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Mapping employment dismissal law: A lexicometric investigation of EPL stringency and regulatory style

Benoit Pierre Freyens
J.H. Verkerke

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Inclusive Labour Markets, Labour Relations
and Working Conditions Branch

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Investigation of EPL Stringency and Regulatory
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1. Introduction

A vast economic literature investigates how employment protection law (EPL) affects important economic outcomes. Prior researchers have used many different data sources, dependent variables, time periods, and econometric methods. A significant strand of this literature, including a number of especially prominent papers, relies on a single, additive, leximetric index designed to measure the level of protection afforded to workers or the costs of terminating workers to employers, embedded in labour regulations of each jurisdiction. It is also conventional to assume that these employment laws vary principally along a single dimension of stringency. Studies typically measure the individual components of a country's labour regulations based on a coding scheme that assesses whether each legal requirement is more or less protective of workers (or restrictive for employers). Researchers then simply add these weighted component scores to produce an aggregate EPL index.

In the extensive leximetric literature on the employment effects of EPL, however, very few (if any) researchers have thought to test whether the underlying legal data can be reduced to a single, aggregate index of stringency (or restrictiveness) without distorting the analysis and discarding essential information about the regulatory regimes they are studying. Our principal goal in this paper is to question the commonly adopted assumption that EPL can be meaningfully measured using such an index. Rather than assuming that regulatory components can be aggregated according to their strictness, we investigate directly whether the pattern of laws adopted across many jurisdictions supports the conventional wisdom. Specifically, we ask if a single dimension of stringency meaningfully describes the pattern of legal rules coded in the EPLex dataset on individual dismissal law, which the International Labour Office (ILO) recently released to researchers. Our approach draws inspiration and statistical methods from the literature on scale development and data reduction. We use both common factor analysis and multidimensional scaling to assess whether the observed pattern of legal enactments supports using a single, aggregate index of EPL stringency.

Our attention to patterns of labour regulation also implicates a related branch of the comparative law literature on EPL. Scholars often identify national regulatory styles or modes of regulation. This work typically describes distinctive patterns of legal intervention and frequently draws conclusions about whether a given regulatory style tends to promote or retard economic and social development. Commentary on labour regulation offers many well-known examples of informal, qualitative descriptions of distinctive modes of regulation—Danish “flexicurity,” German “codetermination,” the Australian “award” system, and in the United States, an alleged tendency towards *laissez-faire* reliance on free market contracting. But we focus here on several other comparative law analyses that propose more broadly generalizable principles to characterize different modes of regulation.

The well-known body of scholarship on “legal origins” is by far the most prominent, systematic, and pervasive source of references to regulatory styles. Work in this vein distinguishes legal systems according to their historical origin. It principally contrasts legal regimes derived from English common law with those that trace their origin to French, German or Scandinavian civil law. According to legal origin theorists, common law countries tend to privilege private property rights and free contracting, and they regulate economic activity less intensively. In contrast, civil law countries are thought to adopt more intrusive regulations and permit government officials to displace private law rights more readily.

Botero et al. (2004) apply this theory to EPL and conclude that countries display distinctive regulatory styles characteristic of their transplanted legal systems and that these legal origins best explain differences in the level of labour regulation observed in different nations. This prominent study uses three separate aggregate indexes to measure employment

laws, collective relations law, and social security law. Like other work investigating the employment effects of EPL, however, Botero et al. implicitly assume that a single dimension of stringency exhausts the descriptive space within which the laws of various countries can be located.

Critics of the strong “legal origins” hypothesis, such as Deakin, Lele, and Siems (2007), question whether causation runs smoothly from historical legal origin to modern regulatory tendencies. Instead, they propose a more complex process that turns on historically contingent accidents—including the timing of industrialization—and the additional influence of national political realignments and European legal integration. Their “weak legal origins” theory thus embraces the possibility that patterns of labour (and other) regulations vary along multiple dimensions.

Yet another alternative hypothesis attributes regulatory patterns solely to historical contingency, or we can imagine a purely political account of law-making activity. In contrast to these historically and politically based explanatory theories, Saul Levmore (1986a, 1986b) proposes an intriguing functional theory of legal uniformity and variety. According to this approach, legal systems tend to converge on a common solution whenever lawmakers recognize that a specific rule is necessary to achieve important social objectives. In contrast, we should expect to observe a variety of legal rules in different countries if the choice among possible regulatory measures makes no significant difference or whenever lawmakers face empirical uncertainty about the optimal rule.

Each of these theories about regulatory style has empirical implications. In this paper, we introduce a new approach to identifying distinctive modes of labour regulation—an exercise we call “mapping employment dismissal law.” We derive implications for strong and weak versions of the legal origins theory, for a theory of pure historical contingency, for a political account of regulation, and for Levmore’s functional theory of legal uniformity and variety. We then use the results of our common factor analysis and multidimensional scaling exercise to test these implications against the patterns of law-making that we observe in the EPLex data on individual dismissal law. These techniques offer a complementary, empirically grounded method for identifying regulatory patterns. Although not a substitute for the speculative theorizing that dominates this literature, our approach imposes some empirical discipline on that speculation and may expose regulatory patterns overlooked in previous work.

Our paper exploits a newly available dataset from the ILO—the EPLex—that includes unusually rich data about laws regulating individual dismissal in a broad cross-section of nations. These data differ from commonly used leximetric datasets by including comparatively more countries, especially including a considerable sample of developing nations. Although the EPLex dataset has been developed to measure EPL stringency over five years (2009 – 2013), it provides principally a single, cross-sectional observation for 95 countries in the year 2010, along with 13 instances of legal change within the 5-year panel and 11 countries with distinct legal rules for different classes of workers. As additional data for other aspects of EPL and for additional years are released, we plan to update our analyses accordingly.

Preliminary results using common factor analysis undermine the conventional assumption that dismissal law can be meaningfully reduced to a single, aggregate index. Most prior papers make no adjustments to their leximetric measures for coverage or enforcement. Using the comparable unweighted EPLex observations, we find little evidence that these underlying data have either a one- or two-dimensional structure. In the one-factor specification implied by an aggregate index of stringency, for example, only two of the eight legal variables load strongly on that factor. The other six legal variables are only very weakly related to this single common factor, and thus a one-factor specification would discard

essential information about these aspects of labour regulation. Alternatively, the conventional approach—by aggregating all eight legal components into a single index of stringency—would arbitrarily combine uncorrelated regulatory measures and thus distort the subsequent analysis of EPL’s economic effects. Performing classical multidimensional scaling tends to confirm the absence of any obvious one- or two-dimensional structure in these unadjusted leximetric data.

Using observations weighted by coverage information for each country, however, uncovers a somewhat different pattern. Our results suggest that coverage-weighted data have a more definite structure than the raw EPLex data. The number of potential common factors expands from one to two, and many more legal components approach the degree of communality required for inclusion in a common factor. Multidimensional scaling similarly suggests that at least two dimensions are present in these data. We tentatively conclude from this line of analysis that the many prior papers that make no adjustment for the extent of coverage may have grossly mismeasured the likely effects of EPL for some countries. And if a structure requiring two (or potentially more) dimensions to characterize these legal data persists, then even a coverage-weighted index of stringency would be neglecting important features of the leximetric data on dismissal law.

The rest of the paper proceeds as follows: Section 2 offers a critical review of prior empirical studies of EPL that focuses on the gradual development and refinement of the leximetric techniques common to this literature. Section 3 describes several theories of regulatory style and derives empirical implications for each theory. Section 4 explains our empirical methods and relates them to the existing literature on data reduction, scale development, and ideal point estimation. Section 5 describes the EPLex dataset and compares it to other leximetric measures commonly used in the literature on labour regulations. Section 6 presents our empirical results, and Section 7 discusses their practical implications. Section 8 concludes.

2. Prior empirical studies of employment protection law

Economic theory produces equivocal predictions about how EPL affects employment, labour-force participation, unemployment rates, and other important economic outcomes. Early theoretical work concluded that stricter employment protection regulation makes it harder to terminate someone but that the resulting increase in firing costs also tends to discourage hiring (e.g., Hart 1984, Gavin 1986, Bentolila and Bertola 1990, Hamermesh 1993, Hopenhayn and Rogerson 1993). Thus, we should expect greater employment protections to reduce flows both into unemployment (firing) and out of unemployment (hiring). Only empirical evidence can determine which effect will predominate in response to any particular legal regime.

A vast empirical literature investigates this and many related questions. Although a full review is well beyond the scope of this article and would duplicate prior efforts (e.g., Addison and Teixeira 2003, 2005, Boeri 2011, Verkerke 1995, 2009, 2014), it is appropriate to re-examine here some key developments in the leximetric measurement of EPL strictness. We need to understand how this unit of measurement arose in order to determine whether scholars have been justified in their widespread adoption of a single, additive index of stringency.

Attempts to measure the costs of employment protection laws and regulations date at least to the early 1960s. Oi (1962) famously modelled labour as a “quasi-fixed” input and quantified the hiring and firing costs of a U.S. firm. Additional case studies followed (see Cascio 1987 for a review), but the 1960s and 1970s did not witness considerable scholarly—or industry—attention to the costs and benefits of employment protection laws (Daniel and

Stilgoe, 1978). The situation changed dramatically in the 1980s. Soaring unemployment rates in many OECD countries motivated scholars to explore the root causes of deteriorating economic conditions. Most of this research (see Hamermesh and Pfann 1996 for a review) focused on understanding how the labour market adjusts to macroeconomic shocks, on determining the source and structure of labour adjustment costs, and on deriving aggregate functional forms to describe the adjustment process. This work defined adjustment costs very broadly to encompass all natural obstacles, difficulties changing production levels, direct labour expenses such as search and training costs, and any legal or regulatory constraints. Although both collectively bargained and statutory job security provisions undeniably affect adjustment costs, none of these studies developed specific methods to measure the stringency of employment protection laws.

In the ensuing decade, the US labour market improved considerably while high unemployment rates persisted throughout much of Europe—a condition that came to be known as “Eurosclerosis.” These parallel developments prompted researchers and policy makers to look more closely at whether stringent EPL might be discouraging hiring in European countries. They began studying labour policy by developing qualitative assessments of EPL and country rankings (Emerson 1988), by constructing simulation models (Gavin 1986), and by combining theoretical and quantitative analysis (Lazear 1990).

Except for the well-known Lazear paper, none of these early studies found any clear association between the persistence of unemployment in Europe and the provisions of employment protection laws in those countries. The Lazear study identified a correlation between severance pay obligations and four important labour market outcomes, including unemployment. When other scholars re-examined the same data, however, they discovered coding errors and questionable econometric assumptions that cast considerable doubt on Lazear’s conclusions (Addison and Grosso 1996, Addison, Teixeira and Grosso 2000, Addison and Teixeira 2003, 2005). The paper also relied on a very crude measure of EPL—severance pay for blue-collar workers with 10 years of job tenure. This data series had the virtue of allowing comparisons among a large number of countries over a relatively long time period (1956-84), but it neglected many other highly salient regulatory provisions and only imperfectly captured international variation in severance pay requirements. Thus, despite its prominent place in the literature on EPL, Lazear’s pioneering paper has not held up well to subsequent scholarly scrutiny.

Beginning in the late 1980s and accelerating during the 1990s, other scholars constructed far more comprehensive indexes of labour regulation. For example, Piore (1986) developed a qualitative description of the components of EPL for the U.S. and some European countries. However, Emerson (1988) led the way by being first to rank countries using a wide variety of indirect measures of EPL stringency. He considered economic variables such as employment durability and job turnover, evaluated legal rules governing collective layoffs, individual dismissal and atypical contracts, and incorporated employers’ survey responses about how labour regulations constrain termination decisions. Emerson thus combined legal information with opinion data and labour market statistics. His paper also provided excellent insight into the many labour market effects—both positive and negative—that may result from a stringent EPL regime. Emerson deserves considerable credit for originating a general leximetric approach that subsequent researchers have refined and expanded. His study paved the way for other scholars who have used an EPL index to measure the stringency of labour regulations.

Building on Emerson’s work, for example, Bertola (1990) summarized various itemized rankings in a composite metric of EPL stringency for eight European countries, to which he added Japan and the United States. Bertola then compared this new ordinal measure to cardinal firing costs estimates for the UK, Italy, France, and Germany derived in the frequently cited Bentolila and Bertola (1990) study. The Bentolila and Bertola estimates, in

turn, were constructed from eight different sources, including Emerson (1988) and OECD data. Their cost estimates incorporated notice costs, the probability of a contested dismissal, success rates for employees challenging discharges, legal costs, and levels of monetary compensation for wrongful discharge, though not the likelihood of reinstatement. Bertola's ordinal ranking of EPL stringency in these four European countries (IT > FR > DE > UK) matched the cardinal firing cost measure and thus tended to confirm the accuracy of his composite leximetric measure. He then investigated whether his rankings were correlated with labour market outcomes such as employment stability, wages, or unemployment. Bertola found no relationship between stricter EPL and levels of employment or unemployment, though unemployment persistence was somewhat greater in countries ranked higher on his ordinal scale. In subsequent work, Bertola (1992) developed a theoretical rationale for these results.

Even in these very early leximetric efforts, researchers realized that EPL stringency depends in part on factors other than the text of legislative enactments. Labour regulations must be enforced to be effective. The judicial system may be more or less receptive to such claims, and judges often retain significant discretion because they must evaluate the facts and interpret the law in individual cases. Ideally, measures of EPL should incorporate information about enforcement (Bertola 1999). Bentolila and Bertola (1990) attempted to capture the influence of judicial discretion using observed probabilities and patterns of claims lodgement, employee success rates in court, and judicially awarded redress.

