	12.21	-0.07	12.97	0.04
	(270.28)	(1.05)	(493.43)	(1.33)
Company independence D	11.47	1.31	12.29	-0.90
	(270.28)	(0.99)	(493.43)	(1.22)
Post-choice establishment	0.54*	-0.53	0.52	-2.57
	(0.25)	(0.78)	(0.28)	(1.37)
Number of employees			0.08	-0.34
			(0.07)	(0.24)
Assets			0.11	-0.78
			(0.09)	(0.43)
Operating revenue			0.04	-0.09
			(0.09)	(0.44)
Leverage			0.08	-1.23
			(0.37)	(1.79)
Cash ratio			-0.20	-5.24
			(0.67)	(3.21)
ROA average			-0.01	0.05
			(0.01)	(0.05)
AIC	2427.89	237.27	1964.19	182.43

BIC	2702.92	354.15	2280.61	313.73
Log Likelihood	-1179.95	-86.64	-942.10	-53.21
Num. obs.	24076	285	20141	234

*** p < 0.001, ** p < 0.01, * p < 0.05

Finally, in Portugal the number of firms in the second stage (especially firms choosing the two-tier model) proved to be too small to make the nested dichotomies method workable. In Table 15, we therefore report only the first stage in which the dependent variable is the selection of a non-traditional model. Since there were only 28 such firms in total, we again used the Firth method¹²² to account for very rare events, which improved the efficiency relative to regular logit regression. We were able to fit a multinomial probit regression for a reduced set of variables, which we also report in the table.

Table 15: Firth's biased-reduced logistic regression with dependent variable: 'non-traditional board' for Portugal (columns 1 and 2); multinomial probit for Portugal (3a) and (3b).

	Bias-reduced logit		Multinomial probit	
	(1) Non-traditional board	(2) Non-traditional board	(3a) One-tier	(3b) Two-tier
(Intercept)	-10.30*** (2.60)	-8.68** (2.84)	-7.186*** (0.941)	-13.52*** (3.141)
Number of shareholders (log scale)	1.39*** (0.28)	0.61 (0.36)	0.845*** (0.194)	0.846 (0.494)
Foreign shareholders	0.30 (0.56)	0.21 (0.66)	0.0608 (0.361)	1.281 (0.991)
Largest shareholder	1.90 (1.31)	-0.86 (1.25)	0.851 (0.529)	1.462 (1.818)
Shareholder-directors	-0.99 (1.27)	1.30 (1.22)	-2.303* (1.168)	1.063 (1.715)
Female directors	-0.71 (1.11)	-0.75 (1.35)	-0.224 (0.685)	-1.757 (2.958)
Foreign directors	2.15 (1.44)	5.45*** (1.53)	0.961 (0.925)	-3.340 (7.669)
Directors with background	-2.59** (0.87)	-0.83 (1.08)	-1.086 (0.555)	-0.589 (2.426)
Shareholders with background	1.04 (0.62)	0.55 (0.73)	0.297 (0.412)	0.620 (0.995)
Industry A	-2.43 (2.05)	-2.62 (1.91)		
Industry B	-2.14 (2.43)	-5.00 (2.95)		
Industry C	-3.67* (1.74)	-4.85** (1.72)		
Industry D	-1.16 (1.73)	-3.38 (1.91)		

¹²² See Section 6.3, above.

