Operationalization of Employment Protection Legislation and Implications for Substantive Results: Example of Perceived Job Insecurity and Temporary Employment Risk

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Abstract

Almost all comparative research on the effects of employment protection legislation of regular employees (EPLR) is based on the index of the OECD. This study argues that this index is methodologically flawed and proposes a new EPLR index, following a theory-driven formative index construction approach. To demonstrate the implications using the OECD EPLR index versus the new index, we use two empirical applications: First, the effects of EPLR on perceived job insecurity, using multi-level models with data from the European Social Survey, the European Working Condition Survey, and the European Quality of Life Survey. Secondly the temporary employment risk for new hires, using multi-level models with data from the European Labour Force Survey. Whereas the results based on the OECD EPLR index significantly deviate from the hypotheses in the literature, the results using the new EPLR index is compliant with the hypotheses in the literature. This demonstrates higher criterion validity of the theory-driven new EPLR index and also calls for replications of previous research that is based on the index of the OECD.

Contents

1 Introduction[1]

Previous research on the effects of employment protection legislation on unemployment has led to contradictory results. Some studies find employment protection legislation of regular employees (EPLR) has an increasing effect on overall unemployment (Holt and Hendrickson, 2017; Lazear, 1990), others find no effect (Addison et al., 2000; Addison and Grosso, 1996; Addison and Teixeira, 2003; Blanchard and Portugal, 2001; Nickell, 1997; OECD, 2004). Although some studies find that EPLR increases youth unemployment (Boeri and Ours, 2013; Breen, 2005; Esping-Andersen, 2000; Heckman and Page, 2000; OECD, 2004, 2006), a replication by Noelke (2016) suggests that these results may be an artifact. The discussion about which estimates are to be believed, focuses on the research design and statistical analysis techniques (e.g., Checchi and Leonardi, 2016; Noelke, 2016). A Discussion on the operationalisation of the theoretical concept of EPLR is so far missing and all comparative research is based on the OECD EPLR index (OECD, 2013). In this paper, we close this blind spot and evaluate this key variable. In all three steps of index construction – choice of items, normalization of items, and aggregation – the OECD EPLR index violates key assumptions about the latent theoretical construct. We, therefore, propose a new, theory-driven index for EPLR constructed with the same OECD items, that solves these methodological flaws. We examine the two indices regarding criterion validity and the effect on substantive results using two examples. We examine 1) the effect of EPLR on the subjective job security of permanent and temporary employees and 2) the effect of EPLR on temporary employment risk for new hires. For both examples, we find that the proposed indicator leads to theory-compliant results, whereas the OECD EPLR index leads to results, that contradict expectations from the literature.

The remainder of the paper is structured as follows. In section 2, we give an overview over the current usage of OECD EPLR index as a measurement of EPLR and discuss its methodological deficiency. In section 3, we lay out the construction of the new indicator for EPLR. In section 4, we test the criterion validity of the proposed indicator by applying it to two exemplary research problems. In section 5, we conclude our study with a summary of our results and implications for future research.

[1] We want to thank Christof Wolf, Felix Weiss, and the participants of the ISA RC28 Spring Meeting 2019 and the GESIS Research Day 2018 for helpful comments. A previous and longer version of this paper was published as: Balz, Anne and Pforr, Klaus (2020) Operationalization of employment protection legislation and implications for substantive results: Example of perceived job insecurity and temporary employment risk. In: Balz, Anne (2020) *Causes and consequences of job insecurity in modern societies: temporary employment, employment protection legislation and turnover intentions in a comparative perspective.* Open Access Mannheim [Dissertation]. https://madoc.bib.uni-mannheim.de/53498.

2 Current usage of the OECD index as an indicator for employment protection

The OECD EPLR index is used in most comparative research on the effects of EPLR. Most recent studies (e.g., Baranowska and Gebel, 2010; Gebel and Giesecke, 2011, 2016; Noelke, 2016) include it to measure employment protection for regular employees. This operationalization can be considered as state of the art (Checchi and Leonardi, 2016: 532). Other studies use the OECD EPLR index in addition to the OECD sub-indices on regulations on temporary employment and protection against collective dismissals. Older studies use the OECD overall index[2] that calculates a weighted average between the EPLR sub-index and the two other sub-indices (Breen, 2005; de Lange et al., 2014; Gangl, 2003, 2008). Others use the differences between the sub-indices (Barbieri and Cutuli, 2016) or the ratio (Biegert, 2017). All these variations are based on the EPLR sub-index.

The predominance of the OECD EPLR index is reflected by the wide consensus of what the OECD EPLR index is supposed to measure: the protection of permanent employees against dismissal (e.g., Barbieri and Cutuli, 2016, p. 503).[3] However, so far, only a brief description of the development of the index exists (Allard, 2005; Venn, 2009), and a detailed discussion and assessment of its validity are missing. The minimal documentation in Allard (2005) and Venn (2009) on the development of the OECD index and its sub-indices has significant gaps concerning the theoretical foundation of the index, and the documentation lacks validation studies.

Although the OECD EPLR index includes a wide range of items related to the dismissal of regular employees, it poorly reflects the theoretical construct protection against dismissal, because the mapping and scaling of the theoretical sub-dimensions to the items (i.e. normalization, Drewnowski, 1974) and the aggregation of the items are not theoretically grounded. The OECD EPLR index employs the empirical normalization strategy, i.e. the ranges of the theoretical construct of the sub-dimensions are identical to the empirical realizations of the respective items. Therefore, the realized minima and maxima of the sub-dimensions make up the common scale among the different subdimension. This means that items, which differentiate only on one end of the theoretical construct, are artificially stretched and mask those items that differentiate strongly. Moreover, the OECD EPLR index uses an additive aggregation rule (see Goertz, 2006), which implies perfect compensation between the different sub-dimensions. From the theoretical perspective, this seems implausible for almost all sub-dimensions. If, for example, a country does not impose any restrictions on the grounds for dismissal and the dismissal of permanent employees is legally permitted for almost any reason, the consequences in the form of penalties of an unfair dismissal are irrelevant, because they will never occur.

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2 The OECD overall index was published under the name “overall strictness of protection against dismissals” in the June 1999 Employment Outlook (OECD, 2004). The theoretical construct EPL includes a variety of regulations that can be separated into three independent theoretical sub-dimensions: 1) protection of regular workers against individual dismissal, 2) specific requirements for collective dismissals, and 3) regulations on temporary employment (OECD, 2014: 1).

3 In the literature, this also is called “job security provisions” (Noelke, 2016), “regulation of permanent work” (Baranowska and Gebel, 2010), “employment protection for regular workers” (Barbieri and Cutuli, 2016: 503), “employment protection of regular contracts” (Gebel and Giesecke, 2011), or “employment protection for regular jobs/of permanent contracts/of permanent work contracts” (Gebel and Giesecke, 2016). However, commonly and a bit confusingly the term EPL is also often used as a synonym for protection of regular employees against dismissal, which also is reflected in the name of the original EPL index of the OECD, which included all three dimensions and was published under the name overall strictness of protection against dismissals.

Due to these problems with the normalization rule and the aggregation, the measurement of the OECD EPLR index deviates substantially from its theoretical construct. Although already Bertola et al. (2000) criticized the validity of the index, they did not offer a solution. In the next section, we lay out a new indicator that closes this gap.

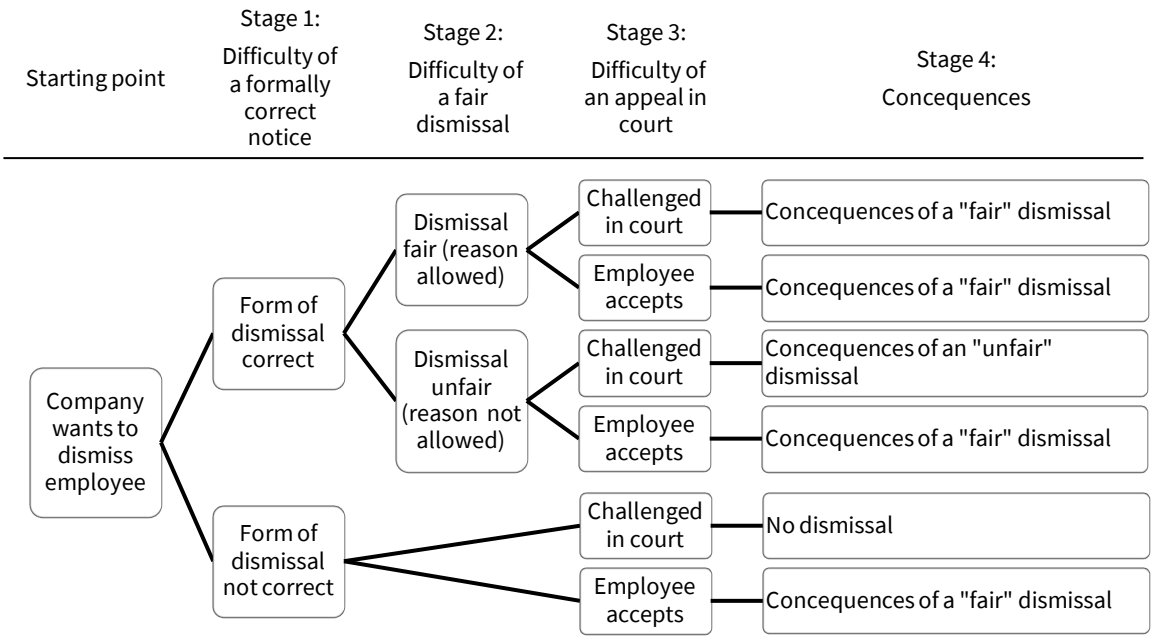
3 New Indicator for Employment Protection Legislation for Regular Employees

There are two approaches to index construction. With the reflexive index approach, one identifies measurable intercorrelated variables that are causally affected by the latent construct. With the formative index approach, one identifies measurable variables that are causally generative of the latent construct (Edwards, 2011). As in cross-national research, we want to summarize different aspects of national legislation into one indicator; therefore, the formative index construction logic is more appropriate (Bollen and Lennox, 1991: 306).[4] For the formative index approach, we have to define the latent construct and its theoretical subdimension. Moreover, we have to determine how the sub-dimensions generate the latent construct. Furthermore, we have to specify how the sub-dimensions are operationalized. Finally, we have to specify how the sub-dimensions together aggregate to the latent construct.