Other researchers have identified and investigated a variety of specific enforcement concerns. The problem of ideological bias arises when the labour court judges who adjudicate dismissal disputes have political or industry affiliations that influence their judgments. The social values of these judges may either blunt or accentuate the restrictiveness of enacted labour regulations (Berger and Neurath 2011, Booth and Freyens 2014). Labour court judges also may render different decisions when the economic climate or supporting legal institutions vary. Thus, we observe "economic endogeneity" (Dertouzos and Karoly 1993, Bertola et al. 2000, Ichino et al. 2003, Marinescu 2011, Jimeno et al. 2015) if, for example, high unemployment rates inspire sympathy for workers or, conversely, if frequent business bankruptcies make judges reluctant to saddle firms with unwanted workers. "Institutional interactions" (Auer 2000, Bertola et al. 2000) also may be present whenever judges exhibit less concern for workers because a jurisdiction provides generous unemployment benefits or undertakes other active labour market policies. Although prior researchers have investigated the (more easily measured) influence of economic conditions and unemployment benefits, we are unaware of cross-country studies that systematically consider the potential influence of ideological bias on EPL stringency.

For most of the 1990s, several teams of OECD researchers led efforts to further develop an EPL index. Once again, progress was incremental and built on the foundation established in prior studies. Grubb and Wells (1993) developed an index for 11 EU countries that assigned scores on a scale of 0 to 3 to specific EPL variables. This index included:

- 1) dismissal restrictions, including severance pay and notice requirements over 3 different ranges of tenure (thus extending Lazear's measure), procedural delays, difficulty of firing as well as legislated aspects of dismissal disputes such as trial period, payable compensation, and extent of reinstatement provisions;
- 2) temporary work restrictions, including grounds and derogations, contract renewals and duration;
- 3) hours restrictions such as maximum working time, flexibility in the distribution of hours and restrictions on nightshift work; and

4) the role of regulations in inducing part-time work.

Components (2) – (4) incorporated measures less directly associated with dismissal law but consistent with a broader view of EPL stringency. At the time of its publication, this index was the most comprehensive measure of labour regulation available. Grubb and Wells ranked EU countries according to regulatory stringency. This exercise produced three clusters of countries: Mediterranean countries (ES, IT, PT, GR) with a high overall ranking for strictness of dismissal protection (scores between 8 and 11), Anglophile countries (UK, IE and DK) with low scores (1 to 3), and a group of Continental European countries (DE, FR, BE, NL) with intermediate scores (between 4 and 7).

A subsequent OECD study (the OECD's 1994 Jobs Study index) removed hours and temporary work variables from the Grubb and Wells measure, extended the composite index to 16 EU countries, and tested for robust associations between the index and labour market outcomes. As in prior work, the stringency of labour regulations appeared to be uncorrelated with employment and unemployment levels. Nevertheless, this study launched the OECD Jobs Strategy initiative and led the organization to recommend that governments consider relaxing the strictness of their employment protection regulations. In support of this recommendation, the OECD relied on a frequently observed association between EPL stringency and the persistence of unemployment. A number of OECD countries (mostly Anglo-Saxon) soon followed the organization's recommendation (OECD 1997).

In another OECD study, Scarpetta (1996) created a composite EPL index by averaging the OECD 1994 Jobs Study index and the Grubb and Wells index. Scarpetta included this composite index as an explanatory variable, along with other labour market institutions such as unemployment benefits and union density, in reduced-form, multivariate regressions designed to estimate how these variables affect the unemployment rate, long-term unemployment and youth unemployment for the period 1983 to 1993. He found significant positive effects for the EPL index, particularly for long-term and youth unemployment (pp.58-61). Scarpetta concluded that these findings tended to confirm the results of Lazear (1990) while using a much broader legal index than the original measure of severance pay (though Scarpetta did not attempt to replicate Lazear's negative employment effects). Conversely, Scarpetta's results clearly conflicted with the findings of other previous leximetric studies such as Bertola (1990).

Two years later, continuing along a similar line of inquiry, Scarpetta and colleagues (Elmeskov et al. 1998) used the same EPL index, which they revised for recent legislative changes. They also extended the 1996 OECD data set by two years and added a combined coordination/centralization collective bargaining control in lieu of the separate controls for these variables used in the earlier study. This paper found an even more robust positive association between strict EPL and structural unemployment than Scarpetta (1996)—a result the authors speculated was possibly attributable to the updated EPL index.

These OECD studies were important because they provided support for the view that strict EPL is associated with higher unemployment at a time when Lazear's paper faced severe criticism. Closer examination of Lazear (1990) had revealed data coding errors, the narrowness of the paper's proxy for EPL strictness, the absence of key control variables, and a failure to correct for time-series autocorrelation. Other researchers found that including improved controls and correcting for the effects of autocorrelation all but eliminated Lazear's results (Addison and Grosso 1996, Addison et al. 2000, Addison and Teixeira 2005). By contrast, work by Scarpetta and his co-authors bolstered the case for a strong EPL effect. These papers used an average of the most comprehensive available EPL indexes and included some of the key controls that Lazear had omitted, such as union density, the structure of collective bargaining, and unemployment benefits.

These OECD studies brought improved empirical methods and comparatively strong results, and were influential in setting the policy agenda and driving legislative reforms in several European countries, including Italy and France. However, two concurrent and very comprehensive studies (Nickell and Layard 1999, OECD 1999) cast considerable doubt on the confident conclusions advanced by Scarpetta and his coauthors. Nickell and Layard regressed the unemployment rate and the employment-population ratio against the same OECD (1994) index of EPL stringency (p.3053). They found no evidence that EPL influences overall unemployment. As in the earlier Scarpetta studies, they found a modest positive association of stricter EPL with higher *long-term* unemployment, but negative effects on *short-term* unemployment balanced the overall effect. The authors criticized Scarpetta's measure of structural unemployment (p.3055) and suggested that methodological differences explain their different results. Nickell and Layard also found more marked adverse effects on employment levels and attributed these negative effects to a localized labour supply issue. Married female labour force participation rates were unusually low in Mediterranean EU countries where EPL is also comparatively strict. We note, however that Addison and Teixeira (2003) have argued that the causal arrow may run in the opposite direction—labour regulations that protect male worker's jobs reduce employment opportunities for women and thus depress their participation rate.

The contrasting claims of Nickell and Layard (1999) and the Scarpetta studies mirrored the stalemate that arose a decade earlier after the publication of Lazear (1990) and Bertola (1990). In this case, however, the papers used nearly identical EPL indexes, regression methods, and data sources. Another OECD (1999) study further confirmed the equivocal state of this enormous empirical literature on EPL. This work used a far more sophisticated EPL index than prior papers. The authors updated the legal data from the 1994 index (which was based largely on 1980s legislation), expanded the scope of its indicators to 22 components (including temporary work and collective dismissals), and revised the ranking of dismissal protection for 27 OECD countries. This updated index supplemented legal data with multi-country survey information, incorporated uneven weights for the 22 component indicators, and generated cardinal scores rather than a mere ordinal scale. With minor revisions, this 6-point scale, which now covers 1985-2013 (<http://stats.oecd.org/>), has been used widely in post-1990s research.

The OECD (1999) study provides a fitting epilogue to a decade of progressively more sophisticated efforts to use leximetric indexes to estimate the labour market impact of EPL. Stricter EPL had no noticeable effect on overall unemployment and the employment-population ratio, but it appeared to produce compositional effects. Unemployment increased (and the employment-population ratio decreased) for younger workers—and to a much lesser extent for females and older workers. But these same variables decreased (increased) for prime-age males. Thus even OECD researchers found that a higher EPL index was only associated with more self-employment, lower job turnover, and higher unemployment duration. And subsequent work (Boeri 2011) has challenged these conclusions as well.

A consensus among critics has gradually emerged that the aggregate coding of typical EPL indexes produces a flawed leximetric measure. Such indexes can only very imperfectly identify the effects of a specific labour market institution such as EPL (Freyens 2010, Verkerke 2009, 2015). To provide just one example, Bassanini and Garnerò (2013) suggest in a recently published paper that much of the impact of EPL on within-sector labour reallocation can be attributed to two specific EPL components (the length of the trial period and the extent of reinstatement) rather than to any arbitrary aggregation of EPL measures.

Moreover, legal and market institutions interact with one another. It remains a puzzle, for example, that interacting the EPL index with coordinated or centralized collective bargaining indicators produces highly significant effects in the studies we have reviewed.

Several studies also find significant interaction effects between EPL and the macroeconomic environment (Blanchard 2000, Blanchard and Wolfers 2000).

By this stage in the development of the literature, the limitations of the leximetric index approach were well known, and include:

- 1) the inherent subjectivity of index construction (particularly decisions about how to weight individual legal components),
- 2) the bluntness of an ordinal index,
- 3) lack of practical information about enforcement, coverage, ease of law avoidance, collectively bargained conditions, and
- 4) rapid obsolescence of supporting information used to establish index values thus requiring frequent updating.

As Tito Boeri noted in his recent review of labour market reforms and dualism (Boeri 2011), the leximetric approach to measuring EPL has receded somewhat from its original prominence. From 2000 onwards, the academic literature on the effects of EPL took a new turn and focused more frequently on within-country reforms considered as natural experiments. These studies typically have applied difference-in-differences estimation methods to time-series (or panel data) variations in EPL. The “treatment” usually consists of legal reforms that reduce (or remove) employment protection for a well-defined group of workers or employment contracts. The “control” group consists of workers of similar attributes who are unaffected by the reforms.

For instance, many European countries have legislated exemptions from EPL requirements when a firm’s size falls under a certain employment threshold (Boeri and Jimeno 2005, Garibaldi et al. 2008, Bauer et al. 2007, Kugler and Pica 2008). Other idiosyncratic reforms targeted specific EPL components such as probation period (Riphahn 2004, Scoppa 2010) and temporary contracts (Boeri 1999, Riphahn and Engellandt 2005, Boeri and Garibaldi 2007, Dolado et al. 2007). In the US, researchers have used these “natural experiment” methods to examine the employment, wage and productivity impacts of US States’ episodic adoption of wrongful discharge protections between 1970 and 2000 (see Verkerke 1995 and 2009 for a review). As in the European context, findings about potential employment effects in the US from stricter EPL have proven equivocal. In their instrumental variables model, Dertouzos and Karoly (1992, 1993) found up to five percent state-wide reductions in employment depending on which of several wrongful discharge doctrines a jurisdiction had adopted. However, subsequent difference-in-differences models of Miles (2000) and Autor et al. (2004, 2006) either reversed, or strongly mitigated, these results.

Although a majority of international panel-data and time-series studies have examined OECD countries, a smaller body of work has also emerged on Latin American and Caribbean countries (Heckman and Pagés 2000, 2004 and numerous other contributions to the 2004 volume). As with the OECD literature, the evidence for these developing or middle-income countries is somewhat mixed. These studies typically have found negative employment effects from EPL in a handful of countries only and no significant effects elsewhere.

Outside of Latin America and the OECD countries, only India has attracted significant research interest. As in the United States, EPL adoption in India varies significantly among the federal states. This institutional structure is well suited to applying difference-in-differences methods. The comparative strictness of employment protection law in India falls at the opposite end of the spectrum from the conventional *laissez-faire* image of US dismissal regulation (but see Verkerke 2009 for criticism of the conventional account). In India,

although the federal Industrial Dispute Act imposes stringent regulations on dismissals, individual Indian States may adopt legislation that either mitigates or opts-out of those federal rules. In a high-profile study, Besley and Burgess (2004) exploited the resulting State-by-State variation in job security rules and found that States with stricter EPL had lower employment growth and slower labour adjustment than other Indian States. As with Dertouzos and Karoly (1992, 1993) in the US context, the Besley and Burgess study has faced criticism on methodological grounds, although it appears to have stood the test of time more successfully (see Betcherman 2014: pp.16-18 for a recent review of this segment of the literature).

The number of idiosyncratic EPL reforms undertaken over the last three or four decades, particularly in European countries, currently numbers in the hundreds. A growing body of natural-experiment studies has analyzed the economic effects of these legal reforms. The references cited above are but a small sample from this rapidly expanding body of work. Again, it is well beyond the scope of this paper to exhaustively review these papers. We can, however, offer some tentative generalizations about this work. This branch of the literature has unquestionably broadened the methods and scope of EPL research. Although this new generation of work no longer depends on indexes of EPL strictness, it too has failed to resolve the key ambiguities raised in earlier studies. Moreover, during the past 30 years, employment protection legislation in OECD countries such as Canada, Denmark, Mexico, Norway, Switzerland and Turkey has seen at most minor reforms. Without significant legal change, researchers cannot use the natural experiment method to investigate the effects of EPL in these jurisdictions.

Despite the growth of these alternative methods, studies based on country rankings and EPL indexes still largely dominate policy discussions, particularly within international organizations. For example, the OECD continues to update and extend the organization's 6-point EPL index, which now covers 43 countries (including all of the largest non-OECD nations, such as Brazil, China, India, Indonesia, and Russia) with data for 2008-13. Beginning around 2006, other international organizations and research centres also began to develop new indexes of EPL stringency. These efforts include: (a) the World Bank's Employing Workers Index, constructed as part of the organization's Doing Business project, but now discontinued,¹ (b) the Labour Regulation Index (LRI), a project of the Cambridge Centre for Business Research (CBR), and (c) the ILO's EPLex indicators (see Aleksynska and Cazes 2016 for a recent comparative review).

Amongst these new leximetric efforts, the ILO's EPLex is most nearly comparable to the widely used OECD index. Despite notable methodological differences, the EPLex composite indicator is highly correlated to the OECD index's first measure of legal rules that apply to individual dismissals for regular contracts. By contrast, the (now discontinued) World Bank's index captured information mostly related to economic dismissals (redundancy) in the spirit of the OECD index's third measure—collective dismissals. Due to its discontinuance in 2011, the Employing Workers Index only covers a short range of years. Like the OECD index, the EPLex dataset covers mostly OECD countries (except Iceland, Ireland, Israel and Latvia) but also 64 non-OECD countries, 8 of which are large or significant emerging countries (with the exception of India).

