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Do Institutions Contribute to a Comparative Advantage in Innovation?

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Abstract: Adopting a comparative capitalism approach, this study examines three institutional configurations: Liberal Market Economies (LMEs), Coordinated Market Economies (CMEs), and Creative Corporatist Economies (CCEs) in an attempt to assess whether they are associated with a comparative advantage in radical or incremental innovation. Three hypotheses are tested: (1) LMEs have a comparative advantage over CMEs in radical innovation, (2) CMEs have a comparative advantage over LMEs in incremental innovation, and (3) CCEs have a comparative advantage over LMEs and CMEs in radical innovation. Panel data on exports and R&D expenditure in high-tech and medium high-tech industries are used as proxies for radical and incremental innovation. In line with expectations, CMEs are found to have a comparative advantage over LMEs in incremental innovation. The results do not confirm that LMEs have a comparative advantage over CMEs in radical innovation, nor that CCEs have a comparative advantage over LMEs and CMEs in radical innovation. This challenges the notion that radical innovation is exclusive to LMEs and indicates that the comparative capitalism approach cannot fully explain comparative advantages in innovation.

Keywords: institutions, comparative advantage, varieties of capitalism, radical innovation, incremental innovation

JEL: O43, O57, P10, P52

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1 Introduction

Traditional trade theory has focused on a limited set of factors of production generating the comparative advantages that allow for economic specialization of goods and services (Heckscher, 1919; Ohlin, 1933; Ricardo, 1819; Samuelson, 1949). Over time, new additions have been suggested and the new trade theory of the 1980s and 1990s has shifted its attention to technological change and human capital (Grossman and Helpman, 1991; Romer, 1990), as well as increasing returns and heterogeneous firms (Helpman and Krugman, 1985; Krugman, 1991; Melitz, 2003). Also, institutions have been proposed as a source of comparative advantage, which in practice allows for evaluations of the "institutional content of trade" (Levchenko, 2007, p. 791; also e.g. Greif, 1992; North, 1990).

Although institutions have been suggested to primarily affect trade through their abilities to influence the configuration of transaction costs and the ease with which economic agents can coordinate their activities (North, 1990), there is still no consensus on what types of institutions matter. One reason for this is that the literature does not seem to agree on what institutions constitute. For instance, institutions have been conceptualized as rules and regularly defined as the "humanly devised constraints that shape human interaction" (North, 1990, p. 3). However, institutions can also be seen as equilibria upon which firms can coordinate (Greif and Kingston, 2011; Kingston and Caballero, 2009), or as constitutive rules or a resource (Hindriks and Guala, 2015). Furthermore, institutions are typically thought of as either individual rules and norms or entire legal systems. This tends to result in a lack of analytical precision, making it difficult to pin down how institutions might contribute to a country's comparative advantage. Despite this, the question is possibly important. In line with, for example, the arguments of the legal origins school of thought, the legal setting has important consequences for economic development, including the development of trade that allows for economic growth (Acemoglu et al., 2005; La Porta et al., 2008).

Against this background, the question is whether institutions indeed influence the comparative advantage of nations. Compared to previous literature, we attempt to link such comparative advantages to systems of institutions that directly concern firms. We do so by moving beyond the issue of contract enforcement, important as it is, to include also other forms of provisions that directly influence the manner in which firms are organized such as labor markets, inter-firm relations, and relations between firms and the financial industry. Thus, rather than dividing the world economy into common law and civil law societies (Acemoglu et al., 2005; La Porta et al., 2008), we make use of a comparative capitalism approach that allows us to conduct a more fine-

grained analysis. The literature on comparative capitalism comes in many forms, but with respect to the institutional sources of comparative advantage, one particular framework stands out: the Varieties of Capitalism (VoC) framework of Hall and Soskice (2001), as it greatly emphasizes the influence of institutions on comparative advantage.

A dominant framework within the comparative capitalism approach to political economy in the broad social science sense, VoC includes a binary classification of institutionally stable OECD countries in Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs). The former are said to be characterized by a dominance of market forms of governance, while the latter to a greater extent depend on non-market features such as inter-firm networks and strategic interaction between firms. While LMEs are said to offer a comparative institutional advantage to firms that specialize in high-tech sectors based on radical innovation, CMEs offer a comparative institutional advantages to firms specializing in medium high-tech sectors characterized by incremental innovation.