Industry E	-1.43 (2.06)	-2.07 (1.95)		
Industry F	-3.33 (2.06)	-5.16* (2.25)		
Industry G	-4.83* (2.02)	-5.96** (1.95)		
Industry H	-2.50 (2.03)	-3.75* (1.88)		
Industry I	-2.11 (1.77)	-2.37 (1.73)		
Industry J	-1.43 (1.68)	-2.76 (1.67)		
Industry K	0.11 (1.60)	-1.64 (1.64)		
Industry L	-3.78 (2.05)	-3.05 (1.89)		
Industry M	-1.00 (1.65)	-2.82 (1.64)		
Industry N	-0.41 (1.68)	-1.22 (1.60)		
Industry O	4.55* (1.86)	1.73 (2.51)		
Industry P	-0.72 (2.13)	-0.70 (1.97)		
Industry Q	-2.05 (2.07)	-2.31 (1.90)		
Industry R	-2.42 (2.49)	-1.27 (1.93)		
Listing	3.16*** (0.67)	2.70** (1.00)	1.890*** (0.436)	2.111* (1.011)
Age of company (log scale)	1.40*** (0.34)	0.72 (0.49)	0.394 (0.203)	1.501** (0.524)
Company independence A	-1.74 (1.63)	-3.60** (1.39)		
Company independence B	-1.94 (1.49)	-5.57*** (1.48)		
Company independence C	-0.90 (1.47)	-3.01* (1.47)		
Company independence D	-2.06 (1.28)	-3.51** (1.15)		
Post-choice establishment	-0.41 (0.73)	-0.49 (0.82)	-0.449 (0.502)	2.359 (1.250)
Number of employees		-0.39* (0.16)		
Assets		0.04 (0.21)		
Operating revenue		0.79** (0.26)		
Leverage		0.31 (0.90)		

Cash ratio		2.12 (1.20)	
ROA average		-0.06*** (0.02)	
AIC	453.51	270.56	312.9
BIC	708.16	555.16	492.6
Log Likelihood	-192.75	-95.28	-132.4
Num. obs.	13225	9090	13225

***p < 0.001, **p < 0.01, *p < 0.05

6.5. Overview of results and discussion

The preceding regression results provide a wealth of information. In order to gain a general overview, Tables 16 and 17 summarise the results of the significant coefficients.

Table 16: Overview of results (significant coefficients without financial data)

Group	Variable	BG	HR	CZ	DK	FI	FR	HU	LT	LU	NL	RO	SI	IT	PT
1	Number of shareholders	+		+			+	+				+		+	+
	Foreign shareholders	+						-				-		+	
	Largest shareholder										-	-			
	Shareholder-directors	-		-	-		-	-		-		-	-	-	
	Female directors			-				+			+	+		+	
	Foreign directors				+					+	-	-			
	Directors with preference			+	+						+			+	-
	Shareholders with preference							+				+			
	2	Industry													
Listing		+			+		+		+	+		-		+	+
Age of company		+		+	+			+			+	+		+	+
Company independence															
5	Post-choice establishment			-	+			-				-		+	

Note: dark shades for p<0.01 (including p<0.001), light shades for p<0.05 (whereby for the variables *industry* and *company independence* the table shows the highest level of significance). For Italy and Portugal the table shows the results for the dependent variable 'non-traditional board'.

Table 17: Overview of results (significant coefficients with financial data)

Group	Variable	BG	HR	CZ	DK	FI	FR	HU	LT	LU	NL	RO	SI	IT	PT
1	Number of shareholders							+				+		+	
	Foreign shareholders				-			-							
	Largest shareholder												-		
	Shareholder-directors			-	+			-				-	-	-	
	Female directors											+			
	Foreign directors				+					+	-	-	+		+
	Directors with preference				+										
	Shareholders with preference											+			
	2	Industry													
Listing		+			+		+		+			-		+	+
Age of company								+			+	+			
Company independence															
3	Number of employees				+			+				-			-
	Assets	+		+			+	+				-			
	Operating revenue														+
4	Leverage		-												
	Cash ratio							+				-			
	ROA average	-			-			-		-					-
5	Post-choice establishment			-								-			
	Co-determination required							+							

Note: dark shades for $p < 0.01$ (including $p < 0.001$), light shades for $p < 0.05$ (whereby for the variables *industry* and *company independence* the table shows the highest level of significance). For Italy and Portugal the table shows the results for the dependent variable ‘non-traditional board’.

While the regression results are different across countries (and therefore running a regression that would combine all countries makes little sense), it is possible to identify some general patterns for most of the countries (Romania being the exception, as discussed at the end of this section).

Starting with the governance-related variables of group (1), first, a higher total number of shareholders is often associated with the two tier system. The reason could be that larger companies tend lean more strongly toward the two-tier-model. A two-tier model may, at least in certain countries, better help outside shareholders to monitor and to make their voice heard. This seems particularly likely when representatives of minority shareholders are appointed to the supervisory board, either through an informal arrangement, a shareholder agreement, or a legal requirement.¹²³ However, this variable loses some of its significance when we add other size-related variables. The number of shareholders is also a proxy for firm size, which may matter independently from the number of shareholders. This can also be seen in the *listing* variable, which is very often significant.