The third index developed recently is the CBR's LRI index (Deakin et al. 2007), which contains forty indicators organized under five sub-categories. It overlaps in many ways with the OECD and EPLex indexes, and, like the OECD and EPLex measures, the LRI focuses both on collective separations and individual dismissal. In contrast, the EPLex in its current iteration covers only the subject of individual dismissal law. In its original version, the LRI

¹ The World Bank's Doing Business 2011 study discontinued all of the sub-indices of the Employing Workers index, including the difficulty of hiring index, the rigidity of hours index, and the difficulty of redundancy index

covered fewer countries (31) than either the OECD (41) or EPLex (95) indexes, though it captured a much longer time span (1970-2013) than either. Recently released updates to the LRI dataset now cover 117 countries. (See <http://www.cbr.cam.ac.uk/datasets/>.) As with the ILO's EPLex, there are few published studies that make use of the LRI (but see Deakin et al. 2007, and Deakin and Sarkar 2008). More recently, CBR researchers have produced a number of working papers based on LRI data (Deakin et al. 2014, Deakin and Sarkar 2015). These papers conclude that EPL produces at most very modest increases, or even small reductions, in unemployment levels in the analyzed countries.

In summary, labour economists agree that economic theory produces equivocal predictions about how EPL affects labour market outcomes. The body of cross-country empirical studies based on leximetric measures—as well as work based on the complementary natural experiment approach—tend to confirm these predicted ambiguities. Throughout the past several decades, researchers have significantly refined the EPL indexes used in this work. Beginning in the late 1980s with limited cross-section analyses using comparatively crude legal indexes, this literature has developed increasingly sophisticated schemes for measuring legal rules. Researchers have increasingly incorporated multi-country survey information, extensive panel datasets, and firm- and industry-level data. Long time-series studies analyzing significant legal variations within many countries have become increasingly common. A common feature of nearly all of these index-based studies, however, is that they rely on the assumption that EPL can and should be described by a single, additive dimension of stringency.

3. Theories of regulatory style

The concept of regulatory style or a mode of regulation involves a comparison across jurisdictions, either nations or sub-national units such as states or provinces. It posits the existence of two or more distinct patterns in how jurisdictions regulate. Such a pattern may exist across several categories of legal rules or instead appear among the individual components of rules governing a specific subject area. In this initial investigation, we focus rather narrowly on the laws regulating individual dismissals. Future work will extend the analysis to other aspects of labour regulation as additional data become available.

Some prior commentary offers informal, qualitative descriptions of characteristic regulatory styles, such as Danish “flexicurity” or German “codetermination.” These accounts can identify important institutional details, but they are difficult to generalize. These descriptions may suggest possible explanatory hypotheses, but without further development, they have no definitive empirical implications. Instead, we focus here on several more systematic theories of regulatory style.

3.1 “Strong” legal origins theory

By far the most prominent prior scholarly discussion of regulatory styles is the “legal origins” literature. According to the legal origins hypothesis, “the historical origin of a country’s laws shapes its regulation of labour and other markets.” (Botero et al. 2004, p.1340). This theory primarily contrasts common law and civil law traditions, and each legal tradition is associated with a distinctive regulatory style. In a series of papers that focus principally on corporate law, shareholder protections, and the regulation of business enterprises, Rafael La Porta and colleagues develop a now-familiar thesis. On their account, countries that received a common law legal tradition enjoy an economic advantage over those burdened with a civil law or socialist legal regime. (La Porta et al., 1997, 1998, 1999)

Other scholars have sought to describe the mechanisms that produce these different outcomes (Hall and Soskice, 2001). Common law countries tend to establish a “liberal market” economy, in which judicial independence reduces the risk of rent-seeking regulatory capture, the steady evolution of precedent permits timely adaptation to changing market conditions, and respect for personal autonomy and private contracts creates strong incentives for entrepreneurship. In contrast, the “coordinated market” regime in civil law countries produces more intrusive, less flexible regulation with a greater risk of interest group capture. Proponents of the legal origins theory report a wide array of cross-country comparisons that find an association between nations’ legal tradition and important measures of economic performance (see, e.g., La Porta et al., 1997, 1998, 1999; Mahoney, 2001). Critics, however, raise a number of questions about the existence and implications of these associations (see, e.g., Hall and Soskice, 2001; Ahlring and Deakin 2007).

Botero et al. (2004) extend the orthodox legal origins argument to labour regulation. In this widely cited paper, the authors construct a leximetric index composed of sub-index scores for civil rights, employment law, collective labour relations law, and social security law. They find that civil law countries regulate the labour market more intrusively than common law countries. Although political control by a left-leaning government also is associated with more stringent regulation, Botero et al. conclude that the influence of legal origin is larger. Moreover, they also report that a higher score on their labour index (and thus more protective legislation) is associated with reduced labour force participation, increased youth unemployment, and a larger informal sector. They conclude that the propensity of civil law countries to adopt more stringent labour regulations reduces economic performance in those nations.

In keeping with methods common throughout the EPL literature, proponents of the legal origins theory have consistently described labour regulations using a single, additive index of stringency. Although Botero et al. (2004) measure separately the influence of legal origin on three broad areas of regulation (employment protection law, collective labour rights, and social security law), in each case the coding and analysis assumes laws vary only in their stringency. According to the theory, countries under the influence of the common law tradition regulate the labour market less intensively than countries influenced by any of the civil law traditions. Thus, legal origins theory predicts that a single latent variable underlies the pattern of labour regulations and that countries can be arrayed according to their legal tradition along that unidimensional axis of stringency.

3.2 “Weak” legal origins theory

Critics of legal origins theory have raised many objections. For example, Deakin, Lele, and Siems (2007) use a very long time-series on labour regulation in five prominent countries to test the legal origins hypothesis. The authors observe that although the legal origins theory implies a prediction about the development of legal rules over time, Botero et al. (2004) rely on a single cross-sectional observation from the mid-1990s. To remedy this mismatch between theory and data, DLS (2007) construct a longitudinal labour regulation index covering five aspects of employment and labour law: (1) alternative working relationships, (2) work time, (3) dismissal, (4) employee representation, and (5) industrial action. In a major methodological advance, the authors cite specific legal sources for each of the values in their dataset. In addition, they incorporate information about both formal legal rules and “self-regulatory mechanisms, including collective agreements, which play a role functionally similar to that of the law in certain systems.” (p.144)

The results reported in DLS (2007) fail to support the legal origins hypothesis. First, electoral politics best explains regulatory change between 1970 and 2005 in the UK and France, while Germany, India, and the United States saw very little change during the same

period. Second, the data reveal that India has largely repudiated any common law influence on labour law that the country inherited from Britain. Third, the US and UK systems diverged long ago, and each country's regulatory evolution since 1970 has followed a distinct path. Finally, similarity at the aggregate level between Germany and France conceals significant divergence in each of the individual sub-indexes. (p.151) Subsequent papers also using the CBR-LRI data on larger groups of countries have cast further doubt on the "strong" legal origins hypothesis. (See Deakin and Sarkar, 2008, 2015; Deakin and Haldar, 2015.)

Instead, DLS (2007) emphasize "the timing of major legal innovations induced by nineteenth century industrialization" (p.139). The comparatively early industrialization of Britain caused the medieval law of master and servant to persist in the common law tradition; in contrast, industrialization in France followed the development of private law codes which embodied comparatively modern concepts limiting the employer's power of control. (p.140) This theory of a "weak" legal origins effect thus rejects the functionalist account that views common law as superior by virtue of its adaptability to changing conditions or its resistance to regulatory capture. Instead, legal origin simply creates an institutional channel for particular historical accidents to persist in those countries that inherit either the British common law or one of the civil law traditions. And contrary to the functionalist perspective, this "weak" legal origins story rejects the claim of many legal origins theorists that the distinctive institutional features of the common law tradition confer an economic advantage on those countries fortunate enough to have received that legal model.

On its face, the "weak" legal origins thesis appears to embrace the unidimensional approach of the "strong" legal origins theory. For example, one prominent paper asserts that "just as maximum employment protection through law (a score of "1") may not be optimal for employees, given possible inefficiencies from over-regulation, so its complete absence (a score of "0") may not be optimal for employers, given the presence in unregulated markets of transaction costs and other barriers to coordination." (DLS, 2007, p.143) But the same paper emphasizes the need to introduce the additional dimension of time into the analysis. Using an early version of the CBR-LRI data, the authors find legal stability over time in the US, Germany, and India. In contrast, the UK and France saw considerable change during the period from 1970-2005, and that change can be traced to developments in each country's electoral politics. This paper also analyzes the five sub-indexes of the CBR-LRI labour regulation index. This detailed legal and historical discussion reveals factors—including changing political winds, distinct national preoccupations, the influence of case law, the role of the informal sector, divergence between civil law countries on sub-indexes despite proximity in the aggregate, and a broad trend of convergence among European systems—that challenge conventional conclusions about the role of legal origin. On balance, the "weak" legal origins theory relies heavily on the dimensions of stringency and change over time, but finding that multiple latent variables underlie the pattern of dismissal regulations (or national legal systems more generally) would tend to confirm the more complex picture that this theory posits.

3.3 Historical and political influences

Some comparativists question whether we will or should find any enduring and consistent patterns in countries' regulatory regimes. Instead, they emphasize the historical contingency of political and legislative developments—the role that distinctive events and unpredictable local influences play. For example, Acemoglu et al. (2001) offer an historical account of comparative economic development that emphasizes systematic differences in colonial institutions that arise from variations in the mortality rates of European colonizers. In the limiting case, however, unique historical accidents would dominate all other forces in shaping legal rules. Although no one seriously advances this position, considering its implications can help us calibrate precisely where on the spectrum of possibilities the

observed patterns of regulation lie. If no systematic patterns of regulation exist, then we should expect to find that no common factors exist among our measures of individual regulatory components. Dismissal regulation would instead be a sort of random walk from the perspective of the analyst, and the dimensionality of the data would equal the number of components under examination.

Many commentators emphasize the importance of political influences on the development of regulation (for critical discussion of political factors, see, e.g., Botero et al., 2009). Under this theory, the outcomes of electoral politics (or in nondemocratic countries, the political orientation of autocrats) should primarily determine patterns of legislation. Although Botero et al. run a “horse race” between legal origins and a candidate political theory, their test focuses exclusively on the dimension of stringency and examines only the success of left-leaning political parties. According to the political theory, patterns of regulation should be interpretable in political terms, which could include electoral results, interest group influence, or distinctive national political commitments. Thus, it would be evidence in favour of the political theory if one (or more) of the latent variables underlying the data on regulatory components implied a political explanation for its existence.

3.4 Functional theory of legal uniformity and variety

Another branch of comparative law scholarship can also shed light on distinctive patterns of regulation. In a series of articles describing a functional or behavioural approach to comparative law, Saul Levmore (1986a, 1986b) proposes that jurisdictions will adopt uniform rules when “a particularly necessary behavioural effect can be accomplished only with a certain rule.” (Levmore 1986a, p.895) In contrast, rules will vary “over a range in which rules do not greatly affect behaviour or when reasonable people could disagree over which rule best accomplishes a desired effect.” (Id.) Levmore thus predicts that we should observe patterns of uniform legal rules or regulatory variety according to whether these conditions exist.

The theory of uniformity and variety can be viewed from two perspectives. First, following the approach of Levmore (1986a), we may conduct an independent analysis of whether efficiency (or some other social goal) requires a particular rule or if instead the choice of rule will have insignificant or empirically uncertain effects. In the former case, the theory predicts that we should observe all nations adopting reasonably similar rules governing this subject matter. In the latter case, the theory implies that historical accidents, differing legislative judgments, and local conditions will produce a wide variety of legal rules. On this interpretation, the theory thus depends on an independent analysis of whether some important social goal requires a particular rule or whether the effects of choosing one rule over another are empirically uncertain or insignificant.

Alternatively, if one accepts the theory, then according to Levmore, observing regulatory uniformity implies that a rule is likely to be efficiency-enhancing, and observing variety implies either empirical uncertainty or insignificance. Of course, legislators also pursue important social goals other than economic efficiency. Thus, the theory must be amended to recognize that the “necessary behavioural effect” that generates patterns of regulatory uniformity or variety also may arise from a widely shared non-efficiency goal such as equity or fairness.

Turning to the law of individual dismissal, it is well known that economic theory produces inconclusive predictions about how dismissal protections will ultimately affect economic outcomes. It may therefore be easiest to apply the uniformity-variety theory in reverse—using patterns of regulation to infer something about their social desirability. The theory, however, could generate predictions about uniformity and variety along a single

dimension of stringency. Or it may instead predict how many latent variables should be present in the observed pattern of regulation. It seems reasonable to infer that regulatory variety along multiple dimensions would be even stronger evidence for uncertainty about (or insignificance of) regulatory effects. Thus, evidence of multiple latent variables and significant cross-country variation among those measures would tend to confirm the ambiguous predictions of economic theory. Because legislators also pursue non-efficiency goals, the inference from uniformity to efficiency is less direct than Levmore's original analysis would suggest. Nevertheless, if the theory is correct, then cross-national regulatory uniformity implies that the uniform rule serves an important social purpose—either efficiency or some other compelling social goal.

4. Empirical analysis

Our ultimate goal is to determine how best to describe and measure the legal components of individual dismissal regulation. As we have seen, various explanatory theories make different assumptions about the dimensionality of these regulatory systems. So in this section we report a number of empirical approaches we have used: (1) to evaluate the degree of association among the eight variables composing the EPLex data, (2) to detect a structure in the way these variables interact with one another, and then, (3) using the identified structure, to reduce the number of variables to a few key dimensions that capture the essential cross-country variation in the EPLex indicators.

Exploratory factor analysis is one such method. It allows the data to speak to us about what structure is embodied in the pattern through which countries adopt various regulatory components. In contrast to the fixed aggregation schemes common to the EPL literature, factor analysis does not require us to formulate any priors about the dimensional structure of the EPLex data. It reveals first the number of latent variables (ideally fewer than the number of legal components present in the data) that can best explain any observed pattern in the coded legislation. This technique therefore provides guidance towards determining an optimal framework to condense the information contained in the leximetric data.