3.1 Definition of the latent construct EPLR and derivation of the sub-dimensions

To determine the sub-dimensions of this latent EPLR construct, we use a theoretical model to understand the dismissal process.

Figure 1 Dismissal Procedure



Source: Own presentation.

[4] Reflexive index construction requires correlation among the item from which the index is constructed (Latcheva and Davidov, 2014: 750). As can be seen in Table A1 in the appendix, the items of the OECD EPLR index correlate only weakly.

Figure 1 shows the flow diagram of the dismissal process. If a company wants to dismiss an employee (Stage 1), notice must be given. This notice can be valid in form or not (e.g., a verbal notice instead of a written notice as required). Therefore, the first factor is the difficulty of formally correct notice. If the notice is valid in form, the next bar to pass is whether the reason for dismissal is legally valid or not (Stage 2), so the second decisive factor is the difficulty of a fair dismissal. In any case, the employee can take legal action against the dismissal (Stage 3). Therefore, the difficulty of an appeal is the third decisive factor. We assume that in the event of a challenge in court, the courts will rule according to the law[5]. At the end of the dismissal process, the outcomes or consequences are listed (Stages 4). Costs for employers correspond to the benefits for employees and vice versa.

This dismissal procedure model implies that a formative EPLR indicator should include the following sub-dimensions: the difficulty of a formally correct notice, the difficulty of a fair dismissal, the difficulty of challenging a dismissal in court, and the consequences of a fair or unfair dismissal. To operationalize these sub-dimensions, one must determine the measurable factors that determine those difficulties.

3.2 Operationalization of the sub-dimensions of EPLR

To operationalize these sub-dimensions, we use the legal situation as the starting point. Because the OECD also used the legal situation to construct the OECD index (OECD, 2004) and this coding of country laws into items has been proven to be reliable (Noelke, 2016: 22f. Online-Appendix), we can use the existing OECD coding (OECD, 2004) to construct the new EPLR index. This offers the advantages that our index can be constructed with existing data.

The first subdimension (Stage 1) is the "difficulty of a formally correct notice". The OECD offers two items that influence this dimension: "notification procedures" and "delay to start a notice"[6]. The OECD understands these items as "procedural inconveniences". The items capture the form that a valid notice of termination must take and how long employers must wait before notice of termination can be issued in a valid form. If these restrictions on the form of a notice of termination are not complied with, the notice is invalid. The "difficulty of fair dismissal" (Stage 2) can be measured by the item "definition of unfair dismissal", which indicates the grounds on which a dismissal is legally permissible. Stage 3 refers to how difficult it is for employees to challenge a wrongful termination in court. There is no coding for this within the EPLR framework of the OECD, because this difficulty cannot be derived directly from the law.[7] We use collective bargaining coverage[8] as a proxy. In other contexts, the degree of organization of trade unions has been used as a proxy for their influence in society, which also can serve as a proxy for the difficulty to challenge an employee's unfair dismissal in court. Thus, data on employees' access to union support, legal advice or

[5] This means we do not account for possible grey areas, unsystematic decision error or a bias in favor of employees or employers in the legal system of countries.

[6] Delay to start a notice: Estimated time includes, where relevant, the following assumptions: 6 days are counted in case of required warning procedure, 1 day when dismissal can be notified orally or the notice can be directly handed to the employee, 2 days when a letter needs to be sent by mail and 3 days when this must be a registered letter.

[7] During the development of the OECD indicators, a discussion was held as to whether some aspects of the legal system such as “burden of proof,” “contested dismissal cases per 1,000 workers,” or “average time for a decision in labor cases” should be included (Venn, 2009: 27–47). However, the role of courts was not included in the EPLR OECD index which has been criticized afterwards (Bertola et al., 2000: 67–70).

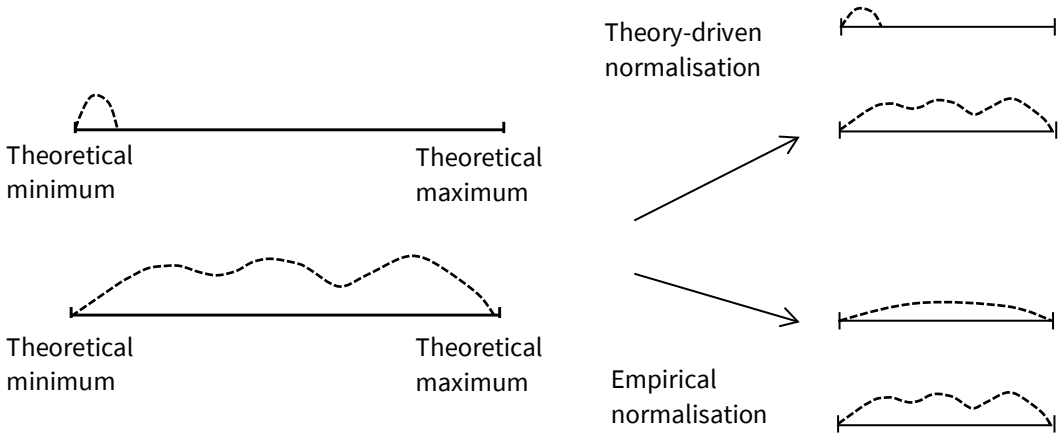
[8] Collective bargaining coverage rate corresponds to the ratio of employees covered by collective agreements divided by all wage earners with a right to bargaining (see OECD, 2019; Visser, 2019).

legal support from union lawyers usually are available. Ensuring that employees are aware of their rights and helping them to enforce these rights reduces the difficulty to contest an unfair dismissal in court. The data on the coverage rate of trade unions also is provided by the OECD (2013). Stage 4 distinguishes between the consequences of "fair" and "unfair" dismissals. "Notice period" and "severance pay" are regarded as the consequences of a fair dismissal, and the two suitable items for the consequences of an unfair dismissal are "compensation following an unfair dismissal" and the "possibility of reinstatement following an unfair dismissal".

3.3 Normalization of items

The items that operationalize the sub-dimensions from the theoretical model have to be normalized, i.e. they have to be transformed to a common scale. Most normalization procedures are based on the empirical distribution of the items: e.g., Index of Social Progress (Estes, 1997), and Index of Social Health (Miringoff et al., 1999). In rare cases, a theory-driven normalization strategy is chosen: e.g. "Level of Living Index" (Drewnowski, 1974) and the "Human Development Index (HDI)" (UNDP, 1999). The essential aspect of theory-driven normalization is the definition of the "critical points of the indicator," i.e., the survival level and saturation point (Drewnowski, 1974). Below the minimum or the survival level, further deterioration is not to be expected, whereas above the saturation point, a further increase is not to be expected. Usually, there are no objective criteria or unanimous expert opinions to unambiguously determine these critical points (Drewnowski, 1974: 22). Whereas empirical standardization usually can be described in one sentence, theoretical standardization requires a comprehensive theoretical explanation (e.g. Drewnowski, 1974: 52–68). However, such an approach is particularly important if the empirical distribution clusters at one end of the latent subdimension, as is shown in Figure 2.

Figure 2 Theory-driven vs empirical normalization



Source: Own presentation.

Figure 2 on the left side shows the distributions of two items. For the upper item, the distribution is restricted to the lower end of the theoretical subdimension, whereas the lower item is distributed over the entire range of the subdimension. The right side of Figure 2 shows the results of the two normalization strategies. Whereas the theory-driven normalization considers the distribution on the latent subdimension, the empirical normalization assumes that the empirical maximum equals

the theoretical maximum. Therefore, if an empirical normalization is chosen, the resulting measurement misleadingly suggests a high variance over the entire subdimension, although the measurement does not reflect the range across the construct. If the two items are aggregated, the variance of the upper item is artificially inflated relative to the lower item. Although a theory-based normalization is not empirically verifiable, this approach improves the correspondence of the measurement with the underlying latent subdimension.

For the new EPLR index, we follow a theoretical approach. The mappings of the original coding and the critical points (survival level and saturation point) are explained below and summarized in Table 1. The column 'new coding' shows the proposed theoretical normalization on the basis of the defined theoretical minima and maxima.