¹²³ For an overview of European countries with such a requirement see TSG Baltic, *Study on Minority Shareholders Protection* (May 29, 2018), available at <https://ssrn.com/abstract=3225130>, at pp. 85-8.

Second, in some cases it can be seen that, the larger the largest shareholder, the less two-tier companies. This is plausible: smaller, e.g., family-type businesses are more likely to choose the more flexible one-tier model (and it may also be beneficial that it puts even non-executive directors into closer proximity to business decisions). In even more cases, there is a negative relationship between a two-tier board and companies with directors who are also shareholders of this company; we suggest that, as this is typical for many smaller family-type businesses, a similar line of reasoning applies.

Third, female directors tend to be more frequent in two-tier companies. While recent years have seen a general increase in female board membership (also prescribed in some corporate laws and recommended in some corporate governance codes),¹²⁴ it is plausible that this is more pronounced in the more structured environment of the two-tier model. It could also be suggested that, in some countries, there could be some resistance to the idea of giving women a greater say in companies; thus, a further explanation could be that appointing women to the supervisory board may be more readily accepted than providing them with the more managerial responsibility in the one-tier board.

Fourth, the variables relating to the foreign nationality of shareholders and directors could reflect that two-tier models are more likely to benefit the operation of the board in a more complex corporate governance environment. However, the results are rather inconsistent: foreign directors matter with expected result for Denmark and Luxembourg; i.e. in the rare cases that Danish and Luxembourgish firms choose the two-tier model (see Figure 2 in Section 4.1, above), they are more likely to have foreign directors (likewise for Portugal for any choice different from the traditional model); by contrast, there is no effect in the traditional two-tier countries (Croatia, Czech Republic, Hungary and Slovenia).

Thus, it may rather matter who the foreigners are and what their national origin is. In countries with a traditional one-tier model, foreign directors/shareholders may have a tendency to pull firms toward the two-tier model, whereas in two-tier jurisdictions we may observe the opposite effect. Our variables indicating the background of directors with different nationalities all point in the right direction (i.e. they are positive), even if they are only marginally significant. Nationality may not in all cases drive preferences (e.g. individuals may be more familiar with corporate governance systems from other jurisdictions where they live; citizenship is a very imprecise measure in this respect).

With respect to the variables describing the firm and its business, i.e. group (2), the clearest result is that listed companies are more likely to choose the two-tier model (and in Italy and Portugal: either the two-tier or the one-tier model). This is likely to reflect a greater need of listed companies for a structured supervision of the management. As listed companies often have professional executives, there is also a lesser need of being able to combine the positions of being both an executive and a director of the company (as may be the case in many smaller one-tier companies). It can also be seen, however, that listing is not significant for the traditional two-tier countries: thus, here, even non-listed public firms may frequently decide to stay faithful to the two-tier structure.

¹²⁴ See e.g. Monika Leszczyńska, 'Mandatory Quotas for Women on Boards of Directors in the European Union: Harmful to or Good for Company Performance?' (2018) 19 *European Business Organization Law Review* 35.

Company age is also significant for many countries: thus, older companies are more likely to be two-tier companies, and younger companies are more likely to be one-tier companies. This confirms the finding of the previous section that we observe a decline of the two-tier model in countries with board choice.¹²⁵ This result is most plausible for countries which recently introduced the one-tier model (Czech Republic, Hungary), and maybe for those which have always allowed choice (Bulgaria, the Netherlands for small companies). It is more surprising for countries that only introduced the two-tier model recently (Denmark, Romania, also Italy and Portugal as one of the two new options); yet, here a possible interpretation may be that, as companies grow older and the founding generation retires, agency costs increase and a greater need for a strict division between management and supervision arises.

The variables for industry and company independence are significant for some of the countries that have a relatively large number of companies with different board structures in our dataset. Thus, it seems plausible to say that some of these firm-characteristics can determine the board structure; yet, it is difficult to identify clear patterns (e.g. in the sense that companies from particular industries would choose a particular board model).