By identifying regulatory components that covary in the sample, we also can hope to identify the substantive content or meaning associated with specific groups of legal components. Although factor analysis is a parsimonious and widely used technical heuristic (Hayton, Allen, and Scarpello, 2004; DeVellis, 2012; Pituch and Stevens 2015) it does not necessarily generate an intuitive interpretation of these latent dimensions. We therefore complement our factor analysis with classical multidimensional scaling (MDS), a more flexible technique for testing the inherent structure of a dataset. MDS assesses the similarity of multivariate data on spatial dimensions that may not be evident in the correlation matrix or discoverable through factor analysis.

Formally, we seek to quantify the following relationship using our $n \times p$ data set:

$$X_{p \times 1} = A_{p \times m} F_{m \times 1} + e_{p \times 1}$$

In which:

X_i denotes the $p = 8$ EPLex components ($i = 1, \dots, p$);

F_j denotes the common factors ($j = 1 \dots m$), where m is to be determined

A_{ij} denotes the 8 EPLex loadings for each common factor $j = 1 \dots m$

e_i denotes the error terms for each EPLex component (the portion of the relationship not explained by inter-component correlations)

n denotes the number of EPLex country/year/sector/class of worker observations included in the analysis. (Depending on our focus, we will use $n = 95, 106, 108, \text{ and } 119$).

Applying both exploratory factor analysis and multidimensional scaling, we investigate whether a single dimension of stringency best characterizes the individual components of dismissal regulation, or if instead the EPLex data reveal additional dimensions on which these dismissal regulations vary. Using the results produced by these techniques of multivariate analysis, we also examine the pattern of legal regulations for consistency with the predictions of comparative law theories of regulatory style.

5. The data

In this initial application of our method, we use the newly available ILO EPLex dataset. Based on the EPLex database of legislation concerning employment protection in 95 countries for the period from 2009 to 2013. Coding includes eight groups of regulatory components:

- Area 1.1 – valid grounds for dismissals;
- Area 1.2 – prohibited grounds for dismissals;
- Area 2 – probationary periods;
- Area 3.1 – procedural requirements for dismissals;
- Area 3.2 – notice periods;
- Area 4.1 – severance pay;
- Area 4.2 – redundancy pay; and
- Area 5 – avenues for redress.

Each topical sub-indicator and a summary indicator are normalized on a scale from 0 to 1. Although currently limited to individual dismissal regulation, the ILO plans to expand the EPLex indicator to cover additional areas of regulation in the future. The ILO also provided coverage data (Aleksynska and Eberlein, 2016), which we incorporate into our analysis by weighting the original EPLex variables as follows:

- CovArea 1.1 – valid grounds for dismissals \times coverage coefficient;
- CovArea 1.2 – prohibited grounds for dismissals \times coverage coefficient;
- CovArea 2 – probationary period \times coverage coefficient;
- CovArea 3.1 – procedural requirements \times coverage coefficient;
- CovArea 3.2 – notice period \times coverage coefficient;
- CovArea 4.1 – severance pay \times coverage coefficient;
- CovArea 4.2 – redundancy pay \times coverage coefficient; and
- CovArea 5 – avenues for redress \times coverage coefficient

The EPLex indicators are based on a high-quality database of legal information. That database includes broad coverage of countries, particularly including a significant group of developing and middle-income nations in addition to the developed nations that commonly appear in EPL indexes such as the comparable OECD series. The ILO clearly documents its

coding conventions, and each component captures significant variation in the legal provisions concerning individual dismissals. Moreover, the EPLex measures pay careful attention to variation in legal requirements for different types of workers and firms.

In contrast to the OECD and CBR-LRI indexes, however, the EPLex indicators currently cover only a very short time series. And limited legislative activity during the sample period means that, as a practical matter, the current EPLex indicator principally provides a single cross-sectional observation for 95 countries in the year 2010. However, eleven countries in the EPLex dataset have dual systems of labour regulations—applying different rules to different classes of workers or employers. In addition, 13 countries enacted changes to their EPL legislation during the sample period (2009-2013). The largest EPLex sample ($n = 119$) thus includes additional observations both for dual systems and for legal changes. In this broadest sample, we treat dual systems and legal changes as separate sources of variation. Thus, for example, the United Kingdom appears in the data as a separate country for 2010 and for 2013, and New Zealand appears as one observation for employers with 10 or fewer employees and another for employers with 11 or more employees. We have repeated the same analyses using more restricted samples that omit dual systems or legal changes or both, and we consistently find no notable changes in either our quantitative or qualitative results.

A significant omission from coverage is India, the largest democracy and a rising global economic power. In addition, the EPLex indicators do not incorporate judicial decisions, collective bargaining agreements, and sources of soft law such as shared workplace norms. Finally, as we have already noted, the database currently covers only individual dismissals from regular employment.

6. Empirical results

In this section, we report our findings about the dimensionality of the observed patterns of individual dismissal regulation.

6.1. Unweighted EPLex data

The starting point for any attempt to understand the structure of presumably interrelated variables is to examine their one-to-one correlation coefficients. Table 1 presents the correlation matrix for the unweighted EPLex data.

Table 1. Correlation Matrix

Variable	Area 1.1	Area 1.2	Area 2	Area 3.1	Area 3.2	Area 4.1	Area 4.2	Area 5
1.1 - Valid Grd.	1							
1.2 - Prohibited	-0.1632	1						
2 - Probation	0.2684	-0.0222	1					
3.1 - Procedure	0.1205	-0.0209	0.2109	1				
3.2 - Notice	-0.0939	0.1526	0.1436	0.0043	1			
4.1 - Severance	0.0193	-0.1969	0.0349	0.1148	-0.0759	1		
4.2 - Redundancy	0.2065	-0.2608	0.0168	0.2161	-0.1579	0.6498	1	
5 - Redress	0.1265	0.0805	0.0735	0.2525	-0.1026	0.0799	0.0693	1

Note: All observations, unweighted ($n = 119$).

Applying the informal but commonly used 30-percent rule of thumb for the presence of notable correlations reveals a single source of structure in the data: a strong relationship between areas 4.1 and 4.2 (severance and redundancy pay). Except for these two EPLex variables, which significantly and positively correlate with one another, the correlation matrix shows only a collection of small, positive and negative values.

6.1.1. Exploratory factor analysis

We can also conduct exploratory factor analysis in an effort to extract any latent common factors that may be present in these data. Tables 2 and 3 report the results of factor analysis (MinRes method) applied to the unweighted EPLex data, using one-factor and two-factor models respectively. The squared factor loadings (also known as “communality”) show the proportion of each variable’s variance explained by the common factor(s). The unexplained variance (also known as “uniqueness”) refers to the proportion of each variable’s variance that is idiosyncratic to that legal component and unrelated to any factor. This value also includes any variance due to measurement errors.

Table 2. Factor Loadings

Variable	Factor One	Squared Loadings	Unexplained Variance
1.1 - Valid Grounds	0.21	0.05	0.95
1.2 - Prohibited Grounds	-0.25	0.06	0.94
2 - Probation	0.03	0.00	1.00
3.1 - Procedure	0.24	0.06	0.94
3.2 - Notice	-0.16	0.02	0.98
4.1 - Severance	0.65	0.43	0.57
4.2 - Redundancy	0.97	0.94	0.06
5 - Redress	0.10	0.01	0.99
Sum of Squared Loadings	1.57	1.57	6.43

Note: All observations, unweighted, one factor ($n = 119$).

Table 3. Factor Loadings

Variable	Factor One	Factor Two	Squared Loadings	Unexplained Variance
1.1 - Valid Grounds	0.11	0.41	0.20	0.80
1.2 - Prohibited Grounds	-0.24	0.00	0.06	0.94
2 - Probation	-0.11	0.53	0.26	0.74
3.1 - Procedure	0.11	0.47	0.25	0.75
3.2 - Notice	-0.17	0.06	0.03	0.97
4.1 - Severance	0.65	-0.06	0.41	0.59
4.2 - Redundancy	0.99	0.02	1.00	0.00
5 - Redress	0.01	0.35	0.12	0.88
Sum of Squared Loadings	1.54	0.80	2.33	5.67

Note: All observations, unweighted, two factors ($n = 119$)

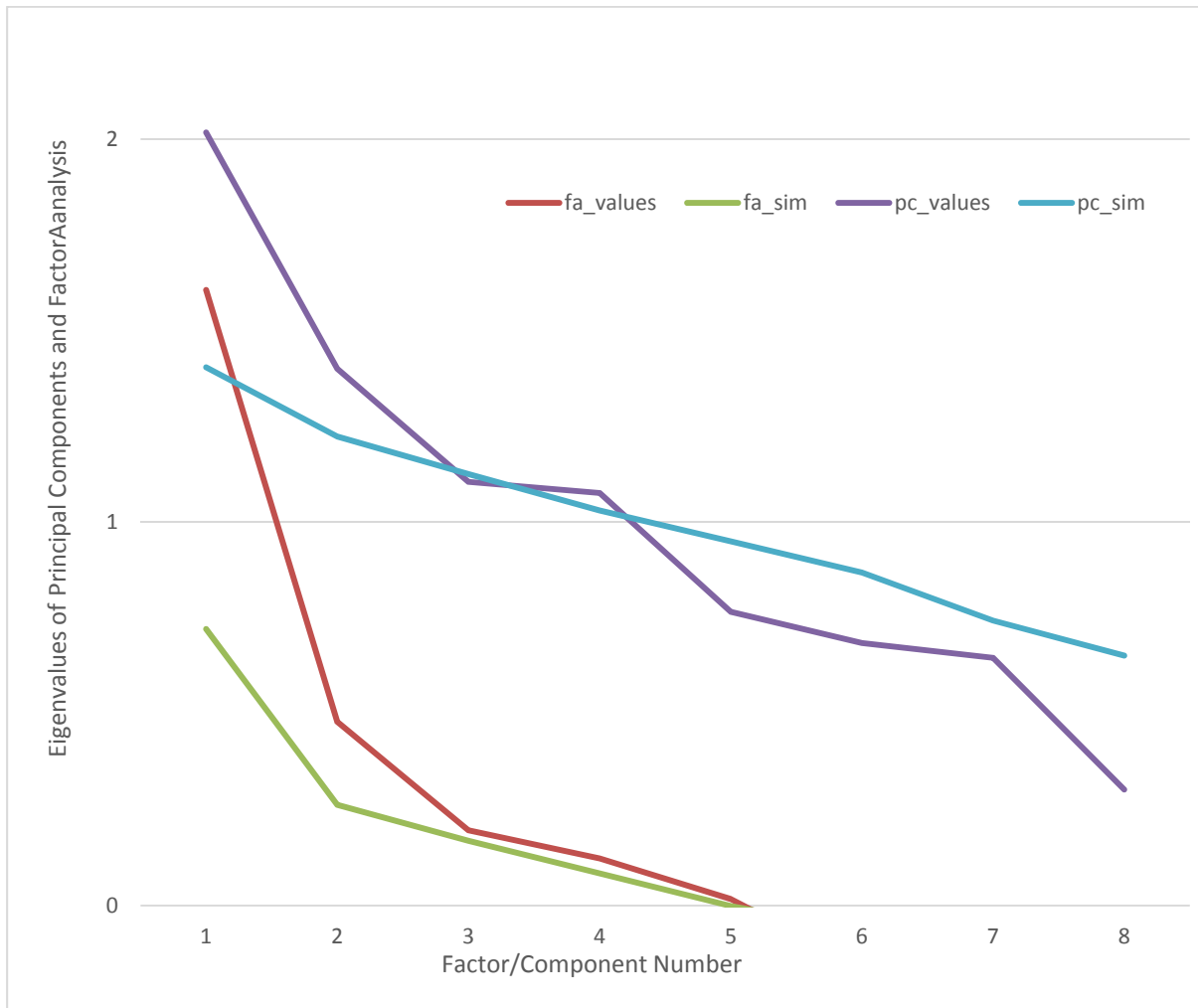
Considering the lack of correlation among the EPLex components that we observed in Table 1, it is no surprise to find that only one factor comes anywhere close to satisfying conventional tests for retention as a common factor. Strong loadings for Factor One confirm that the severance and redundancy pay variables move together and thus may be combined into a single factor for the purposes of further analysis. This factor, however, captures at most a fifth ($1.57/8 = 0.196$) of the cross-country variance among legal systems. It aligns almost perfectly with redundancy pay and reasonably well with severance pay. Nevertheless, the remaining variables are only very weakly related to this “separation pay” factor or with one another.

The goal of exploratory factor analysis is to identify reliable common factors. A reliable factor groups variables in a meaningful way that embodies a latent dimension in the observed data. Although the criteria for determining the reliability of a factor are as much art as statistical science, we reach the same conclusions about the EPLex data regardless of which standards we use. For example, Pituch and Stevens (2015) propose that a factor may be considered reliable if it has three or more variables with loadings of 0.8, or four or more variables with loadings of 0.6. A factor loading in the range between 0.6 and 0.8 for an EPLex variable implies that between 36% and 64% of its variance can be explained by that factor. A more permissive rule for exploratory factor analysis retains a factor whenever its loadings are 0.4—or even 0.3 on a sufficient number of variables. This weaker, more inclusive test for retaining factors, however, ordinarily requires slightly more observations ($n \geq 150$) than the EPLex dataset provides ($n \leq 119$).

Neither test suggests that the unweighted EPLex data can be fruitfully reduced to one or two common factors. Applying the more restrictive Pituch and Stevens rule to these results suggests that both factors should be rejected. One might conceivably choose to retain Factor One because it confirms the strong correlations we observed between severance and redundancy pay obligations. But recall that this factor captures very little of the overall variance in these legal data. Even the weaker test for inclusion leaves us without much confidence in the candidate common factors. Several variables load modestly on Factor Two, but at a mere 0.8, the sum of squared loadings for that factor indicates that it captures only about 10% of the overall variance. Our exploratory factor analysis thus implies that these data have no latent common factors that would allow them to be meaningfully reduced to one or two dimensions.