Table 1 Normalization assumptions for new EPLR index

Theoretical subdimension[g]	Item[e]	Original coding	Value label	Critical points	New coding
Stage 1: Difficulty of a formally correct notice of termination	Item 1: Notification Procedures	0	An oral statement is enough		0
		2	A written statement of the reasons for dismissal must be supplied to the employee		0
		4	A third party (such as works council or the competent labor authority) must be notified		0
		6	The employer cannot proceed to dismissal without authorization from a third party	Survival level	0
	Item 2: Delay involved before notice can start[a]	0	≤ 2 days		0
		1	< 10 days		0
		2	< 18 days		0
		3	< 26 days		0
		4	< 35 days		0
		5	< 45 days		0
		6	≥ 45 days	Survival level	0
Stage 2: Difficulty of fair dismissal	Item 5: Definition of justified or unfair dismissal	0	When worker capability or redundancy of the job are adequate and sufficient ground for dismissal	Survival level	0
		2	When social considerations, age or job tenure must when possible influence the choice of which worker(s) to dismiss		2
		4	When a transfer and/or a retraining to adapt the worker to different work must be attempted prior to dismissal		4
		6	When worker capability cannot be a ground for dismissal	Saturation point	6

Stage 3: Difficulty of an appeal	Item 9: Maximum time to make a claim of unfair dismissal[d]	0	Before dismissal takes effect		0
		1	≤ 1 month		0
		2	≤ 3 months		0
		3	≤ 6 months		0
		4	≤ 9 months		0
		5	≤ 12 months		0
		6	> 12 months	Survival level	0
	Additional Item[f]: Collective bargaining coverage (in percentage)	0	0	Survival level	0
		…	…		…
		6	100	Saturation point	6
Stage 4: Consequences of dismissal	Item 3a: Length of the notice period at 9 months tenure	0	0 months		0
		1	≤ 0.4 months		0
		2	≤ 0.8 months		0
		3	≤ 1.2 months		0
		4	< 1.6 months		0
		5	< 2 months		0
		6	≥ 2 months	Survival level	0
	Item 3b: Length of the notice period at 4 years tenure	0	0 months		0
		1	≤ 0.75 months		0
		2	≤ 1.25 months		0
		3	≤ 2 months		0
		4	< 2.5 months		0
		5	< 3.5 months		0
		6	≥ 6 months	Survival level	0
	Item 3c: Length of the notice period at 20 years tenure	0	< 1 months		0
		1	≤ 2.75 months		0
		2	≤ 5 months		0
		3	≤ 7 months		0
		4	< 9 months		0
		5	< 11 months		0
		6	≥ 11 months	Survival level	0
	Item 4a: Severance pay at 9 months tenure (in months pay)	0	0		0
		1	≤ 0.5		0
		2	≤ 1		0
		3	≤ 1.75		0
		4	≤ 2.5		0
		5	< 3		0
		6	≥ 3	Survival level	0

Stage 4: Consequences of dismissal (cont.)	Item 4b: Severance pay at 4 years tenure (in months pay)	0	0		0
		1	≤ 0.5		0
		2	≤ 1		0
		3	≤ 2		0
		4	≤ 3		0
		5	< 4		0
		6	≥ 4	Survival level	0
	Item 4c: Severance pay at 20 years tenure (in months pay)	0	0		0
		1	≤ 3		0
		2	≤ 6		0
		3	≤ 10		0
		4	≤ 12		0
		5	< 18		0
		6	≥ 18	Survival level	0
	Item 7: Compensation following unfair dismissal (in months pay)	0	≤ 3	Survival level	0
		1	≤ 8		1
		2	≤ 12		2
		3	≤ 18		3
		4	≤ 24		4
		5	≤ 30		5
		6	> 30	Saturation point	6
	Item 8: Possibility of reinstatement following unfair dismissal	0	No right or practice of reinstatement	Survival level	0
		2	Reinstatement rarely or sometimes made available		2
		4	Reinstatement fairly often made available		4
		6	Reinstatement (almost) always made available	Saturation point	6

Note: [a] Source: authors consideration;

[b] Source: OECD (2014);

[c] Estimated time includes, where relevant, the following assumptions: 6 days are counted in case of required warning procedure, 1 day when dismissal can be notified orally, or the notice can be directly handed to the employee, 2 days when a letter needs to be sent by mail and 3 days when this must be a registered letter;

[d] Maximum time period after dismissal notification up to which an unfair dismissal claim can be made;

[e] Not included in the OECD EPLR index. Source: OECD (2019);

[f] Typical compensation at 20 years of tenure, including back pay and other compensation (e.g. for future lost earnings in lieu of reinstatement or psychological injury), but excluding ordinary severance pay.

Stage 1: Difficulty of formally correct notice of termination

The measurement of the subdimension "difficulty of formally correct dismissal notice of termination" indicates the difficulty of giving formal notice of dismissal on a continuum from very easy to extremely difficult. The zero point represents "very easy". The saturation point is reached when the legally required form of dismissal is so difficult to comply with that it represents a major obstacle for the employer. We consider the requirement of the consent of an employee-friendly third party—that has a high tendency of refusal of consent—to be a major obstacle for an employer to comply with the requirements of a formal notice of dismissal. If an employer can comply with the process easily, the survival level is reached. As shown in Table 1, the original coding differentiates only at the lower end of the scale. Although code 4 and 6 refer to a third party, unfortunately, the coding does not distinguish between employee-friendly and employer-friendly third parties. However, in the 800 country years currently available, only Portugal in 1985–1989 and Venezuela in 2014 take the value 6. Thus, considering that almost without exception, employers must only notify a third party, it can be assumed that this is not an obstacle to dismissal, this item is irrelevant. The saturation level is close to the empirical maximum, i.e. lower levels are substantively equivalent, which means that this item has practically no variance.

The second item measures the "delay involved before notice can start". We consider this as an obstacle if the dismissal becomes cost-ineffective. In this case, a theory-based normalization can be based on the average tenure. The maximum value represents a delay of 45 days, which the employer has to wait to give formally correct notice of termination. This is not an obstacle, because this period is negligibly short in comparison to the average length of service. Again, the saturation level is close to the maximum, i.e. lower levels are substantively equivalent. Therefore, we assume that the required form of notice does not play a role in the protection of employees against dismissal.

Stage 2: Difficulty in finding a legally permissible ground for dismissal

The subdimension "difficulty in finding a legally permissible ground for dismissal" is captured with the item "definition of unfair dismissal". It measures the reasons for dismissal that can be given, so the dismissal will not be overturned in court. We define lack of performance as a sufficient reason for giving notice as the survival level. More liberal legislation does not change the situation. The saturation point is reached if notice can only be given if an employee cannot fill any other position in the company, even after extensive retraining, i.e. more restrictive regulation is essentially equivalent.

Stage 3: Difficulty of appealing a dismissal in court

The items for the OECD index do not include a measurement for the subdimension "difficulty of an appeal", which should measure the difficulty of employees to challenge a formally incorrect or legally inadmissible notice in court. We use "collective bargaining coverage rate in %" as a proxy. We define 0% as the survival level and 100% as the saturation point. We rescale these values to 0 to 6.

Stage 4: Consequences of dismissal

The subdimension "consequences of dismissal" is measured with "notice period" and "severance pay" if the outcome is fair dismissal. For both items, there are three versions depending on tenure length. Considering average tenure length, for all three versions of the "notice period" items, we

define the maximum level as the survival level. For short tenure, the maximum notice period is still so short that it should not affect the dismissal decision considering the opportunity costs. Although for a longer tenure, the maximum might be high enough to hurt economically, averaging over the tenure of the entire workforce, higher costs of dismissal are weighted down. The same argument holds for "severance pay ". We consider the severance pay, even in the worst-case too low, to affect the dismissal decision considering the opportunity costs. Therefore, we define the survival level as the maximum.

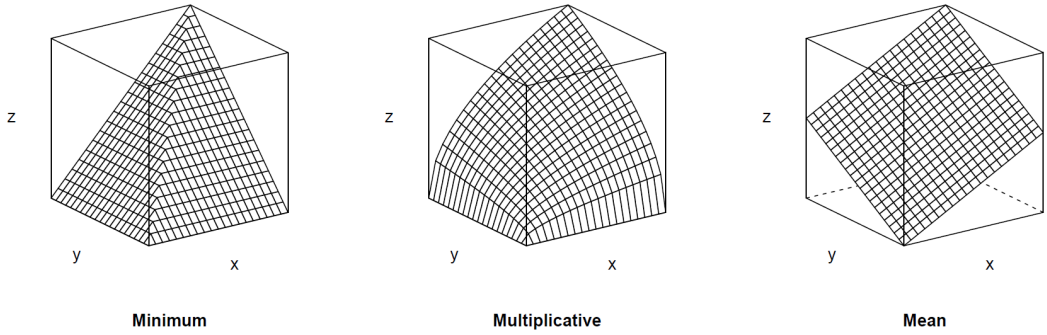
The subdimension "consequences of dismissal" for unfair dismissal is measured by items "practice of reinstatement" and "compensation following unfair dismissal (excluding severance pay)". Because reinstatement is offered almost never in the minimum, and almost always in the maximum, we define the survival level as the minimum and the saturation point as the maximum. For "compensation following unfair dismissal", we do not see a survival level or a saturation point within the range of the original scale, and therefore assume the minimum as the survival point and the maximum as the saturation point.

Our conceptual reasoning on the relation between the theoretical sub-dimensions and the OECD items reveals the second problem with the OECD EPLR index. The majority of the included items differentiate only at the lower end of the theoretical dimension. However, because all items in the OECD EPLR index are empirically normalized, the variance of the items that differentiate across the entire theoretical dimension is deflated by the artificially stretched items. The proposed indicator only includes the items for the sub-dimensions "difficulty of fair dismissal", "difficulty of an appeal", and "consequences of unfair dismissal".