The variables of groups (3) show that larger firms often have a two-tier board, presumably because these firms require a more extensive supervision of management. The main variable that is often significant captures the company's assets; in some cases, the number of employees also matters; the variable describing average operating revenue over the past three tends to be insignificant and may provide a less accurate description of company size. In any event, in several (but not all) countries these three variables exhibit some multicollinearity.

With respect to the variables on the firm's profitability and financial structure, i.e. group (4), results for leverage and cash ratio are inconsistent. ROA average is negatively correlated with the use of two-tier companies in countries where one-tier is the dominant model (Bulgaria, Denmark, Hungary, Luxembourg, see Figure 2 in Section 4.1, above). A possible explanation could be that, as some claim, a two-tier board structure may act too conservatively in rejecting good but risky projects;¹²⁶ yet, the reverse causal relationship cannot be excluded either (i.e. companies with low ROA may implement a two-tier structure in order to fix existing problems). Without a research design that permits causal inference, this interpretation remains speculative. Interestingly, Pellegrini and Sironi's propensity score study found that unlisted one-tier firms in Italy had a smaller ROE and ROA than their matched counterparts that had retained the traditional *collegio sindacale*.¹²⁷ Our less ambitious regression design does not show such a result for Italy. However, in Portugal non-traditional companies (most of which use the one-tier model) have a lower ROA than traditional ones. However, wherever this variable is significant, the coefficient is very small, which is why we probably should not read too much into this.

The final group (5) of the two law-related variables shows largely plausible results for the dummy variable on 'post-choice establishment': it is negative for the Czech Repub-

¹²⁵ Section 5.3, above.

¹²⁶ See Section 2.2, above.

¹²⁷ Pellegrini and Sironi (2017), above note 37.

lic and Hungary, which only used to have the two-tier model,¹²⁸ and positive for Denmark and Portugal, which only used to have the one-tier or board-of-auditors model. It is difficult to say what may account for further details in the variation of this variable as it may depend on, for example, the expertise and motivation of local lawyers advising on changes to a company's board structure.

The variable on whether the number of employees exceeds the legal threshold for employee board representation is largely insignificant. We also examined further details about the firms in countries with employee co-determination, tracking the choice of board models by the number of employees. Here, we found that, while a higher number of employees is correlated with the choice of the two-tier model, there is usually no clear cut-off point at the respective thresholds for employee co-determination. The only country where there could be such an effect is Slovenia: it requires employee co-determination from 50 employees. In the band of 40-49 employees we have good number of one-tier companies (8 out of 27) but only few in the band of 50 to 69 employees (3 out of 28). It should also be noted that Slovenia is the only country in our sample that has a 50% requirement for employee board participation;¹²⁹ thus, in countries with a lower participation requirement, the possible pull towards the two-tier model may be less pronounced.

The one country that deviates from some of the general findings is Romania: here two-tier companies tend to have fewer foreign directors and shareholders, they tend to be non-listed, they tend to have smaller assets and a lower number of employees, and they tend to be older and precede the introduction of the two-model in Romania.¹³⁰ Romania also has an unusual non-linear pattern in the prevalence of the two board models. As shown in Figure 7, the popularity of the two-tier model first increases in firm size, but then sharply drops of among the largest firms.

¹²⁸ See also Section 5.2, above.

¹²⁹ See Section 4.2, above.

¹³⁰ As already noted in Sections 4.1 and 5.2, above.