The method of parallel analysis generates a useful graphical representation of loadings for successive factors and helps us to determine which factors we should retain. A scree plot displays the squared loadings (or eigenvalues) for each factor and compares those values to the hypothetical values that would arise from a randomly generated data matrix of the same size. The test for including a factor depends on finding that its squared loadings exceed those generated by random sampling. Figure 1 below presents a scree plot corresponding to the factor analytic model we have been discussing.

Figure 1. Parallel Analysis



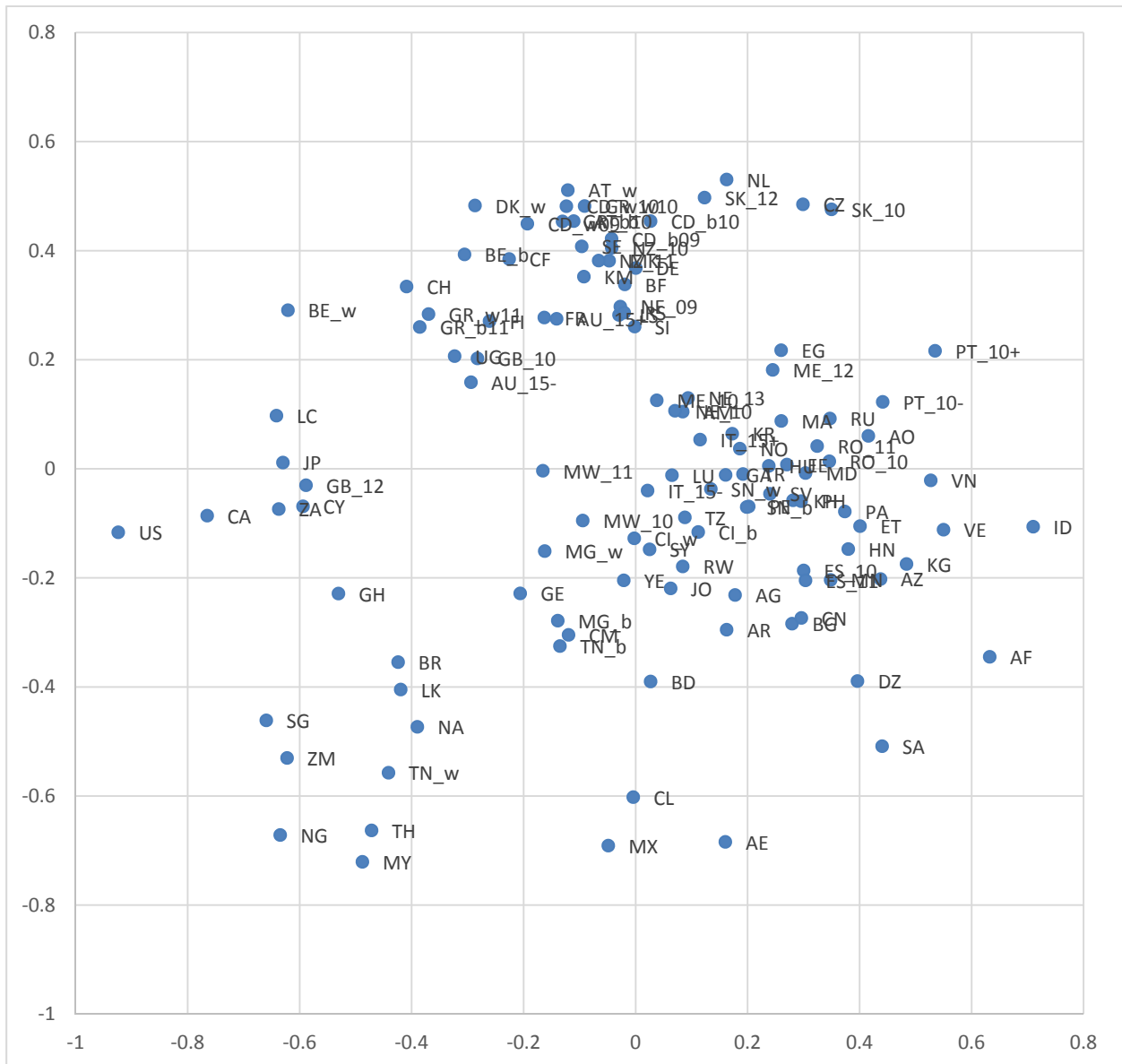
Note: All observations, unweighted (n = 119)

For the unweighted EPLex data, parallel analysis confirms the comparative importance of the first two factors we have been considering. Their eigenvalues both lie well above the line for randomly generated data. In addition, the comparatively gradual decline of the eigenvalues lends support to the conclusion that these data have no other latent common factors that would allow us to reduce their dimensionality without discarding the majority of the information they contain.

6.1.2. Multidimensional Scaling

In order to confirm the implications of our factor analysis, we also applied classical multidimensional scaling (MDS) to the unweighted EPLex data. The classical (or metric) MDS procedure assesses the similarity of observations in a dataset by progressively extracting the largest eigenvalues from a distance matrix. This solution minimizes a loss function called “strain” and produces a transformed set of values expressed in a predetermined number of dimensions. Thus, it is possible to use MDS to reduce the dimensionality of a multivariate dataset. The procedure can identify spatial dimensions that are not apparent in the correlation matrix or revealed by exploratory factor analysis.

Figure 2. MDS Plot – unweighted EPLex



Note: All observations, unweighted, two dimensions ($n = 119$)

In Figure 2, we present two-dimensional MDS results for the unweighted EPLex observations. As expected, a two-dimensional specification does not provide much explanatory leverage. We observe some clustering of countries but no hint of the linear relationship that would lend support to a single dimension of EPL stringency. Instead, countries appear to be distributed broadly throughout the two-dimensional EPL policy space. And goodness-of-fit measures for the classical MDS model confirm that none of these dimensions captures a substantial portion of the variance in these leximetric data.

We can reasonably conclude from these results that no latent EPL dimensions are apparent in the unweighted data. The correlations in Table 1 suggest that countries with high severance payments (4.1) tend also to impose high redundancy payments (4.2), and vice-versa for low values of these variables. This relationship seems to indicate some common variation among EPLex countries in a “separation pay” dimension. However, we are unable to validate this hypothesis of a hidden dimension using standard methods of multivariate analysis.

6.2. Coverage-weighted EPLex data

Many studies make the implicit assumption that EPL applies to the whole labour market, but in practice this is rarely the case and various categories of workers are commonly left uncovered by employment protection measures. In this section we repeat our analysis on the EPLex index values weighted by the percentage of the workforce covered.

For each of the EPLex countries the ILO has collected data from various sources on the number of individuals in each category of workers excluded from EPL provisions (aggregate [1]), on the total number of employees in the private sector (aggregate [2]), on the total number of employees in the economy (aggregate [3]) and on the total number of employed individuals in the economy, inclusive of self-employed and cooperative workers (aggregate [4]). Using this information, three types of coverage weights can be computed:

- Coverage of employees = $[3 - 1] / [3]$
- Coverage of private sector employees = $[2 - 1] / [2]$
- Coverage of employed = $([3 - 1] / [4])$

The weights we use rest on the coverage of the employed (difference between the number of employees and the estimated number of excluded workers, divided by the number of employed workers - the economically active population). Table 6 presents the correlation matrix for the comprehensive sample including dual systems and legal changes.

Table 4. Correlation Matrix

Variable	Area 1.1	Area 1.2	Area 2	Area 3.1	Area 3.2	Area 4.1	Area 4.2	Area 5
1.1 – Valid Grd.	1							
1.2 – Prohibited	0.1871	1						
2 – Probation	0.4655	0.1801	1					
3.1 – Procedure	0.2981	0.0758	0.3024	1				
3.2 – Notice	0.0716	0.2142	0.1883	0.0389	1			
4.1 – Severance	0.0914	0.0742	0.0502	0.1537	0.0471	1		
4.2 – Redundancy	0.2813	0.0497	0.0542	0.2118	-0.1194	0.6335	1	
5 – Redress	0.4235	0.3344	0.2418	0.3188	0.0477	0.1511	0.1976	1

Note: All observations, coverage-weighted ($n = 119$)

As compared to the raw EPLex data, coverage-weighted values reveal new sources of correlation among these legal variables. The strong relationship between severance and redundancy pay requirements remains, but significant, positive correlations now emerge between other components of countries' EPL regimes. Coverage-weighting markedly increases the observed positive correlations in the unweighted data, and the negative correlations in the unweighted data are either greatly reduced or turned positive.

It is possible that taking account of coverage reduces the trade-offs (negative correlations) among EPLex variables because coverage itself trades-off against strictness (a hypothesis discussed in Boeri and Van Ours Ch. 10 with respect to the OECD index). While this hypothesis may hold for specific countries we note that in its examination of this question the ILO found no such trade-off, possibly because the ILO coverage data reflect *de jure* rather than *de facto* coverage. In any case, legal provisions that specify the extent of coverage play an important role in defining the substantive content of EPL. We would expect a stringent severance pay requirement that applies narrowly to workers in a particular industry to affect labour markets quite differently than a less stringent rule that applied universally. Thus, we believe that taking account of coverage significantly improves the leximetric measurement of EPL.

6.2.1. Exploratory factor analysis

In order to investigate more deeply these relationships in the coverage-weighted data, we perform factor analysis using the same methods we applied to the unweighted data. Table 5 presents the unrotated factor loadings for a two-factor model of the eight coverage-weighted EPLex variables.

Table 5. Factor Loadings

Variable	Factor One	Factor Two	Squared Loadings	Unexplained Variance
1.1 - Valid Grounds	0.29	0.67	0.53	0.47
1.2 - Prohibited Grounds	-0.05	0.37	0.14	0.86
2 - Probation	0.06	0.61	0.37	0.63
3.1 - Procedure	0.22	0.40	0.21	0.79
3.2 - Notice	-0.12	0.25	0.06	0.94
4.1 - Severance	0.64	-0.05	0.41	0.59
4.2 - Redundancy	0.99	0.01	0.98	0.02
5 - Redress	0.21	0.53	0.32	0.68
Sum of Squared Loadings	1.58	1.46	3.04	4.96

Note: All observations, coverage-weighted, two factors, unrotated ($n = 119$)

The communality of these legal variables is highest for redundancy pay (CovArea 4.2), as it was in the unweighted data. But we also observe potentially significant loadings for six other EPL components, with only Notice (CovArea 3.2) remaining unrelated to either of the common factors. Given our sample size, any loading greater than 0.4 may be considered statistically significant. These results tend to confirm our impression from the correlation matrix that the coverage-weighted data have a more definite structure than the raw EPLex data.

The factor loadings in Table 5 suggest the existence of at least two common factors but should not be considered the final word on the structure of these data. By construction, the MinRes method extracts factors using a least-squares procedure. In this case, the factor analytic model leaves us with a majority of the variance in these legal variables unexplained by the two factors we have extracted.

We next orthogonally rotate the factors in order to consider other potential groupings of the EPLex variables that may reveal different factor structures. The primary goal of rotation is to bring the factor space closer to a “simple structure”—one in which each variable loads primarily on only one factor and each factor has comparatively high loadings for only a few variables and near-zero loadings for the remaining variables. Rotation procedures refine the results of factor analysis by eliminating correlation between the factors and thereby delivering mutually independent factors. We rotated these factors using the Varimax, Quartimax, and Equamax procedures and found that the resulting loadings did not differ significantly.² Table 6 reports results for the orthogonal Varimax procedure, the default rotation method in most statistical packages. This approach increases factor loadings somewhat and redistributes those loadings across the two factors. But rotation does not alter the basic factor structure substantially and the two-factor model still captures only a bit more than half of the variance in these data.

Table 6. Factor Loadings

Variable	Factor One	Factor Two	Squared Loadings	Unexplained Variance
1.1 - Valid Grounds	0.40	0.55	0.46	0.54
1.2 - Prohibited Grounds	0.00	0.72	0.53	0.47
2 – Probation	0.20	0.74	0.59	0.41
3.1 – Procedure	0.31	0.60	0.45	0.55
3.2 – Notice	0.00	0.63	0.39	0.41
4.1 – Severance	0.63	0.00	0.41	0.39
4.2 – Redundancy	0.99	0.12	0.99	0.01
5 – Redress	0.21	0.78	0.65	0.35
Sum of Squared Loadings	1.72	2.76	4.48	3.52

Note: All observations, coverage-weighted, two factors, rotated varimax ($n = 119$)

These procedures allow us to classify each of the factors according to the specific high-loading EPLex variables that define them. Factor One in Table 6 shows high loadings on the two separation payment items (redundancy and severance pay). This pattern mirrors the results of the unweighted analysis presented in Table 3. In the coverage-weighted analysis, however, Factor Two now shows high loadings for valid grounds (CovArea 1.1), prohibited grounds (1.2), probation (2), procedural requirements (3.1), and redress (5). Exploratory factor analysis uses loadings such as those reported in Table 7 to classify variables and define any latent dimensions. However, putative common factors must be interpreted very cautiously. Standard criteria for factor selection ordinarily counsel against including factors with single (or dual) high loadings. By this standard, Factor One is a borderline case. We may nevertheless retain this factor in light of the significance of the separation pay elements in the correlation matrix. By contrast, Factor Two in the coverage-weighted analysis more easily satisfies conventional reliability standards.

² We have also used oblique rotations (which do not guarantee inter-factor independence) such as the Oblimin and Promax procedures, again with only marginal difference in the structure and loading of the factors.