Although elaborately studied, the VoC framework's assumption of institutional stability and its binary classification of countries as either LMEs or CMEs have received criticism (see e.g. Amable, 2003; Crouch, 2005; Jackson and Deeg, 2006; Meelen et al., 2017; Schneider and Paunescu, 2012; Streeck, 2011). In light of this critique, we find it necessary to refine Hall and Soskice's (2001) classification of countries.

In an attempt to do this, as units of observation we select only those countries that have been consistently classified as LMEs and CMEs by previous studies. We end up with Canada, the UK, and the US as well as Austria, Belgium, and Germany, and label them as LMEs and CMEs, respectively. We also identify a third group of countries: Denmark, Finland, and Sweden. These countries seem to have institutions that would contribute to a comparative advantage in radical innovation (Schneider and Paunescu, 2012). In line with Ornston (2013), we name these Creative Corporatist Economies (CCEs).

Restricting the analysis to our set of LMEs, CMEs, and CCEs, this study examines whether their institutional configurations contribute to a comparative advantage in either radical or incremental innovation. It does so by using exports and R&D expenditure in high-tech and medium high-tech industries as proxies for radical and incremental innovation, respectively.

2 Theoretical Framework

The literature on comparative capitalism for understanding institutions and comparative advantage comes in many forms, and so do the taxonomies used for classification and analysis of countries. For instance, Amable (2003) introduced five types of capitalisms, and Hollingsworth and Boyer (1997) developed their social systems of production or governance framework.

One of the most prominent, however, is Whitley's (1999) business systems framework and his thesis that distinct national models (i.e. business systems) with distinct institutions exist, which provide firms with different incentives, leading to variations in how firms organize themselves.

Another framework is Hall and Soskice's (2001) Varieties of Capitalism (VoC) framework. Like the business systems framework, Hall and Soskice (2001) focus on the private sector and firms rather than on the state as such. However, unlike the business systems framework, the VoC framework also seeks to link micro-level behavior to macro-level outcomes via a focus on firms as the "key agents of adjustment in the face of technological change or international competition whose activities aggregate into overall level of economic activities" (Hall and Soskice, 2001, p. 6). This link to the macro-level and nations as a whole arguably makes the VoC framework more suitable in an analysis of national comparative advantages. Furthermore, and although many authors propose that institutions contribute to a comparative advantage of nations (Acemoglu et al., 2005; Amable, 2003; Greif, 1992; La Porta et al., 2008; North, 1990; Whitley, 1999), the VoC framework is the strongest proponent of institutions contributing to an explicit comparative institutional advantage for nations. Though infrequently applied in the field of economics, another advantage of VoC is that it incorporates game theoretical features and conceptualizes institutions not only as rules (North, 1990), but also as equilibria (Greif and Kingston, 2011). Also, much of it is aligned with other similar frameworks, such as Berglöf's (1997) financial systems framework.

2.1 The Varieties of Capitalism Framework

The political economy plays an essential part in the VoC framework. It is an arena populated by multiple actors (e.g. individuals, firms, producer groups, or governments) that are assumed to interact rationally and strategically with each other. As mentioned, Hall and Soskice (2001) identify firms to be the central actors in the political economy, where firms constantly encounter coordination problems both internally with employees as well as externally with stakeholders due to incomplete contracts, transaction costs, and principal-agent issues such as opportunistic

behavior (Hall and Soskice, 2001). Normally, one would turn to Williamson's (1985) theory on markets and hierarchies and suggest that when markets fail to provide sufficient coordination, hierarchies (i.e. within-firm coordination) provide the solution. On the contrary, Hall and Soskice (2001) argue that because of information asymmetry, which gives rise to adverse selection and moral hazard, one cannot rely entirely on hierarchies to secure cooperation and coordination either. Instead, the authors claim, to solve these problems, firms must develop internal and external relationships to all relevant actors in five spheres of the economy: industrial relations, where firms must coordinate with labor unions on wage levels and labor force-working conditions; vocational training and education, where firms must ensure access to a workforce with appropriate skills while workers must decide in what skills to invest and to what extent; corporate governance, where firms must be able to access finance and investors to ensure appropriate returns on their investments; inter-firm relations, where firms must form relationships with other enterprises, especially its clients or suppliers, in order to secure a stable demand for its products, relevant input supplies, and access to technology; and own employees, where firms must ensure that their workers have the right competencies and the willingness to cooperate with others in order to deliver on the firm's objectives.