3.4 Aggregation

In the next step, we define how the normalized indicators are aggregated to the new EPLR index. The essential aspect of the aggregation rule is the assumption which indicators are complements or substitutes (Goertz, 2006: 46; Noll, 2002; OECD, 2008: 33; Scheuch and Zehnpfenning, 1989: 171). If indicatory are complements, we also have to define the zero point. Additive aggregation assumes substitutability, multiplicative (e.g. Joint Democracy index, Lemke and Reed, 2001), or other nonlinear rules imply a complementary relationship. Figure 3 shows a minimum, a multiplicative and with "mean" an additive aggregation of the dimensions X and Y to Z.

Figure 3 Compensation for different aggregation rules



Note: Own presentation.

The process model shown in Figure 1 implies complementary relationships between the indicators that belong to the different subdimension at the individual stages. More specifically, when a fair dismissal is legally possible for any reason, or if an unfair dismissal has no consequences or cannot be brought to court, protection against dismissal, regardless of the other dimensions, does not exist. Therefore, the overall indicator should equal zero if one of the three dimensions equals zero. If, on the other hand, unfair dismissals always are overturned in court, the legislation concerning reasons for fair dismissals becomes very important, which implies a multiplicative combination of the dimensions with previously defined zero-points. Note that this substitution logic is violated by the aggregation rule of the OECD EPLR index, which constitutes the third major problem that our proposed EPLR index addresses.

For the new EPLR index, we use the geometric mean as the aggregation rule. Within the sub-dimensions, we assume that the items are perfect substitutes, i.e. to measure the "consequences of unfair dismissal", we use the arithmetic mean of items 7 and 8. This approach results in the following Equation 1 for the proposed indicator:

Equation 1 EPLR index

$$\begin{aligned}\text{EPLR index} &= \text{Protection against dismissal} \\ &= f(\text{Difficulty of fair dismissal}, \text{Difficulty of appeal}, \text{Consequences of unfair dismissal}) \\ &= \Bigg(\text{Definition of justified or unfair dismissal} \times \text{Collective bargaining coverage} \\ &\quad \times \frac{\text{Compensation following unfair dismissal} + \text{Possibility of reinstatement following unfair dismissal}}{2}\Bigg)^{\frac{1}{3}}\end{aligned}$$

4 Empirical test – Validity and substantive implications

Because we use a formative index construction approach, we cannot test the underlying assumptions of the index construction by analyzing the distribution and correlation of items. However, we can test the criterion validity of our proposed indicator in comparison to the OECD index. Therefore, we apply our index to the estimation of two exemplary effects discussed in the literature on the effects of EPLR. The first example is the effect of EPLR on the subjective job security of employees in permanent and temporary jobs (Berglund, 2015; Bryan and Jenkins, 2016; Chung, 2016; Chung and van Oorschot, 2011; Clark and Postel-Vinay, 2009). The second example is the effect of EPLR on temporary employment risk for new hires (de Lange et al., 2014; Gebel and Giesecke, 2016), which also relates to the research on EPLR on labour market opportunities of young people (e.g. Breen, 2005; Esping-Andersen, 2000; Heckman and Page, 2000; Noelke, 2016; OECD, 2004, 2006).

A necessary condition for differences in the effects of EPLR depending on the measurement is a difference in the distributions of the OECD index and the proposed index. Kernel density estimators of the OECD EPLR index and the proposed EPLR index (see Figure A1 in the Appendix) show that the new EPLR index is bi-modally distributed, whereas the OECD EPLR index is unimodal and approximately normally distributed. Consequently, the descriptive findings of the proposed distributions of the latent construct between countries differ considerably. The new EPLR index indicates a polarization of the underlying theoretical dimension, which would be masked if the OECD EPLR index is used. The mean of the new EPLR index is 2, with a standard deviation of 1.8. The OECD EPLR index has a mean of 2.3, with a standard deviation of 0.7. The correlation between the indices is 0.67.

To test criterion validity, we have to minimize interfering factors that could bias the substantive effects. Therefore, we need a close causal link between the latent construct and the effect. Moreover, the research design has to be suitable for discovering causal connections. Thus, a fixed-effects approach would be an ideal research design. However, because both operationalizations of EPLR show minimal intra-country variation over time (see Figure A2 in the Appendix), country fixed-effect models cannot be used for the empirical tests. Therefore, empirical tests are restricted to cross-country comparisons, with all the associated causality problems, including omitted variables at the country level. To minimize causality problems, we investigate only those effects that are linked directly to the construct EPLR, and control for all confounding variables.

4.1 Effect of EPLR on subjective job security

For the first criterion validity test, we examine the effect of EPLR on subjective job security. According to the theoretical construct, EPLR protects permanent employees against dismissal. According to the literature, this should be reflected in the subjective evaluation of both permanent and temporary employees (Balz, 2017; Berglund, 2015; Chung, 2016; Chung and van Oorschot, 2011; Clark and Postel-Vinay, 2009), which propose the following hypotheses:

Hypothesis 1.1: Stricter EPLR increases the subjective job security of permanent employees.

Hypothesis 1.2: Stricter EPLR decreases the subjective job security of temporary employees.

From these hypotheses follows:

Hypothesis 1.3: Stricter EPLR increases the difference in subjective job security between permanent and temporary employees.

Although previous research agrees on these hypotheses, the empirical evidence is mixed (Balz, 2017; Berglund, 2015; Chung, 2016; Chung and van Oorschot, 2011; Clark and Postel-Vinay, 2009). Studies that use the OECD EPLR index find the expected effects described in the literature only if, despite an interaction effect, they incorrectly do not include a random slope (Bryan and Jenkins, 2016). When the models include a random slope, the expected effects are no longer significant (Chung, 2016). Given the discrepancy between the consensus regarding the hypothesis and the mixed empirical evidence, we consider this to be an ideal candidate for evaluating the two indices.

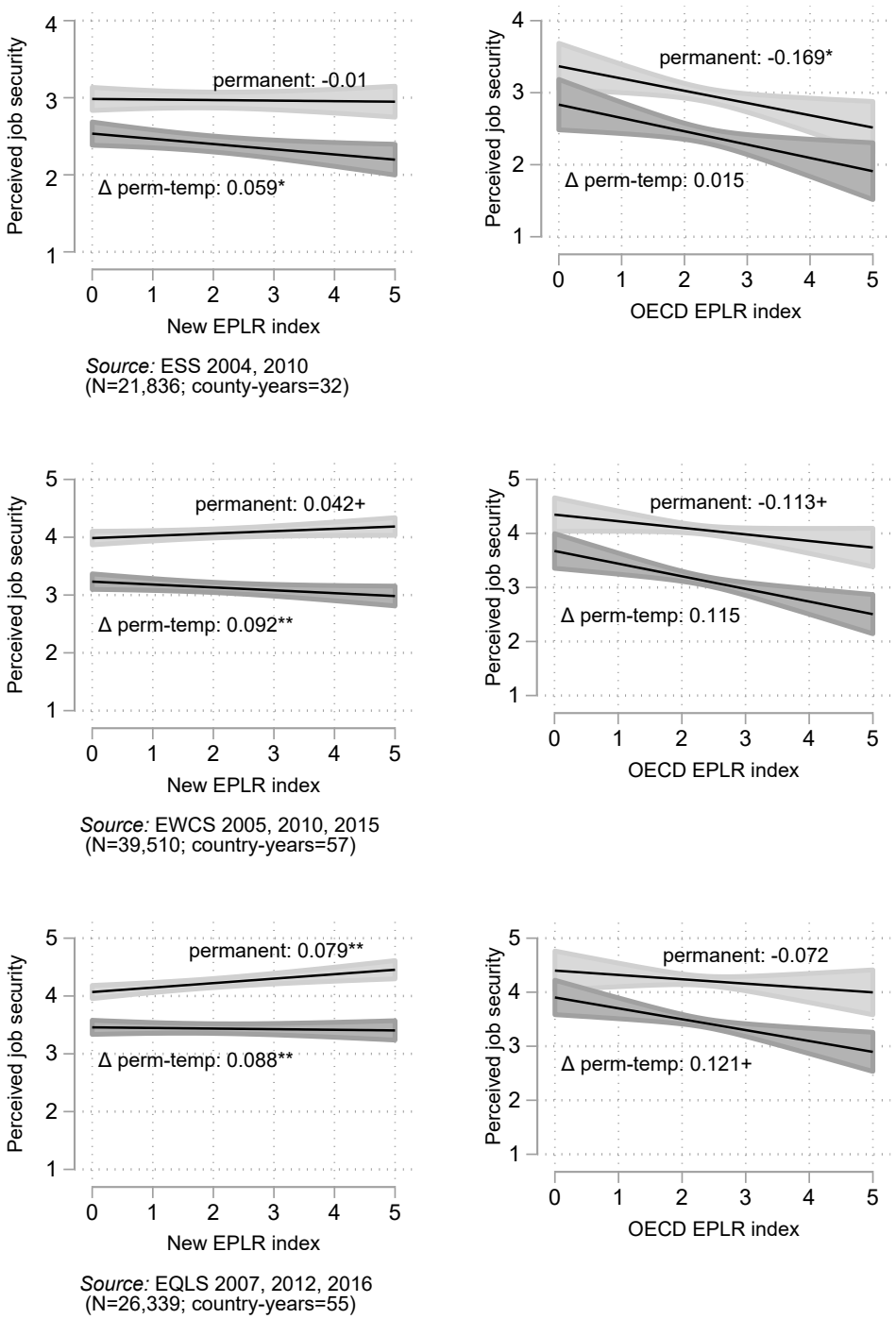
Data and Methods

For the validity test, we use the data from the European Social Survey (ESS) 2004 and 2010; European Working Condition Survey (EWCS) 2005, 2010, and 2015; and European Quality of Life Survey (EQLS) 2007, 2012, and 2016. Based on these data sets, we estimate a linear multi-level regression model on subjective job security. The dependent variable "subjective job security" is scaled from 1 to 4 in the ESS, and 1 to 5 in the EWCS and the EQLS. The first level in the multi-level model is employees aged 20–67. The second level is country-years. At the country level, we control for regulations of temporary contracts and the unemployment rate. At the individual level, the included control variables differ across the datasets. Depending on the variables available, we control for company size, industry sector, working hours, general and company-specific human capital, gender, and age. For summary statistics for the variables included in the models, see Tables A2–A4 in the Appendix.