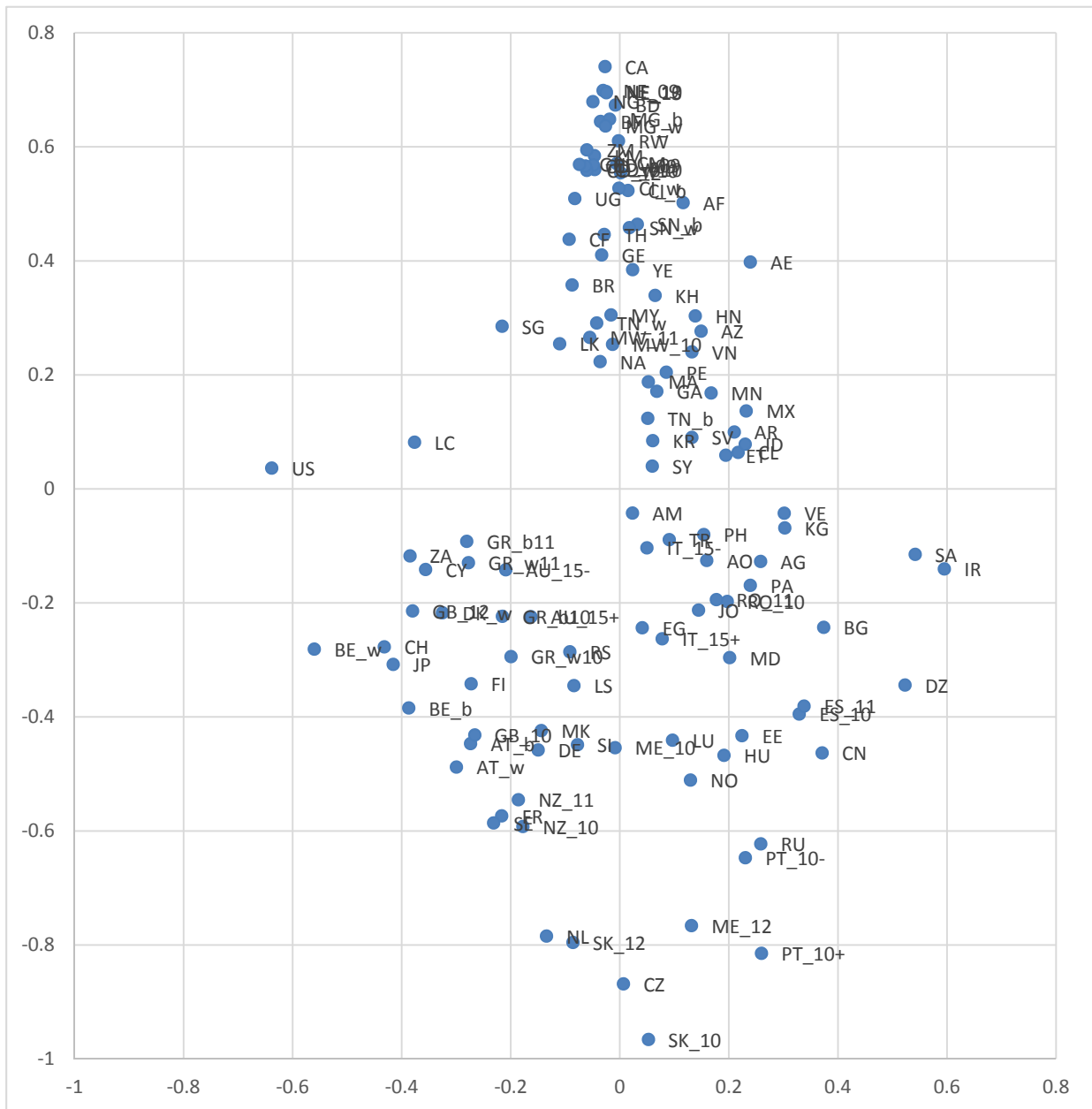
Taken together, these results suggest that relative to the unweighted data, there is significant, though not overwhelming, communality in the eight coverage-weighted EPLex variables. These legal components align roughly with two common factors. The remaining 44% of the variation ($3.52/8$) is attributable to variable-specific causes. The analysis thus suggests that a bit more than half of the variance in the observed EPLex variables may be explained in terms of two underlying latent factors. These factors principally comprise: (1) transfer payments upon separation; and (2) valid grounds, prohibited grounds, probation, procedural requirements, and redress at trial. Factor One reported in Table 6 now passes the strong (Pituch and Stevens) criterion for reliability using the full dataset ($n = 119$). This criterion applies for any n , and therefore provides support for retaining Factor One that was not present in the unweighted data. Factor Two also satisfies the threshold for reliability under these stringent guidelines.

Thus, at this stage, we may conclude that coverage-weighting leads to significant convergence among EPLex components (higher communality)—a feature that other researchers have observed for the OECD index (e.g. Boeri and Van Ours 2008, Ch. 10). Moreover, the convergence reveals two latent dimensions. We knew from our analysis of the unweighted data that countries with high (low) severance payments are also countries with high (low) redundancy payments. The coverage-weighted data confirm that we can capture this relationship with Factor One (separation pay). Our analysis of the coverage-weighted data also reveals another latent dimension. Countries that impose protective substantive requirements for fair dismissal also tend to be countries that have a short probation duration and offer generous redress for wrongful dismissal. This second latent dimension (Factor Two) was largely obscured in the unweighted data and could not be validated.

6.2.2. Multidimensional scaling

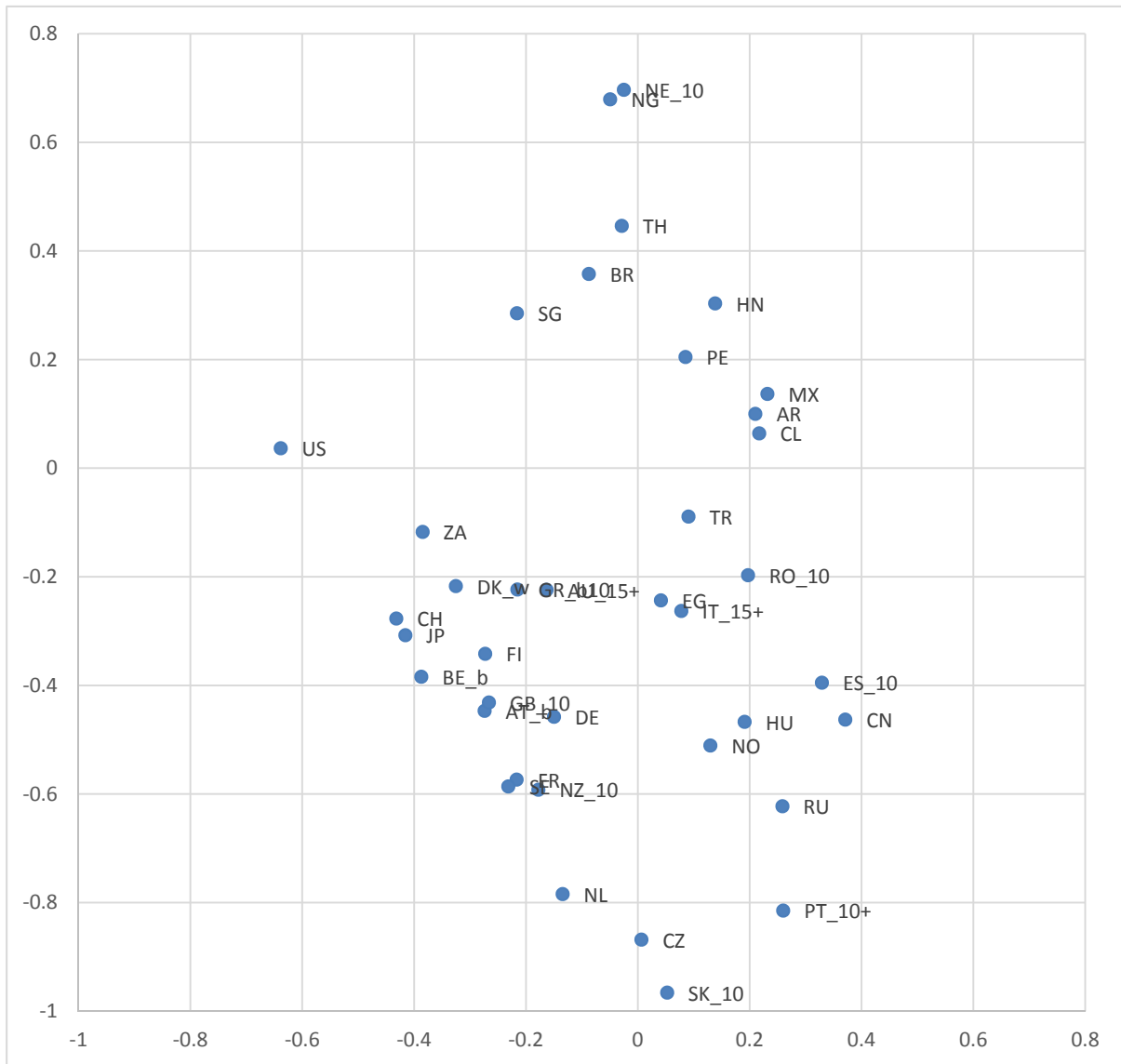
Turning to the multidimensional scaling analysis of the weighted data, we present below MDS plots for the most comprehensive sample (Figure 3) and for a selected group of countries that makes the plot somewhat easier to read (Figure 4).

Figure 3. MDS Plot – weighted EPLex, full sample



Note: All observations, coverage-weighted data, two dimensions ($n = 119$)

Figure 4. MDS Plot – weighted EPLex, selected sample



Note: Selected observations, coverage-weighted data, two dimensions ($n = 119$)

Two phenomena are apparent when comparing the unweighted and coverage-weighted MDS plots. First, cross-country “EPL distances” appear smaller in the weighted CovArea data plots. That result seems consistent with the results of our factor analysis. If we capture a larger share of the data’s common variation through two latent dimensions in the weighted (relative to the unweighted) data, then it is also intuitive that the goodness-of-fit will be improved for these coverage-weighted EPLex data as well. In MDS analysis, the more dimensions we use to produce a distance plot, the better is the goodness-of-fit of this plot relative to the observed data. In this case, by switching from the unweighted to coverage-weighted data, we move from zero dimensions to two plausible dimensions, which improves the goodness-of-fit. Since our objective is to reduce the EPLex data by identifying just a few latent dimensions (more than zero, but less than eight), the MDS plots confirm that the coverage-weighted data have a more definite structure than the unweighted data.

Second, we note that there is a substantial amount of country reshuffling as we move from the MDS plot of the unweighted data to the plot of the coverage-weighted data. Some countries remain roughly in the same position in the same quadrant and remain close to one another (CA, BE, GB, DK, AU) but others conspicuously shift from one quadrant to another (JP, SG). This fact suggests that the communality and convergence brought about by coverage weighting is taking place among the latter set of countries. Another striking feature is that those countries in the southwest and northwest quadrants appear to shift to the right while those in the northeast quadrant shift to the left in the weighted plots (Figures 3 and 4).

* * *

In summary, both exploratory factor analysis and the MDS plots confirm that coverage-weighted data have a much more definite structure than the raw EPLex components. We identify two plausible common factors which suggest these data have at least a two-dimensional structure. However, even these latent dimensions fail to capture roughly half of the variance contained in these legal components. Thus, our results raise substantial doubts about the conventional strategy of constructing a single, aggregate index of EPL stringency.

6.2.3. Correlations among plausible EPL measures

It is also instructive to consider the pattern of correlation coefficients among plausible EPL measures. As we have seen, only coverage-weighted EPLex data has a sufficiently definite structure to create any hope that these eight variables can be represented in fewer dimensions. Thus, we focus here on measures derived from the coverage-weighted data. Table 7 below displays the statistical relationships among various possible leximetric measures. The first three rows present one-dimensional values for the aggregate EPLex index and the factor analysis along with the raw unweighted EPLex index for comparison. The remaining rows refer to a two-dimensional factor analytic model and the three dimensions computed for the MDS model.

Table 7. Correlations among Plausible EPL Measures

	Original EPLex	Coverage-Weighted EPLex	FA_Cov 1-Factor Model	FA_Cov 2-Factors Factor One	FA_Cov 2-Factors Factor Two	MDS_Cov Dimension One	MDS_Cov Dimension Two	MDS_Cov Dimension Three
Original EPLex	1	0.59	0.59	0.36	0.48	0.53	-0.31	0.04
Coverage-Weighted EPLex	0.59	1	1.00	0.38	0.92	0.98	-0.12	0.08
FA_Cov 1-Factor Model	0.59	1.00	1	0.35	0.94	0.98	-0.13	0.02
FA_Cov 2-Factors Factor One	0.36	0.38	0.35	1	0.02	0.27	-0.50	0.28
FA_Cov 2-Factors Factor Two	0.48	0.92	0.94	0.02	1	1	0	0
MDS_Cov Dimension One	0.53	0.98	0.98	0.27	1	1	0	0
MDS_Cov Dimension Two	-0.31	-0.12	-0.13	-0.50	0	0	1	0
MDS_Cov Dimension Three	0.04	0.08	0.02	0.28	0	0	0	1

Original EPLex = Original EPLex Aggregate Index
 Coverage-Weighted EPLex = Coverage-Weighted EPLex Aggregate Index
 FA_Cov 1-Factor Model = Factor Scores, Coverage-Weighted, One-Factor Model
 FA_Cov 2-Factor Model = Factor Scores, Coverage-Weighted, Two-Factor Model Factor [1 & 2]
 MDS_Cov Dimension [1 & 2 & 3] = Multidimensional Scaling, Coverage-Weighted, Dimensions [1 & 2 & 3]

Note: All observations (*n* = 119)