In order for political economies to enjoy efficient coordination and high economic performance, they should develop complementary institutions in all spheres, meaning that a political economy that has a certain type of coordination in one of its five spheres should strive to develop complementary institutions in its other four spheres. The authors further postulate that it is possible to compare national political economies based on how well they resolve the mentioned coordination problems in these five spheres and introduce two distinct types of market economies: Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs).

2.1.1 Liberal Market Economies

In LMEs, firms coordinate their activities predominantly via competitive market and hierarchical relationships to, for example, control wages. This, in combination with shifting market opportunities and a substantial freedom for firms to hire and fire, give rise to trade unions that are generally weak. Furthermore, because firms in LMEs engage in production strategies that rely on a diverse labor force and short-term contracts, fluid labor markets with a lot of movement of workers among firms are created. Fluid labor markets, in turn, create a need for educational training that provides workers with general skills that are utilizable across firms. An extensive movement of workers, scientists and engineers, in particular, also facilitates the transfer of technology across firms. Moreover, firm valuation in LMEs is mainly based on publicly available

information that provides firms with access to finance and investors with profitable investment opportunities, but also encourages firms to focus on public dimensions of their performance. For instance, top management is often rewarded for increases in earnings or share price. Additionally, LMEs are generally tolerant of mergers and acquisitions; however, they have also implemented rigid antitrust regulations (Hall and Soskice, 2001).

Among the large OECD countries, Hall and Soskice (2001) classify the US, the UK, Australia, Canada, New Zealand, and Ireland as LMEs.

2.1.2 Coordinated Market Economies

In CMEs, firms rely more on non-market relationships for coordination, such as dense inter-firm networks. Collaboration and incomplete contracts prevail and emphasis is put on strategic interaction between actors and the ability to make credible commitments to each other. Credible commitments are facilitated by (non-market) institutions that allow for exchange of information, monitoring of behavior and sanctioning of deviations from cooperation. This is a parallel to the arguments of Ostrom (1990) as well as to more recent research on two-sided communication about interest and beliefs (Ellingsen and Östling, 2010).

Because of a dependence on these inter-firm networks rather than on market relationships, investors in CMEs are usually provided with information about firm progress via these networks. The reliability of such 'inside' information is ensured because firms value their reputation among the network members and are hence incentivized to provide accurate information. These networks also give rise to managerial incentives that tend to be aligned with both those of the firms and those of the networks, i.e. a focus on firm reputation is more important than a short-term focus on profitability. Moreover, CMEs are not particularly tolerant of mergers and acquisitions. In addition, firms in CMEs engage in business activities that rely on skilled labor and long-term labor contracts. Long-term contracts, in turn, limit the movement of skilled workers across firms and therefore also the transfer of technology. Instead, close inter-firm collaboration tends to facilitate the diffusion of technology as well as a focus on product differentiation and niche products, rather than direct product competition. Moreover, to be able to assure employees that investing in industry-specific skills will pay off and secure firms that their investment in training will lead to employees acquiring usable skills (and that other firms will not simply 'steal' trained workers from other firms instead of making equivalent investment in training themselves), CMEs are often characterized by powerful business and employer

associations, strong trade unions, extensive networks of cross-shareholding, and legal or regulatory systems designed to facilitate collaboration (Hall and Soskice, 2001).

Hall and Soskice (2001) classify Germany, Japan, Switzerland, the Netherlands, Belgium, Sweden, Norway, Denmark, Finland, and Austria as CMEs.

2.1.3 Comparative Institutional Advantage in Innovation

Hall and Soskice (2001, p. 37) introduce the following definition of comparative institutional advantage:

> The institutional structure of a particular political economy provides firms with advantages for engaging in specific types of activities there. Firms can perform some types of activities, which allow them to produce some kinds of goods, more efficiently than others because of the institutional support they receive for those activities in that political economy, and the institutions relevant to these activities are not distributed evenly across nations.