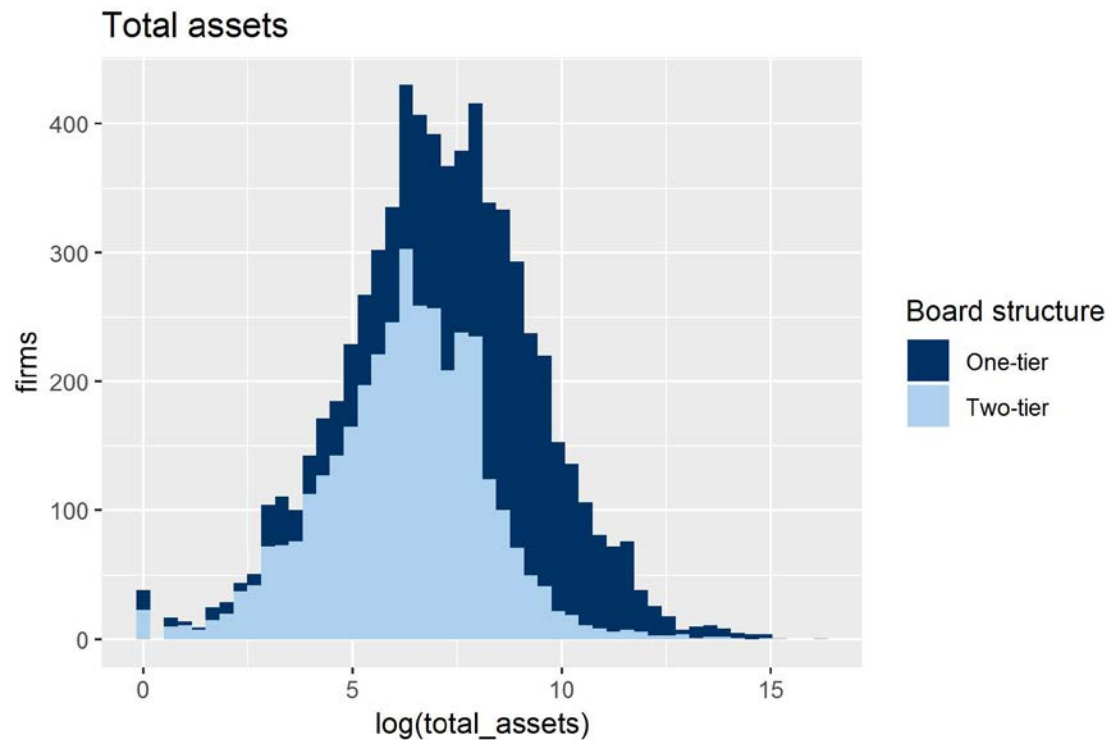


Figure 7: Prevalence of board models in Romania by firm size

Further analysis of the Romanian data reveals that more than one third of its public companies were established in the early 1990s. These companies were former state enterprises which were directly transformed into public companies, initially often with significant state ownership.¹³¹ The majority of these companies implemented the two-tier model when it was introduced in Romania in 2006. Thus, it is these small (but not very small) companies that seem to drive the result as regards the preferences for the two-tier model in Romania.

7. Conclusion

Today, many European countries allow choice between a one-tier model and a two-tier board model, with Italy and Portugal also providing a third model with a board of auditors. Yet, empirical research on the actual choices made by companies is rare. We have aimed to fill this gap, collecting data about the choice of board models from the 14 EU countries which allow such choice. Our initial analysis has found the following:

First, the country-based comparison of board choice has shown that there are profound country differences in the prevalence for one of the board models: in general, the one-tier model is more popular, but there are also some countries with a preference for the two-tier model (and in Italy and Portugal the model with a board of auditors has remained the dominant one). Exploring possible reasons for these different country preferences, we found that corporate laws have little impact; rather, using the method of a

¹³¹ See OECD, 'Corporate Governance in Romania' (2001), available at <http://www.oecd.org/corporate/ca/corporategovernanceprinciples/2390492.pdf> at p. 13.

fuzzy-set qualitative comparative analysis, shows that path dependence is the main determinant for these country differences.

Second, the investigation of time trends has analysed the empirical result that introducing board choice leads to a gradual decline of the two-tier model. This finding holds at the aggregate level and at the level of individual countries. We also established that in the countries which introduced the one-tier model there has been a decline of two-tier companies, both in comparison to the previously established companies and in the subsequent years. We suggest that this observation can provide normative lessons for other countries: thus, in existing two-tier countries, law makers should consider introducing the possibility of choosing the one-tier model.

Third, the regression analysis based on firm-level data has found that a combination of factors can explain the choice of the board structure in the 14 countries. As could be expected, many two-tier companies tend to be larger, older, more complex and more diverse (e.g., in terms of female or foreign board membership). By contrast, other variables are often not significant (e.g., the respective threshold for employee co-determination). We also discussed the results relevant for specific countries, notably the choice between three models in Italy and Portugal and the somehow counter-intuitive but historical contingent situation in Romania.