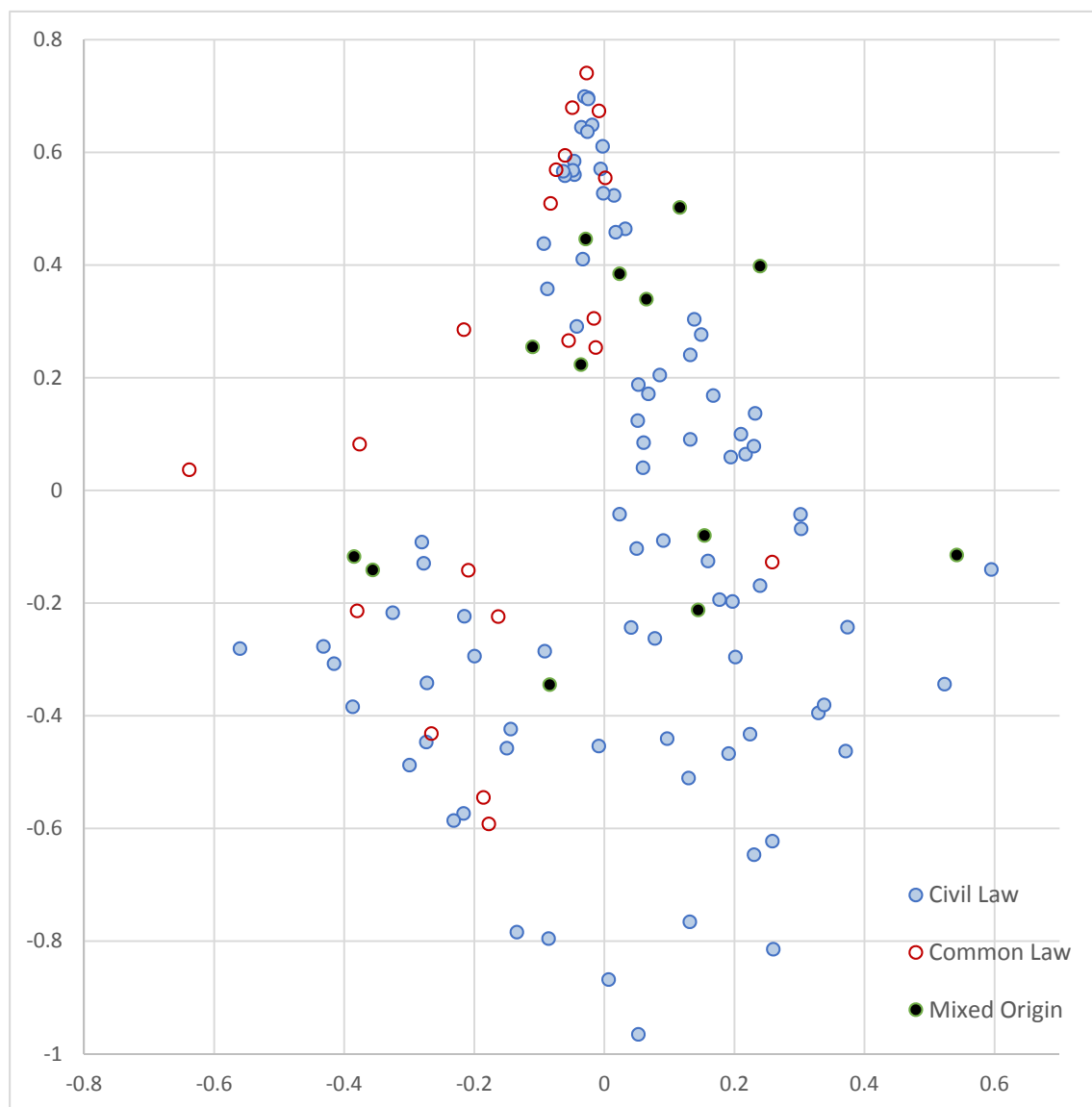
Note first that the aggregate EPLex index computed with unweighted data explains at most 36% of the variance in the alternative coverage-weighted measures. This result confirms that the raw EPLex data have a fundamentally different structure than the coverage-weighted version of those data. Moreover, an analysis based on the unweighted aggregate index would grossly misrepresent the true state of the substantive law in each country.

Second, it is particularly striking to see that the coverage-weighted aggregate index is perfectly correlated with the factor extracted using a one-factor model and also highly correlated with one factor in the two-factor model and one dimension in the MDS model. In other words, each of these measures appears to be capturing only the effect of variation in the separation pay variables (CovArea 4.1 & 4.2). By ignoring any other dimensions present in the data, the aggregate index throws away all of the variance attributable to the other six legal components of the EPLex data.

6.3. Mapping regulatory styles

In order to investigate whether national regulatory styles influence individual dismissal law, we first segregate the two-dimensional MDS data points by legal origin. Our coding follows that of Klerman et al. (2011) for the countries ($n = 68$) that overlap between their data and the EPLex data. We rely on our own coding for the countries ($n = 27$) contained only in the EPLex dataset. The plot in Figure 5 distinguishes civil law, common law, and mixed legal origin countries.

Figure 5. MDS Plot – weighted EPLex, by legal origin

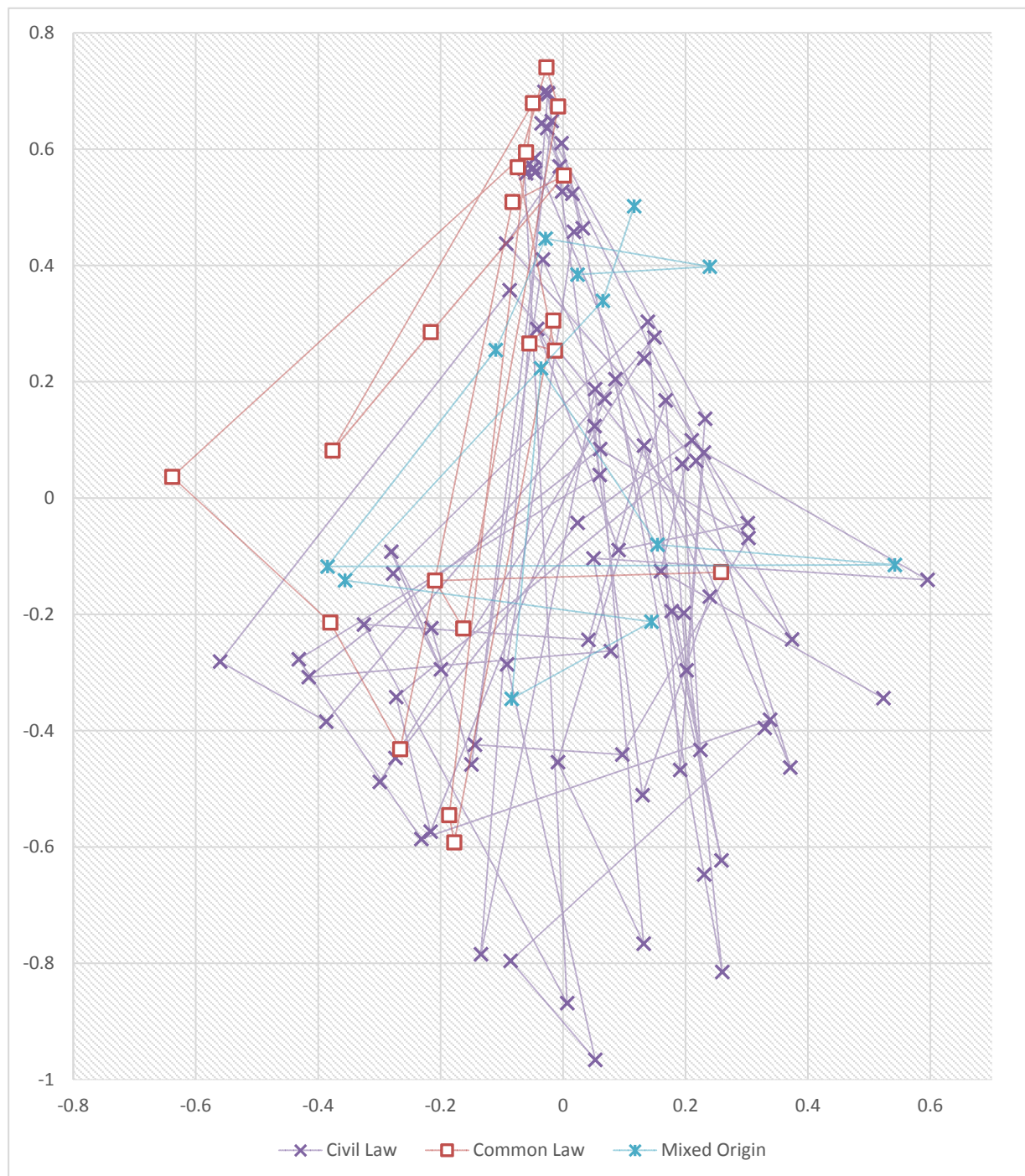


Note: All observations, by legal origin coverage-weighted data, two dimensions ($n = 119$)

Countries from each legal origin group appear dispersed throughout the EPL policy space and equally distributed along the horizontal dimension of that space. Common law countries, however, exhibit a slightly stronger tendency to be located above a diagonal line running from the lower-left to the upper-right corner of the plot as compared to nations from the civil law tradition. This potential pattern deserves further investigation.

In Figure 6, we add connecting lines to the data points and confirm the impression that common law legal origin is associated with values shifted somewhat to the northwest of the plot.

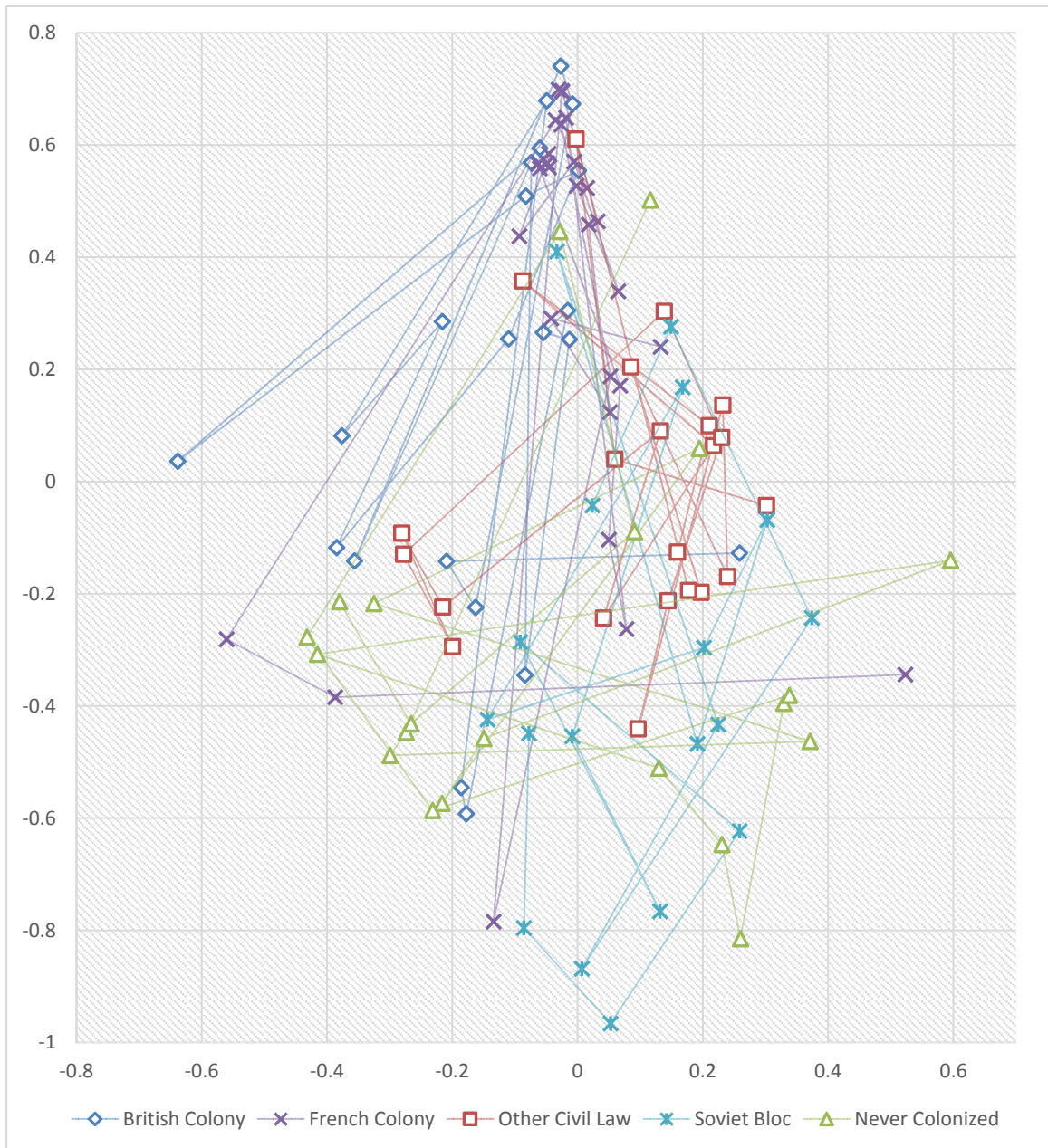
Figure 6. MDS Plot – Fig.5 with connecting lines



Note: All observations, by legal origin coverage-weighted data, two dimensions ($n = 119$)

In Figure 7, we consider the potential alternative hypothesis that shared history rather than legal origin drives regulatory style (Klerman et al. 2011).