This definition implies that the differences in the degree of institutional support for market (as opposed to non-market) coordination provide political economies with different advantages and disadvantages in the production of goods and services. In an attempt to assess this definition, Hall and Soskice (2001) apply it to the field of innovation. More specifically, they analyze radical and incremental innovation. Radical innovation is defined as large changes in product lines or production processes as well as development of new products. This type of innovation, they argue, tends to be important in industries such as telecommunications, medical engineering, and biotechnology, where mergers and acquisitions and fluid labor markets permit access to new technology. Incremental innovation, on the other hand, is defined as small and constant improvements to existing product lines and production processes, and tends to be more important in capital-intensive industries such as machinery, transport, and consumer durables, where maintained quality and cost-control, industry-specific skills, and dense inter-corporate networks facilitate the diffusion of technology. The authors hypothesize that the institutional setting in LMEs should contribute to a comparative institutional advantage in radical innovation, while the institutional setting in CMEs should contribute to a comparative institutional advantage in incremental innovation. They graphically compare the US portfolio of radical and incremental patents to that of Germany to support this view.

2.1.4 Mixed Market Economies

Hall and Soskice (2001) also identify a set of Mixed Market Economies (MMEs), namely France, Italy, Spain, Portugal, Greece, and Turkey. These countries do not fit either the characteristics of LMEs or CMEs, as they incorporate a mixture of liberal and coordinated mechanisms. Since these countries do not rely on complementary institutions, which the authors argue facilitate economic performance, they should merely enjoy sub-par economic development compared to the purer LME and CME models. This claim can be neither confirmed nor denied due to lack of research devoted to the economic performance of MMEs compared to LMEs and CMEs. Therefore, theses countries will not be analyzed in this study.

3 Previous Research

A large number of scholars have conducted similar studies to that of Hall and Soskice (2001) where they try to establish the potential connection between institutions and comparative advantage in different types of innovation, although with a certain degree of variety in their approaches and conclusions.

3.1 Institutions and a Comparative Advantage in Innovation

Including the same countries as Hall and Soskice (2001) in their analysis, Akkermans et al. (2009) used patent data to distinguish between radical and incremental innovation. They found that LMEs have a comparative advantage in some of the radically innovative industries examined and that CMEs have a comparative advantage in some of the incrementally innovative industries examined. Crouch et al. (2009), on the other hand, found that Germany may be one example of a CME that is successful in creating radical innovation in science and technology industries with the explanation that all industries in a country do not necessarily follow the predominant CME model; there may be significant elements of LME-like relationships also in CMEs where radical innovation is dominating, especially in new industries that can circumvent old sets of regulations since they have not yet been adjusted to the new environment.

Allen et al. (2006), Hall and Gingerich (2009), and Schneider et al. (2010) investigated the postulated comparative advantages in radical and incremental innovation on export data and found that LMEs have a comparative advantage in radical innovation and that CMEs have a comparative advantage in incremental innovation. Witt et al. (2017) also tested the VoC claims and found that they applied to all Hall and Soskice's (2001) LMEs, as well as all CMEs but Japan. Schneider et al. (2010) additionally found that some MMEs have a strong export performance in high-tech industries. Taylor (2004) similarly followed Hall and Soskice's (2001) classification and used both patent data and export data but did not find support for a connection between LMEs and CMEs and a comparative advantage in radical or incremental innovation.

Hall and Soskice's (2001) OECD centered LME–CME dichotomy has received criticism. This has lead researchers to suggest revised classifications of countries that can account for the institutions of, for instance, East Central Europe (Nölke and Vliegenthart, 2009), Asia (Kuncic, 2014; Whitley, 1999; Witt and Redding, 2013) and Latin America (Taylor, 2009).

For instance, Schneider and Paunescu (2012) distinguished not only between CMEs and LMEs, but also between CMEs with stable institutions and CMEs whose institutions have become more

liberalized over the past decades. Consistently with the claims of Hall and Soskice (2001), they found that LMEs export more heavily in high-tech industries, and CMEs in medium high-tech industries. Their results also suggested that the liberalized CMEs export more in high-tech industries. Meelen et al. (2017) followed Schneider and Paunescu's (2012) approach and included Liberalized CMEs, but unlike Schneider and Paunescu (2012), they arrived at inconclusive results. Boschma and Capone (2015) tested the VoC claims using both Hall and Soskice' (2001) classification of countries as well as Schneider and Paunescu's (2012) classification and found that CMEs are more likely to move into related (e.g. incremental) industries and technologies, while LMEs are more likely to move into more unrelated industries (e.g. radical).