Results

Figure 4 shows the results for the multi-level models. The figures show the predicted levels of perceived job insecurity for permanent and temporary employees, depending on EPLR. The line with the dark grey confidence interval indicates permanent employees. The line with light grey confidence intervals corresponds to temporary employees. Additionally, the estimated coefficients are shown, i.e., the predicted effect of EPLR on the subjective job security of permanent employees and the predicted difference of the effect of EPLR for permanent and temporary employees. For the complete results, including control variables, see Tables A5–A7 in the Appendix.

Figure 4 Effects of EPLR on subjective job security



Source: ESS 2004, 2010
(N=21,836; county-years=32)

Source: EWCS 2005, 2010, 2015
(N=39,510; country-years=57)

Source: EQLS 2007, 2012, 2016
(N=26,339; country-years=55)

Note: Predicted values based on random slope multilevel model; + p < .1, * p < .05, ** p < .01

With the new EPLR index, we mainly find the expected effects. With the EWCS and EQLS data, we find that protection against dismissal increases the perceived job security of permanent employees. We find with all three data sets that the effect of protection against dismissal is stronger for permanent employees than temporary employees. In contrast, when using the OECD EPLR index, the empirical findings contradict the theoretical expectations across all three datasets. Here, we find that protection against dismissal measured with the OECD EPLR index reduces the perceived job security of permanent employees. Therefore, the OECD EPLR index does not capture the different effects of employment protection on temporary and permanent employees. When the OECD operationalization is used, the interaction effect is not significant in any of the three data sets.

4.2 Effect of EPLR on temporary employment risk for new hires

For the second criterion validity test, we refer to the literature on labor market participation of young adults. The literature generally assumes that strict EPLR has a negative impact on the labor market opportunities of young people (e.g. Breen, 2005; Gebel and Giesecke, 2016; Noelke, 2016), because it increases unemployment risk (Breen, 2005; Esping-Andersen, 2000; Heckman and Page, 2000; OECD, 2004, 2006) and temporary employment risk of labor market entrants risks (de Lange et al., 2014; Gebel and Giesecke, 2016). However, the findings are ambiguous. Although most empirical findings have suggested that EPLR increases youth unemployment, a replication of previous findings has found that these results are unstable and may be an artifact (Noelke, 2016).

Nevertheless, some theoretical expectations are consistent. According to the literature (e.g. Gebel and Giesecke, 2016: 488), the effect of EPLR or protection against dismissal on the youth unemployment and temporary employment rates is caused by the hiring strategies of companies. Thus, to reduce the influence of uncontrolled variables at the country level, we used the effect on hiring behavior to examine the construct validity of the two indices.[9]

Following Gebel and Giesecke (2016), we identified hypotheses to use for the criterion validity test. High protection against dismissal should lead to lower hiring and dismissal rates, and increase incentives to use fixed-term contracts. Thus, stricter EPLR or job security provisions should not reduce the number of new hires in general, but rather the number of permanent hires. This expectation applies to both entrants to the labor market and labor market outsiders (the unemployed), which leads to the following hypothesis:

Hypothesis 2.1: Stricter EPLR increases the risk for labor market new hires to receive a temporary (versus permanent) contract.

An advantage of this hypothesis is that it implicitly controls for current hiring rates in each country by comparing temporary to permanent contracts.

Data and Methods

We use the years 1992-2013 from the 2017 release of the EU labor force survey (EU-LFS) data. The analysis sample is restricted to new contracts for employees aged 18–68. New contracts are de-

[9] Many of the effects studied in the literature are not directly caused by the latent construct protection against dismissal (e.g., youth unemployment rate, fixed-term employment rate for young people) but transmitted through other variables. It is not possible to control all the relevant confounding variables (e.g., the education system) and therefore these questions are not suitable as a test of criterion validity. Moreover, because the low variation of EPLR across time rules out fixed-effect models that could control for many confounding variables, a close link in the causal chain is crucial.

fined as all new employment contracts of employees who were not employed in the previous year and are not on parental leave, i.e., are unemployed or still in the education system. The dependent variable is a dummy indicating temporary vs. permanent contracts. We exclude fixed-term apprenticeship contracts from the sample. We used a linear multi-level model with new contracts as level 1 and country-years as level 2. We control for the duration of the trial period, unemployment rate, regulations on the use of temporary contracts, and years at the country level; and for age, gender, and level of education at the individual level. We use 304 country-years for our analysis. Figure A3 shows the temporary employment rate for new hires across countries. Each dot represents one country-year. The mean temporary employment rate for new hires is 44%, with a standard deviation of 20, the minimum is 10%, and the maximum is 89%. Poland, Portugal, and Spain have particularly high values (greater than 80%), whereas Austria, Denmark, Estonia, Switzerland, and the United Kingdom have low values (less than 20%). As the new EPLR index and the OECD EPLR index have different variances, as can be seen in Figure A1, we also z-standardize both indices to take into account the effects of the differences in the variances on the effect sizes.

Results

The results of the multi-level regression presented in Table 2 show the effects of EPLR and the duration of the trial period on temporary employment risk for new contracts. See Table A8 for a complete regression table, including all control variables.

Table 2 Effect of EPLR on temporary employment risk of new hires

	New EPLR index		OECD EPLR index		New EPLR index (z-stnd.)		OECD EPLR index (z-stnd.)	
	beta	se	beta	se	beta	se	beta	se
New EPLR index	0.032**	(0.005)						
OECD EPLR index			0.111**	(0.012)				
New EPLR index (z-stnd.)					0.057**	(0.009)		
OECD EPLR index (z-stnd.)							0.064**	(0.007)
Duration of trial period (short)	0.074**	(0.020)	0.026	(0.020)	0.074**	(0.020)	0.026	(0.020)
Regulations on the use of temporary contracts	-0.007	(0.006)	0.003	(0.005)	-0.007	(0.006)	0.003	(0.005)
Unemployment rate	0.022**	(0.002)	0.025**	(0.002)	0.022**	(0.002)	0.025**	(0.002)
Variance components								
Individual	0.207	(0.000)	0.207	(0.000)	0.207	(0.000)	0.207	(0.000)
Country	0.023	(0.002)	0.020	(0.002)	0.023	(0.002)	0.020	(0.002)
R^2 Individual	0.069		0.081		0.069		0.081	
R^2 Country	0.410		0.485		0.410		0.485	
Country-years	304		304		304		304	
Individuals	1242199		1242199		1242199		1242199	

Note: + p < .1, * p < .05, ** p < .01; Standard errors in parentheses. R-squared as proposed by Snijders and Bosker (1994, pp. 350–354; 1999, pp. 99–105).

Source: EU-LFS 1992-2003, 2017 release; Estimations from the random intercept model; Restricted Maximum Likelihood.

Both operationalizations of EPLR support the hypothesis that the temporary employment risk of new hires increases with stronger protection against dismissal. At first glance, the proposed EPLR index seems to have no benefit. The effect size for the OECD EPLR index is even larger. However, the difference in the coefficients follows from the distribution differences between the two indices. If both EPLR indices are z-standardized, the effects are similarly large. An increase of the OECD EPLR index by one standard deviation increases the temporary employment risk by 6.4 percentage points and by 5.7 percentage points for the respective increase of the new EPLR index (see Table 2).[10]

The key difference between the two indices is that with the new EPLR index, a shorter legal trial period also significantly increases the temporary employment risk of new hires. This effect reflects the expectations in the literature (e.g. Gebel and Giesecke, 2011), where fixed-term employment is expected to be used as an extended probationary period or screening device (Korpi and Levin, 2001). The incentive to use fixed-term contracts as a prolonged trial period should increase if the legal trial period is short. This effect cannot be found by the model using the OECD EPLR index because the trial period effect is partly confounded with the EPLR effect, because the item is part of the OECD EPLR index. Therefore, although the OECD EPLR index also leads to the expected effects of temporary employment risk for new hires, only with the new EPLR index we can validly estimate the effects of the related concepts, which are hidden when using the OECD EPLR index.

[10] The z-standardization should not be confused with the empirical normalization discussed in section 3.3. With the z-standardization of the index, the coefficient of the valid index is adjusted to the empirical distribution, whereas the empirical normalization leads to an invalid index.

5 Conclusion

Employment protection legislation of regular employees is a key variable in labor market research. In this study, we 1) argue that the OECD operationalization violates several theoretical assumptions, 2) propose a new EPLR index that solves the deficiencies of the OECD index, 3) demonstrate with empirical analyses, that findings are crucially different when using the proposed EPLR index, and 4) show that the proposed EPLR index) has higher criterion validity, because it better corresponds to the predictions of theory.