Figure 7. MDS Plot – weighted EPLex, by shared history



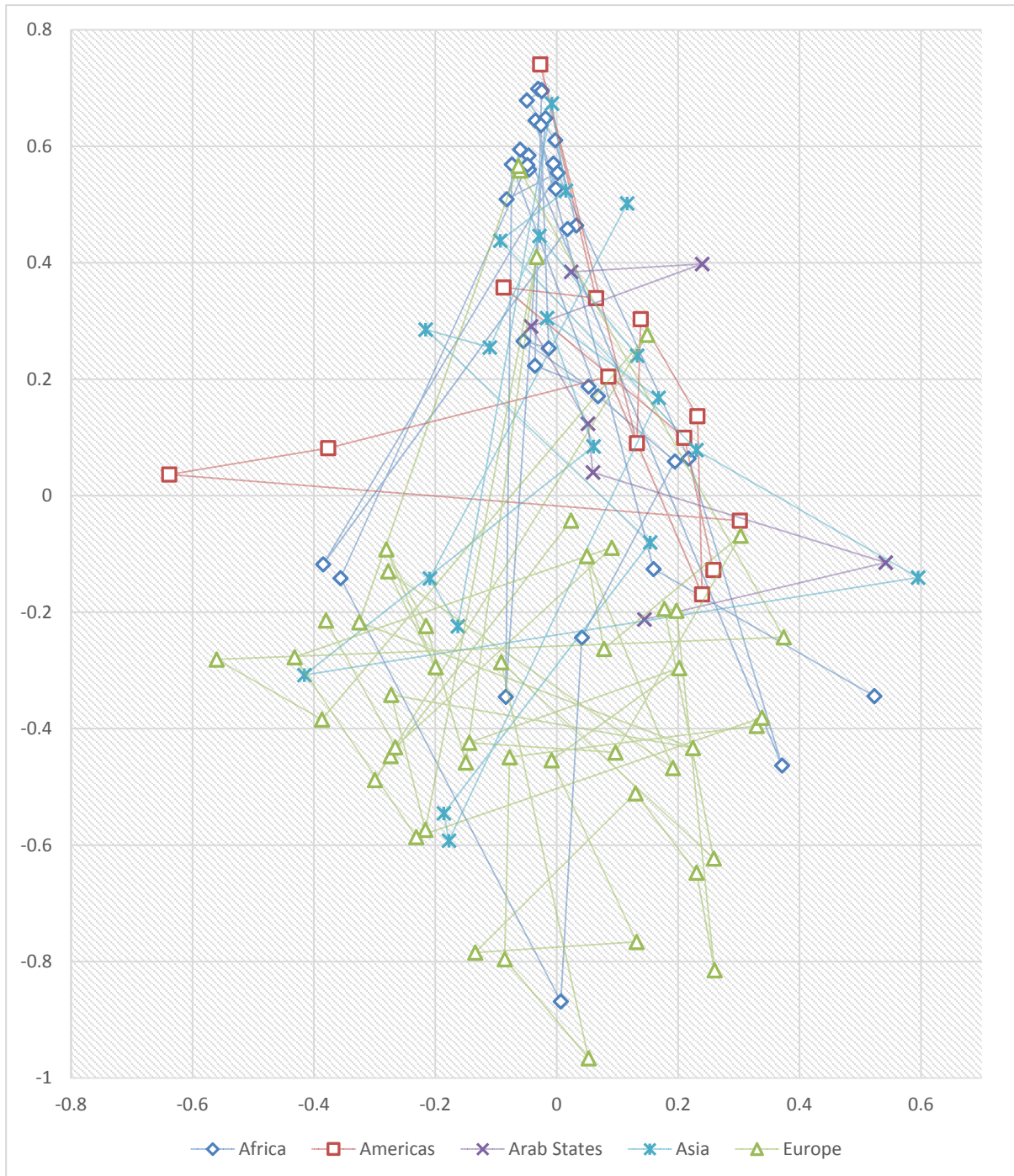
Note: all observations, by shared history coverage-weighted data, two dimensions ($n = 119$)

The MDS plot reveals some evidence of clustering within historical groupings. At least within this particular two-dimensional EPL policy space, former British colonies overlap least with former Soviet bloc countries. The former colonies of non-French civil law nations appear to cluster roughly in the middle of the MDS plot. And countries that were never colonized are dispersed widely throughout the space other nations occupy. We can draw no definitive conclusions, but this data visualization exercise suggests that it may be fruitful to consider colonial origin as an alternative explanation of regulatory style.

Finally, geographic proximity could lead countries to adopt similar labour regulations. Within the European Union, for example, the adoption of EU directives has created some

tendency towards legislative convergence among member states (Deakin, Lele and Siems 2007). The MDS plot in Figure 8 distinguishes countries according to their geographic region.

Figure 8. MDS Plot – weighted EPLex, by geographic region



Note: All observations, by geographic region coverage-weighted data, two dimensions ($n = 119$)

Although far from uniform, the plot suggests the possibility that European countries align at a lower level on the vertical dimension, and African countries fall disproportionately

higher on that same dimension. In evaluating these differences, it is important to bear in mind that the direction of MDS axes is purely arbitrary. The MDS coordinates in EPL policy space can be transformed by rotation, reflection or translation without changing the relationships among points. Once again the data visualization suggests that it would be valuable to conduct further statistical testing to determine which of these alternative explanatory theories best predict differences in national regulatory styles.

7. Implications and interpretation

In this section, we consider what our empirical results can teach us about the practice of constructing leximetric indexes of EPL and about theories of regulatory style.

7.1 Constructing leximetric indexes

A vast literature investigates the effects of EPL on important economic variables. Many prominent papers in that body of work rely on leximetric indexes designed to measure the single dimension of stringency. These indexes are also often based on legal data that fails to consider variation among countries in the extent of EPL coverage. Our empirical results suggest that these leximetric measurement strategies should be re-examined.

First, in the unadjusted EPLex data, our factor analysis and multidimensional scaling reveal no apparent latent one- or two-dimensional structure. To the contrary, these unweighted data appear to have as many dimensions as components. It follows that aggregating these legal components into a single aggregate index would arbitrarily combine apparently unrelated regulatory features. Of course, that arbitrary measure may (or may not) produce statistically significant correlations with unemployment levels and other economic variables. But it would be unwarranted to draw any policy conclusions from those potential correlations. The aggregate index of unadjusted data has no natural legal interpretation because its statistical properties are likely to be mere artefacts of the aggregation method and any peculiar features of the particular sample of countries being studied. In other words, our analysis of the EPLex data implies that only by regressing the economic variable of interest on all eight legal components could a researcher hope to offer useful guidance to legal policy makers about how those regulations affect employment.

Second, using coverage-weighted data dramatically alters the observed relationships among individual legal components. A two- or three-dimensional structure now emerges, and we will say more about that structure in a moment. But the fact that coverage weighting reveals a new pattern of latent variables strongly suggests that any econometric analysis that neglects coverage will be uninformative for policy makers. Only by taking account of coverage can we more fully understand the pattern of regulatory enactments in various countries. Several clusters of individual dismissal provisions commonly found together can be meaningfully considered as a group. By including coverage weights in our leximetric measure, it becomes possible to reduce the dimensionality of the legal data without arbitrarily distorting the outcome of subsequent regression analysis.

Third, even coverage-weighted data resists any effort to reduce the leximetric measure to a single aggregate index of regulatory stringency. Our factor analysis consistently identifies either two or three common factors in the EPLex data. And it is abundantly apparent from the plots of our multidimensional scaling exercise that at least two dimensions are necessary to capture the variation in legal regimes. Countries are dispersed across the two-dimensional space rather than clustered along the diagonal as they would be if a linear relationship existed

between these two dimensions. Thus, our results cast doubt on the common practice in countless EPL studies of relying on a single, aggregate leximetric index.

7.2 Implications for theories of regulatory style

Our results necessarily have more equivocal implications for theories of regulatory style. Those theories differ in their empirical implications and may be subject to alternative interpretations. Moreover, the EPLex dataset, which is currently limited to individual dismissal laws, offers at best a partial and preliminary test for theories focused on broader regulatory practices. Nevertheless, our findings produce some tentative and suggestive conclusions about regulatory style.

“Strong” legal origin theory, as applied in Botero et al. (2004), rests on the assumption that labour regulations can be arrayed along a single dimension of stringency. The fact that even coverage-weighted EPLex data cannot be reduced to a single dimension contradicts that assumption. On the other hand, our tentative finding that common law legal origin is associated with a higher value on the vertical dimension in EPL policy space provides some suggestive evidence that legal origin may play a role in individual dismissal legislation. It remains to be seen whether colonial history fully mediates this apparent association as Klerman et al. (2011) suggest.

“Weak” legal origin theory embraces diverse causal influences and implies that legal systems could display multiple dimensions. Our findings are broadly consistent with this implication of the theory. We hope to collect data on the timing of industrialization in order to provide a more direct test of the hypothesis advanced in DLS (2007).

It is less clear how to test a theory of pure historical contingency. The broad dispersion of countries across EPL space is weakly supportive. But confirmation would require identifying specific historically contingent events and tracing their influence on specific legal enactments. Perhaps the systematic patterns we observe in the coverage-weighted data undermine the extreme contention that legal developments are peculiar to contingent occurrences in each jurisdiction. If, instead, there are two or three identifiable dimensions along which individual dismissal laws generally vary, then EPL would appear to develop along well-established lines rather than randomly on a legal *tabula rasa*.

Measuring the variables relevant to a theory of political influence presents an obstacle to testing. Following Botero et al. (2004), we could map countries according to whether they have a left-leaning government. But that approach seems too simplistic. Perhaps there is another continuously measured political variable that would more accurately capture political influences. It is worth noting that conventional understandings of political influence all focus on the association between left-leaning governments and more protective EPL, and vice versa. That approach assumes that stringency is a meaningful metric though not necessarily that it is the only important dimension in EPL space. Our finding that the weighted EPLex data display at least two dimensions contradicts this implication of the political influence hypothesis.

Finally, we consider the functional theory of regulatory uniformity and variety. In order to generate predictions about regulatory patterns, the functional theory requires an assessment of whether particular EPL provisions are necessary to achieve essential social, political or economic goals. If so, the theory predicts that countries will adopt uniform legal rules for that subject matter. Legal variety arises when a specific provision is unnecessary or when lawmakers are uncertain about its likely effects. No researcher, however, is likely to possess either the information required to make this assessment or the ability to forge a consensus about these highly controversial regulatory measures.

Alternatively, the functional theory implies that observing uniformity implies that the rule is essential, and legal variety implies uncertainty about its effects (or irrelevancy). By mapping individual dismissal law in the EPL policy space, we can assess whether all countries cluster together or diverge from one another. It is also possible to consider subsets of nations to discover, for example, whether their legal systems converge on a uniform solution after a certain level of economic development. Our basic results confirm that the full sample of nations is spread broadly throughout the EPL policy space. We hope to continue investigating whether countries cluster in that space in a manner that would suggest lawmakers choose certain patterns of dismissal protections for particular circumstances (e.g., mature industrial nations, agrarian economies, emerging industrial nations, etc.).

7.3 Limitations and possible extensions

First and foremost, we emphasize once again that the EPLex database currently covers only legislation concerning individual dismissals from employment. Some prior leximetric studies of EPL are similarly limited in scope (see, e.g., Lazear 1990; Autor, Donohue and Schwab 2004, 2006), but many incorporate information about collective dismissals, antidiscrimination protections, unemployment insurance, and various other components of a comprehensive EPL regime. Thus, our conclusions are preliminary and tentative. We plan to extend our methods to other data sources as time and resources allow.

Another important data limitation concerns the absence of substantial time-series variation in the EPLex data. Only thirteen countries (of 95) adopted legal changes in years other than 2010 within the currently available sample period of 2009-2013. A longer panel dataset would allow us to investigate whether the structure of EPL has changed over the decades and how individual countries or groups of countries have moved in the EPL policy space over time. Both the CBR-LRI data and the OECD series include observations (and variation) over a much longer time span. We plan to apply our methods to those datasets as time and resources allow.

Finally, our narrow focus on individual dismissal law may have masked important regulatory patterns. It is entirely possible that strong correlations among broader components of labour regulation could redefine the EPL policy space that our methods identify. We have no reason to expect that a wider range of regulatory subjects will prove to be more highly correlated than the closely related rules governing individual dismissal. Indeed, it would be surprising to find that lawmakers' decisions about less closely related rules cluster together more closely than enactments that regulate a single subject matter. Nevertheless, we plan to extend our analysis to datasets that incorporate more features of the regulatory landscape.

8. Conclusion

This paper identifies and criticizes the widespread assumption that a single, additive dimension of stringency adequately describes variation among nations' individual dismissal laws. More broadly, we offer a new perspective on the vast literature that investigates how employment protection laws influence employment, labour force participation, unemployment, and other economic outcomes. We also build on prior work that associates distinctive patterns of regulation and resulting economic outcomes with the historical legal family from which a country received its legal institutions. Finally, we engage a broader scholarly debate about comparative law that includes both functional and historical approaches.

Our principal contribution is to introduce a new leximetric approach to identify patterns of labour regulation. We review in considerable detail the historical development of the empirical literature on EPL and identify the prior literature's uncritical assumption that a single dimension of stringency accurately describes patterns of EPL worldwide. We then introduce exploratory factor analysis and multidimensional scaling techniques as a method for testing this assumption. These same techniques also allow us to use the EPLex individual dismissal data to investigate regulatory patterns and test the empirical implications of legal origins theory and several alternative comparative law theories.

Our findings, though still somewhat preliminary, call into question the common practice of aggregating EPL components into a single, aggregate leximetric index. Many prominent studies adopt this empirical strategy. But the underlying structure of the EPLex data reveals at least two dimensions in the law of individual dismissal alone. The conventional aggregation strategy thus arguably mismeasures EPL. As a result, this commonly used method runs the risk of distorting empirical results and producing misleading recommendations for policy makers. Although only suggestive, our MDS plots also hint at a possible association between the historical origin of a country's legal system and the location of that country's individual dismissal laws in EPL policy space. Further investigation will be needed to determine whether that association merely reflects colonial history (see Klerman et al. 2011) or instead supports the "strong" legal origins hypothesis.

Despite these important findings, our analysis at this point is necessarily limited by the scope of our dataset and by some ambiguity in the exploratory techniques we employ. First, even our most inclusive sample ($n = 119$, with 8 legal components) falls short of the size and scope that would be desirable for both factor analysis and MDS methods. It is worth reiterating that the EPLex indicators cover only the topic of individual dismissal law. Our analysis, somewhat surprisingly, finds a distinct multidimensional structure despite the narrowness of our focus. Although one might reasonably expect that more diverse legal rules would display even more complex patterns of adoption, it is also possible that strong correlations among these components could lend new support to the conventional unidimensional analysis of stringency. Finally, we have little trouble identifying the legal provisions that align with the two common factors we have identified in the coverage-weighted EPLex data. In the MDS plots, however, it is more difficult to associate dimensions with specific components of the law. We hope to discover methods that will allow us to better define the axes of the EPL policy space we are exploring.

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