Similarly to Schneider and Paunescu (2012), Busemeyer (2009) also demonstrated the existence of three distinct skill regimes within CMEs: the segmentalist (firm-based) skill regime of Japan, the integrationist (school-based occupational) skill regime of Sweden and the differentiated (workplace-based occupational) skill regime of Germany. Moreover, Boyer (2004) suggested that four small social democratic countries (Denmark, Finland, Ireland, and Sweden) and one 'catching-up' country (Portugal) may constitute two institutional configurations that are equally good, if not better, at ICT compared to liberal countries. The author's explanation for the Nordic countries' success was that their institutions are built on a specific combination of liberal and coordinated features, which closely resemble Hall and Soskice's (2001) description of MMEs.

In another study, Ornston (2013) investigated the patterns of coordination between organizational actors in the three spheres of the economy: labor markets, financial markets, and industrial policy, and arrived at three distinct groups of CME economies: (1) Conservative, (2) Competitive and (3) Creative Corporatist Economies. Austria, Belgium, and Germany were given as examples of the first, because of their larger state involvement; Ireland and the Netherlands were examples of the second, because of their higher tendency to rely on market mechanisms; and Denmark, Finland, and Sweden were examples of the last, because of their more pronounced targeting of new, supply-side resources such as risk capital, skill formation and research that may facilitate a movement into new, knowledge-intensive, high-tech industries. Based on interview material, Ornston (2013) found that the Creative Corporatist Economies seemed to be particularly successful in high-tech industries. These results are, though not empirically verified, in line with the findings of Schneider and Paunescu (2012).

Becker (2007) investigated the connection between institutions and innovation on two annually published innovation indices, but did not find any support that LMEs are more radically

innovative than CMEs either. Instead, he found that Finland and Sweden, typically classified as CMEs, were top-ranked on this measure of radical innovation.

Taylor (2007), although not explicitly classifying countries as either LMEs or CMEs, investigated whether decentralized states is a necessary institutional foundation for long-run technological innovation. He used data on patents, scientific publications and high-tech exports, but did not find any support for this view. Moreover, Zhou et al. (2011) analyzed one of the VoC framework's five spheres: the industrial relations sphere and examined the impact of having access to flexible labor on firm's product innovation capacity. Their findings suggest that firms with a high share of flexible labor perform significantly better on product innovation than firms with many workers on fixed-term contracts.

3.2 Measuring Radical and Incremental Innovation

The studies above have mainly used data on number of patents in an attempt to measure and distinguish between radical and incremental innovation. Even though there is an evident link between patents and innovation, such an approach can be questioned, since patents are not only created to enhance sales of new products but also to block competition (Archibugi and Planta, 1996; Gilbert and Newbery, 1982). Acknowledging this, other authors have used patent citations (see e.g. Akkermans et al., 2009). However, this leads to a similar argument; patents may very well be cited for the purpose of blocking competitors (Trajtenberg, 1990).

Another drawback of patent data is that it does not capture non-patented innovation. This is problematic, as only a fraction of a nation's innovation is patented (Taylor, 2007). For instance, firms in the service industry often use other measures of intellectual property to protect their innovation (Taylor, 2007). Patent data does thus only capture a skewed fraction of all innovation.

To avoid this issue, scholars have introduced the use of exports in radical and incremental industries (see e.g. Meelen et al., 2017; Schneider and Paunescu, 2012; Taylor, 2004, 2007). We believe that this approach better captures radical and incremental innovation, as exports include both patented and non-patented innovation. Consequently, we use data on exports in our study. Moreover, we use data on business enterprise R&D expenditure, which is arguably a reasonable alternative to patent data because of its close link to research, and thereby innovation.