So far, comparative research has used the OECD EPLR index for operationalizing employment protection for regular employees without thorough methodological reflection. We close this gap by constructing and testing an alternative theory-driven EPLR index. Starting with the latent theoretical construct of EPLR, we develop an alternative measurement in accordance with the principles of index construction. Based on a broad empirical foundation using four cross-country datasets—ESS, EQLS, EWCS, and EU-LFS—we show that our theory-driven EPLR index generates significantly different results than the OECD EPLR index, and that it has a higher criterion validity. For both the effects of EPLR on perceived job security and on temporary employment risk for new hires, we find the effects predicted in the literature. In contrast, the results from the OECD EPLR index contradict the hypotheses in the literature. Most noteworthy, we find that–opposite to theoretical expectation–strict job security provisions measured with the OECD EPLR index reduce perceived job security for permanent employees. With the new EPLR index, we come to results in line with theory. Moreover, we find in accordance with Korpi and Levin (2001) and Gebel and Giesecke (2016) that with the new EPLR index that in countries with a short probation period, the temporary employment risk for new hires is higher. This effect does not show with the OECD EPLR index.

Besides the substantive implications for comparative labor market research, the second contribution of our study is methodological. Even though the call for a theory-driven index construction has existed for a long time in the index construction literature (e.g. Blalock, 1982; Noll, 2002), it has almost never been implemented consistently. This study is a showcase example of a successful implementation of theory-driven index construction.

Our proposed EPLR index is based on several debatable assumptions. For the normalization assumptions, it would be desirable to identify the saturation and survival levels with respect to the items more precisely. The saturation levels are especially difficult to determine exactly, so refining and empirically testing the proposed threshold could improve the measurement. Another point of possible improvement could be the proxy chosen for the difficulty to challenge a dismissal in court. A detailed analysis of the procedural regulations of a country, the rules on court costs, and the degree to which legal expense insurances are spread might lead to better measurement. The advantage of our approach, however, is that all the coded indicators we use are readily available.

Considering that most previous research has been based on the OECD EPLR index, a replication of key research findings is imperative for a fact-based policy debate about employment protection legislation. Moreover, in the social sciences, all indicators should be constructed with more theory-driven reflection in the normalization and aggregation steps.

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Appendix

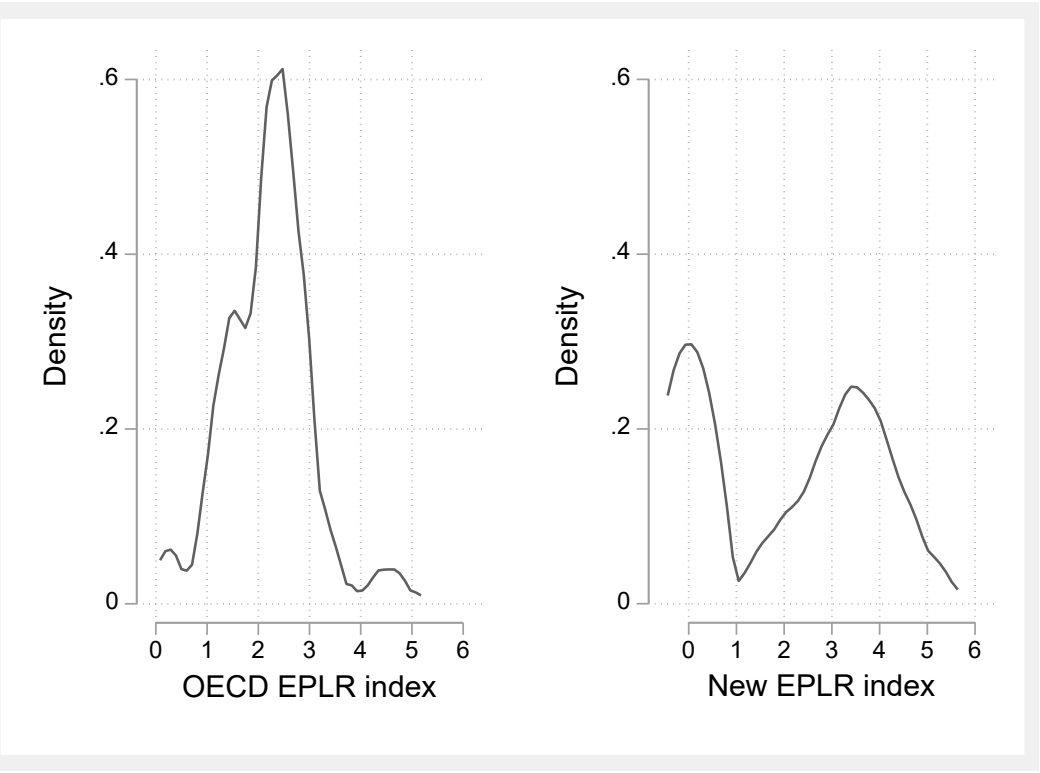
Table A1 Correlation structure of the EPLR items coded by the OECD

	Item 1	Item 2	Item 3a	Item 3b	Item 3c	Item 4a	Item 4b	Item 4c	Item 5	Item 6	Item 7	Item 8
Item 1	1.00											
Item 2	0.50	1.00										
Item 3a	0.14	0.30	1.00									
Item 3b	0.18	0.32	0.76	1.00								
Item 3c	0.06	0.24	0.47	0.51	1.00							
Item 4a	0.13	0.13	0.28	0.09	-0.26	1.00						
Item 4b	0.20	-0.11	-0.14	-0.13	-0.46	0.61	1.00					
Item 4c	0.31	-0.05	-0.08	-0.05	-0.34	0.48	0.90	1.00				
Item 5	0.38	0.26	0.01	-0.14	-0.13	0.30	0.14	0.05	1.00			
Item 6	0.01	0.08	0.13	-0.02	-0.31	0.30	0.29	0.14	0.19	1.00		
Item 7	0.18	0.13	0.13	0.13	0.12	0.16	0.08	0.09	0.53	-0.02	1.00	
Item 8	0.15	0.10	0.09	-0.22	-0.33	0.35	0.07	0.00	0.25	0.13	-0.07	1.00

Source: OECD 2013, own representation

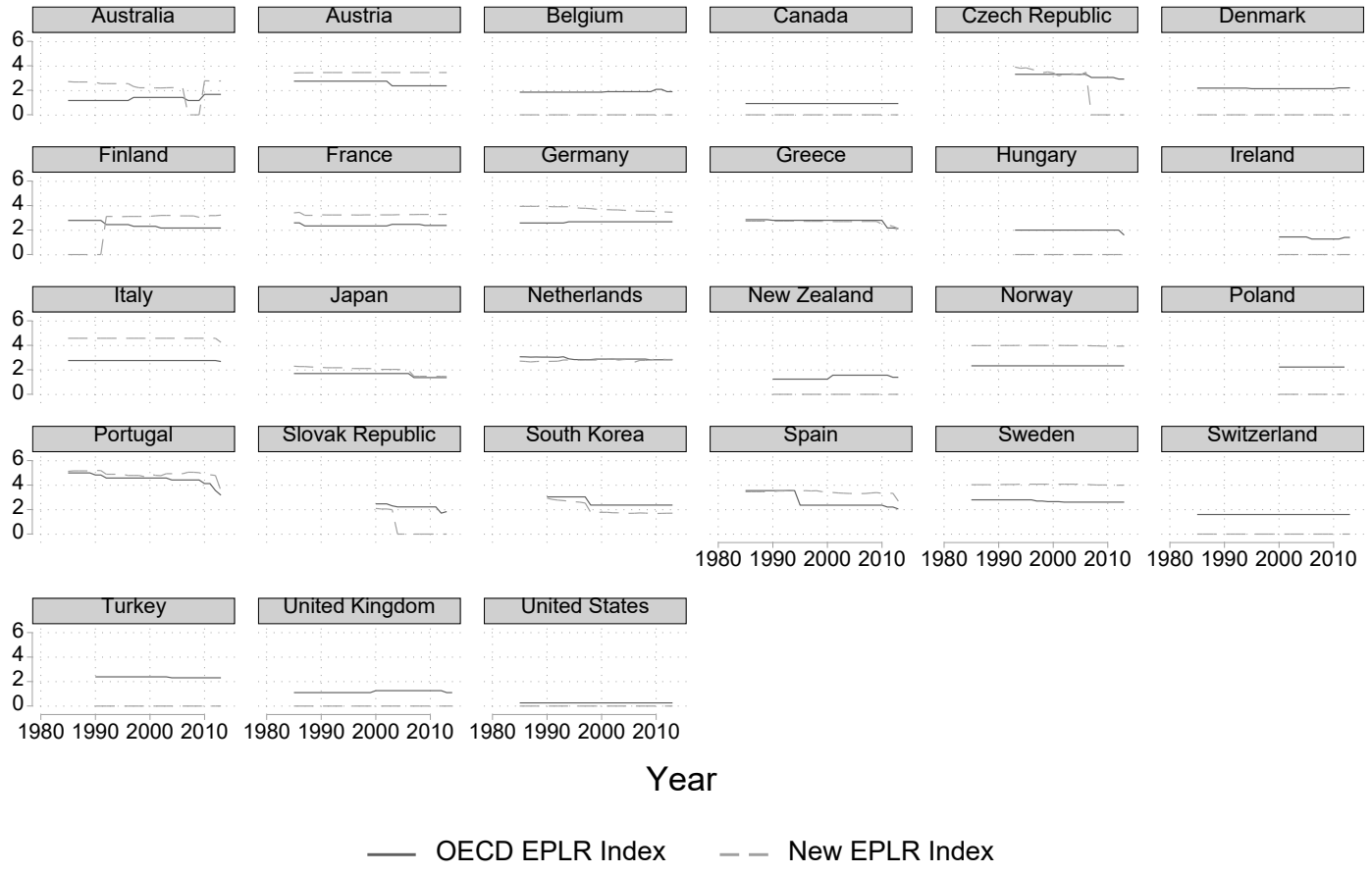
Note: N=767 observations. Item 9 is not included, since it would decrease the number of cases by 521 due to missing values.

Figure A1 Kernel density estimates of OECD EPLR index and new EPLR index



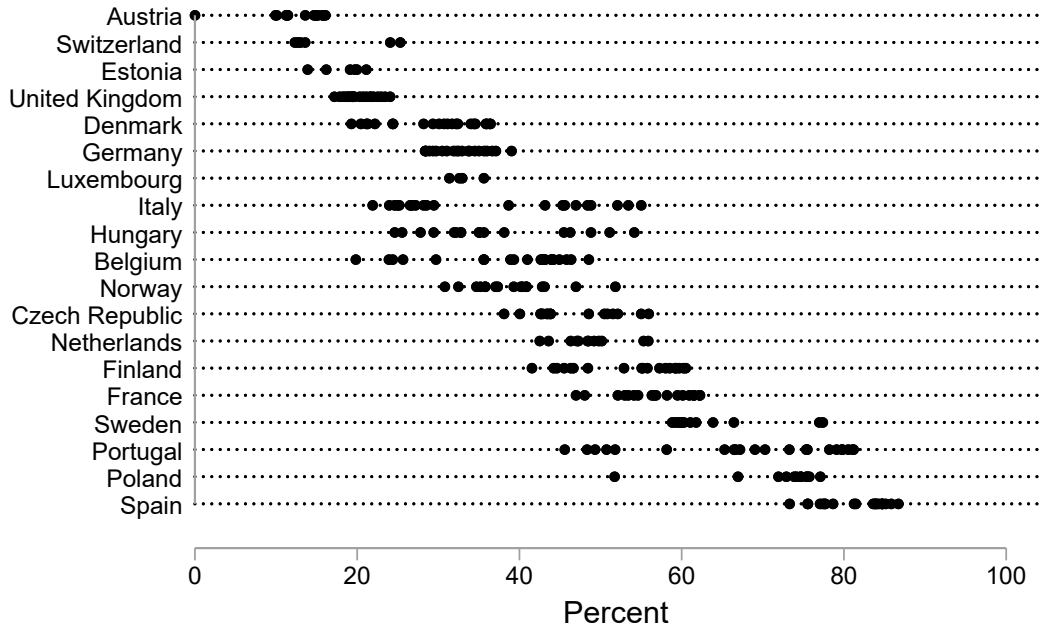
Source: OECD 2013, own presentation

Figure A2 Change of EPLR within countries over time



Source: OECD 2013, own presentation

Figure A3 Proportion of fixed-term contracts for new hires



Source: EU-LFS 1992-2003, release 2017; own calculations; unweighted results.

Table A2 Descriptive statistics ESS 2004, 2010

	Mean	Min	Max
Fixed-term contract (FTC)	0.124	0	1
Education			
ISCED 1-2	0.160	0	1
ISCED 3-4	0.475	0	1
ISCED 5-6	0.365	0	1
”Easy to replace”	5.931	0	10
Learning Period			
<2 days	0.032		
2-6 days	0.085	0	1
1-4 weeks	0.164	0	1
1-3 month	0.224	0	1
3 month-1 year	0.287	0	1
1-2 years	0.125	0	1
2-5 years	0.065	0	1
More than 5 years	0.018	0	1
Age			
18-29	0.171	0	1
30-39	0.264	0	1
40-54	0.409	0	1
55-67	0.156	0	1
Part-time	0.169	0	1
Female	0.494	0	1
Child	0.498		
Unemployed in last 5 years	0.112	0	1
Unemployed more than 12 month	0.088	0	1
Company Size			
<10	0.215	0	1
10-24	0.193	0	1
25-99	0.267	0	1
100-499	0.188	0	1
>500	0.137	0	1
Industry			
1 Agriculture	0.023	0	1
2 Manufacturing Industry	0.176	0	1
3 Construction	0.062	0	1
4 Trade	0.112	0	1
5 Transport/ Infrastructure	0.092	0	1
6 Finance	0.037	0	1
7 Public Administration	0.078	0	1
8 Education	0.105	0	1
9 Health sector	0.142	0	1
10 Service	0.175	0	1

Table A3 Descriptive statistics EWCS 2005, 2010, 2015

	Mean	Min	Max
Fixed-term contract (FTC)	0.113	0	1
Education			
ISCED 1-2	0.183	0	1
ISCED 3-4	0.463	0	1
ISCED 5-6	0.353	0	1
Age			
18-29	0.167	0	1
30-39	0.266	0	1
40-54	0.411	0	1
55-67	0.155	0	1
Part-time	0.151	0	1
Female	0.513	0	1
Company size			
<10	0.245	0	1
10-49	0.330	0	1
50-100	0.129	0	1
100-499	0.184	0	1
>500	0.113	0	1
Industry			
1. A-B Agriculture, hunting, forestry, fishing	0.014	0	1
2. C-D Mining, quarrying, manufacturing	0.154	0	1
3. E Electricity, gas, and water supply	0.014	0	1
4. F Construction	0.053	0	1
5. G Wholesale and retail trade; repair of motor vehicles and motorcycles	0.139	0	1
6. H Hotels and restaurants	0.033	0	1
7. I Transport, storage, and communication	0.069	0	1
8. J Financial intermediation	0.040	0	1
9. K Real estate activities	0.092	0	1
10. L Public administration and defense	0.082	0	1
11. M-N-O-P-Q Other services	0.309	0	1

Table A4 Descriptive statistics EQLS 2007, 2012, 2016

	Mean	Min	Max
Fixed-Term-Contract (FTC)	0.124	0	1
Education			
ISCED 1-2	0.194	0	1
ISCED 3-4	0.460	0	1
ISCED 5-6	0.346	0	1
Age			
18-29	0.150	0	1
30-39	0.270	0	1
40-54	0.426	0	1
55-67	0.154	0	1
Part-time	0.138	0	1
Female	0.519	0	1

Table A5 Effect of EPLR on Job Security (ESS 2004, 2010)

	New EPLR index		OECD EPLR index	
	beta	se	beta	se
Fixed-term contract (FTC)	-0.173	(0.142)	-0.249	(0.223)
New EPLR index	-0.006	(0.028)		
x FTC	-0.060*	(0.024)		
OECD EPLR index			-0.169*	(0.066)
x FTC			-0.015	(0.069)
Reg. on temp. employment (Number and Duration)	0.103+	(0.055)	0.102*	(0.050)
x FTC	-0.075	(0.047)	-0.088+	(0.052)
Unemployment rate	-0.001	(0.013)	-0.001	(0.011)
x FTC	-0.015	(0.011)	-0.013	(0.012)
Education (Ref: ISCED 1-2)				
ISCED 3-4	-0.005	(0.020)	-0.006	(0.020)
ISCED 5-6	0.033	(0.021)	0.032	(0.021)
“easy to replace”	-0.029**	(0.002)	-0.029**	(0.002)
Learning period (Ref: <2days)				
2-6 days	-0.016	(0.040)	-0.016	(0.040)
1-4 weeks	0.019	(0.038)	0.019	(0.038)
1-3 month	0.028	(0.037)	0.028	(0.037)
3 month-1 year	0.104**	(0.037)	0.104**	(0.037)
1-2 years	0.126**	(0.040)	0.125**	(0.040)
2-5 years	0.154**	(0.043)	0.153**	(0.043)
More than 5 years	0.136*	(0.058)	0.136*	(0.058)
Age (Ref.:18-29)				
30-39	-0.130**	(0.020)	-0.130**	(0.020)
40-54	-0.160**	(0.019)	-0.160**	(0.019)
55-67	-0.059**	(0.022)	-0.059**	(0.022)
Part-time	0.061**	(0.018)	0.059**	(0.018)
Female	-0.012	(0.014)	-0.011	(0.014)
Child	0.029*	(0.013)	0.030*	(0.013)
Unemployed in last 5 years	-0.255**	(0.022)	-0.256**	(0.022)
Unemployed more than 12 month	-0.094**	(0.023)	-0.094**	(0.023)
Company size (Ref.:<10)				
10-24	-0.028	(0.019)	-0.028	(0.019)
25-99	-0.016	(0.018)	-0.016	(0.018)
100-499	0.002	(0.020)	0.002	(0.020)
>500	0.024	(0.023)	0.024	(0.023)
Industry (Ref.: service)				
1 Agriculture	0.079+	(0.044)	0.079+	(0.044)
2 Manufacturing Industry	-0.089**	(0.022)	-0.089**	(0.022)
3 Construction	-0.042	(0.029)	-0.042	(0.029)
4 Trade	-0.013	(0.024)	-0.013	(0.024)
5 Transport/ Infrastructure	0.030	(0.025)	0.030	(0.025)
6 Finance	-0.027	(0.035)	-0.028	(0.035)
7 Public Administration	0.280**	(0.027)	0.281**	(0.027)
8 Education	0.296**	(0.025)	0.296**	(0.025)
9 Health sector	0.230**	(0.023)	0.230**	(0.023)

Constant	2.938**	(0.175)	3.323**	(0.218)
Variance components				
Random Slope (FTC)	0.050	(0.017)	0.064	(0.020)
Country	0.085	(0.023)	0.069	(0.019)
Individual	0.811	(0.008)	0.811	(0.008)
Covariance (FTC, cons)	-0.030	(0.015)	-0.031	(0.015)
Explained variance				
Random slope (FTC)	0.268		0.070	
R^2 (Individual)[a]	0.109		0.124	
R^2 (Country)[a]	0.199		0.368	
Country-years	32		32	
Individuals	21,836		21,836	

Note: + p < .1, * p < .05, ** p < .01; Standard errors in parentheses. [a] R-squared as proposed by Snijders and Bosker (1999, pp. 99–105; 1994, pp. 350–354).

Source: Estimations from the random intercept and random slope model (restricted maximum likelihood).

Table A6 Effect of EPLR on job security (EWCS 2005, 2010, 2015)

	New EPLR index		OECD EPLR index	
	beta	se	beta	se
Fixed-term contract (FTC)	-0.259	(0.163)	-0.126	(0.248)
New EPLR index	0.041^{+}	(0.022)		
x FTC	-0.090**	(0.026)		
OECD EPLR index			-0.115^{+}	(0.064)
x FTC			-0.113	(0.082)
Regulation temp. employment	0.084^{+}	(0.045)	0.108*	(0.045)
x FTC	-0.165**	(0.053)	-0.188**	(0.058)
Unemployment rate	-0.034**	(0.009)	-0.034**	(0.009)
x FTC	-0.013	(0.011)	-0.013	(0.012)
Education	0.071**	(0.017)	0.070**	(0.017)
ISCED 3-4				
ISCED 5-6	0.170**	(0.018)	0.168**	(0.018)
Age (Ref.:18-29)	0.000	(0.018)	0.000	(0.018)
30-39				
40-54	0.010	(0.017)	0.010	(0.017)
55-67	0.121**	(0.021)	0.121**	(0.021)
Part-time	-0.014	(0.017)	-0.015	(0.017)
Female	0.004	(0.013)	0.005	(0.013)
Company size (Ref.: <10)				
10-49	0.078**	(0.015)	0.078**	(0.015)
50-100	0.090**	(0.020)	0.090**	(0.020)
100-499	0.096**	(0.018)	0.095**	(0.018)
>500	0.142**	(0.021)	0.141**	(0.021)
Industry (Ref.:10. L Public administration and defense)	-0.278**	(0.052)	-0.278**	(0.052)
1. A-B Agriculture, hunting, forestry, fishing				
2. C-D Mining, quarrying, manufacturing	-0.471**	(0.025)	-0.470**	(0.025)
3. E Electricity, gas, and water supply	-0.240**	(0.051)	-0.240**	(0.051)
4. F Construction	-0.437**	(0.032)	-0.437**	(0.032)
5. G Wholesale and retail trade; repair of motor vehicles and motorcycles	-0.382**	(0.026)	-0.382**	(0.026)
6. H Hotels and restaurants	-0.367**	(0.037)	-0.367**	(0.037)
7. I Transport, storage, and communication	-0.383**	(0.029)	-0.383**	(0.029)
8. J Financial intermediation	-0.295**	(0.035)	-0.294**	(0.035)
9. K Real estate activities	-0.356**	(0.027)	-0.356**	(0.027)
11. M-N-O-P-Q Other services	-0.083**	(0.023)	-0.083**	(0.023)
Constant	4.160**	(0.144)	4.455**	(0.197)
Variance components				
Random Slope (FTC)	0.097	(0.024)	0.119	(0.028)
Country	0.085	(0.017)	0.085	(0.017)
Individual	1.217	(0.009)	1.217	(0.009)
Covariance (FTC, cons)	-0.043	(0.015)	-0.062	(0.018)
Explained variance				
Random slope	0.359		0.212	
R^2 (Individual)[a]	0.129		0.131	
R^2 (Country)[a]	0.446		0.474	

Country-years	57	57
Individuals	38426	38426

Note: + p < .1, * p < .05, ** p < .01; Standard errors in parentheses. [a] R-squared as proposed by Snijders and Bosker (1999, pp. 99–105; 1994, pp. 350–354).

Source: Estimations from the random intercept and random slope model (restricted maximum likelihood).

Table A7 Effect of EPLR on job security (EQLS 2007, 2012, 2016)

	New EPLR index		OECD EPLR index	
	beta	se	beta	Se
Fixed-Term-Contract (FTC)	-0.370**	(0.109)	-0.190	(0.188)
New EPLR index	0.079**	(0.022)		
x FTC	-0.088**	(0.018)		
OECD EPLR index			-0.072	(0.077)
x FTC			-0.121+	(0.066)
Reg. temp. employment (number & duration)	-0.046	(0.045)	-0.012	(0.051)
x FTC	-0.127**	(0.037)	-0.144**	(0.044)
Unemployment rate	-0.030**	(0.009)	-0.027**	(0.010)
x FTC	0.005	(0.007)	0.001	(0.009)
Education				
ISCED 3-4	0.073**	(0.018)	0.072**	(0.018)
ISCED 5-6	0.227**	(0.018)	0.225**	(0.018)
Age				
30-39	-0.014	(0.020)	-0.013	(0.020)
40-54	0.004	(0.019)	0.004	(0.019)
55-67	0.095**	(0.023)	0.095**	(0.023)
Part-time	0.003	(0.019)	0.003	(0.019)
Female	-0.006	(0.013)	-0.006	(0.013)
Constant	4.297**	(0.138)	4.514**	(0.221)
Variance components				
Random Slope (FTC)	0.039	(0.012)	0.061	(0.016)
Country	0.084	(0.017)	0.104	(0.021)
Individual	0.974	(0.009)	0.974	(0.009)
Covariance (FTC, cons)	-0.021	(0.011)	-0.049	(0.015)
Explained variance				
Random slope	0.536		0.267	
R^2 (Individual)[a]	0.106		0.094	
R^2 (Country)[a]	0.381		0.288	
Country-years	55		55	
Individuals	26339		26339	

Note: + p < .1, * p < .05, ** p < .01; Standard errors in parentheses. [a] R-squared as proposed by Snijders and Bosker (1999, pp. 99–105; 1994, pp. 350–354).

Source: Estimations from the random intercept and random slope model (restricted maximum likelihood).

Table A8 Effect of EPLR on temporary employment risk of new hires (extended)

	New EPLR index		OECD EPLR index		New EPLR index (z-stnd.)		OECD EPLR index (z-stnd.)	
	beta	se	beta	se	beta	se	beta	se
New EPLR index	0.032**	(0.005)						
OECD EPLR index			0.111**	(0.012)				
New EPLR index (z-stnd.)					0.057**	(0.009)		
OECD EPLR index (z-stnd.)							0.064**	(0.007)
Duration of trial period (short)	0.074**	(0.020)	0.026	(0.020)	0.074**	(0.020)	0.026	(0.020)
Regulations on the use of temporary contracts	-0.007	(0.006)	0.003	(0.005)	-0.007	(0.006)	0.003	(0.005)
Unemployment rate	0.022**	(0.002)	0.025**	(0.002)	0.022**	(0.002)	0.025**	(0.002)
Age (Ref.:<20)								
20-29	-0.024**	(0.001)	-0.024**	(0.001)	-0.024**	(0.001)	-0.024**	(0.001)
30-39	-0.081**	(0.002)	-0.081**	(0.002)	-0.081**	(0.002)	-0.081**	(0.002)
40-49	-0.063**	(0.002)	-0.063**	(0.002)	-0.063**	(0.002)	-0.063**	(0.002)
50-59	-0.058**	(0.002)	-0.058**	(0.002)	-0.058**	(0.002)	-0.058**	(0.002)
60-69	0.013**	(0.002)	0.013**	(0.002)	0.013**	(0.002)	0.013**	(0.002)
>70	0.000	(0.005)	0.000	(0.005)	0.000	(0.005)	0.000	(0.005)
Education (Ref. low)								
middle	-0.018**	(0.001)	-0.018**	(0.001)	-0.018**	(0.001)	-0.018**	(0.001)
high	-0.014**	(0.001)	-0.014**	(0.001)	-0.014**	(0.001)	-0.014**	(0.001)
Female	-0.010**	(0.001)	-0.010**	(0.001)	-0.010**	(0.001)	-0.010**	(0.001)
Variance components								
Individual	0.207	(0.000)	0.207	(0.000)	0.207	(0.000)	0.207	(0.000)
Country	0.023	(0.002)	0.020	(0.002)	0.023	(0.002)	0.020	(0.002)
Explained variance								
Individual	0.069		0.081		0.069		0.081	
Country	0.410		0.485		0.410		0.485	
Country-years	304		304		304		304	
Individuals	1242199		1242199		1242199		1242199	

Note: + p < .1, * p < .05, ** p < .01; Standard errors in parentheses. R-squared as proposed by Snijders and Bosker (1999, pp. 99–105; 1994, pp. 350–354).

Source: Estimations from the random intercept model (restricted maximum likelihood).