4 Specification of Detailed Research Focus

4.1 Sample of Countries

As evident above, although elaborately studied, there is no consensus regarding the connection between institutions and their contribution to a comparative advantage in radical or incremental innovation. Moreover, there is a lack of agreement on the classification of countries into LMEs and CMEs. This paper therefore attempts to locate the least common denominator of countries to hopefully overcome historically inconclusive results. In other words, as units of observation we select only those countries that have been consistently classified as LMEs and CMEs by previous studies. Following this approach, three LMEs (the US, the UK, and Canada) and three CMEs (Germany, Belgium, and Austria) are included in our study.

In addition, we observe that three countries (Denmark, Finland, and Sweden) seem to have institutions that do not fit the CME characteristics assigned to them by Hall and Soskice (2001). Instead it has been suggested that they may make up a distinct institutional configuration, one that may contribute to success in high-tech industries (Ornston, 2013; Schneider and Paunescu, 2012). As this claim remains largely unverified, this paper attempts to test it by including these three countries in the analysis. We denote them Creative Corporatist Economies (CCEs) following Ornston (2013).

Table 1 Proposed Institutional Configurations

LMEs	CCEs	CMEs
Canada	Denmark	Austria
UK	Finland	Belgium
USA	Sweden	Germany

4.2 Research Question and Hypotheses

The aim of this study is to investigate whether institutions contribute to a comparative advantage in radical or incremental innovation. More specifically, this study examines the innovation character of three institutional configurations: LMEs, CMEs, and CCEs, in an attempt to assess whether these are associated with a comparative advantage in different types of innovation.

Based on Hall and Soskice's (2001) hypotheses that LMEs have a comparative institutional advantage in radical innovation and that CMEs have a comparative institutional advantage in incremental innovation, combined with Ornston's (2013) and Schneider and Paunescu's (2012)

suggestion that CCEs may have particularly favorable institutions for radical innovation, we arrive at the following research question:

> Are there institutional configurations that contribute to a comparative advantage in radical innovation and those that contribute to a comparative advantage in incremental innovation?

To answer this question, we arrive at three separate hypotheses:

H1 LMEs have a comparative advantage over CMEs in radical innovation.

H2 CMEs have a comparative advantage over LMEs in incremental innovation.

H1[1] is supported if the LME coefficient is positive and significant, while H2 is supported if the LME coefficient is negative and significant.

H3 CCEs have a comparative advantage over LMEs and CMEs in radical innovation.

H3 is supported if the CC coefficient is positive, significant and larger than the LME coefficient.

To operationalize our hypotheses we use panel data on exports and R&D expenditure in high-tech and medium high-tech industries. In line with previous research, we rely on high-tech industries as a proxy for radical innovation and medium high-tech industries as a proxy for incremental innovation.

[1] We need both H1 and H2 as these hypotheses are not symmetric, meaning that one cannot answer H2 by inverting H1 and vice versa.

5 Method

To assess whether different institutional configurations, i.e. LMEs, CMEs, and CCEs, are associated with a comparative advantage in radical or incremental innovation, we analyze panel data on exports and R&D expenditure using fixed effects OLS regression analysis.

5.1 Exports

The industry-level data on exports used in this study is retrieved from OECD (2017a) is classified according to Galindo-Rueda and Verger's (2016) OECD Industry Classification into high-tech and medium-high tech industries[2]. Although this classification of industries is not identical with Hall and Soskice's (2001) definition of radical and incremental innovation, we rely on high-tech industries as a proxy for radical innovation and medium high-tech industries as a proxy for incremental innovation for the following reasons: first, the high-tech and medium high-tech industries included in the OECD Industry Classification closely resemble Hall and Soskice's (2001, pp. 42–43) dichotomy of radical and incremental innovation. Second, it is based on R&D intensity, which has been suggested to positively correlate with radical innovation (Schneider et al., 2010). Furthermore, using a similar approach to our predecessors allows for comparability of our findings. Also, the data is available for a large time span, allowing us to include data from 1995 to 2015. This is arguably beneficial since, for instance, Witt and Jackson (2016) suggest that a test of whether the postulated comparative advantages manifest themselves post 2003 (the last year of their study) could capture more of the effects associated with the era of digitalization. Lastly, to make the export data comparable across countries, we use exports as a percentage of GDP.

5.1.1 Revealed Comparative Advantage

In addition to exports as a percentage of GDP in absolute terms, we construct the Balassa (1965) index of Revealed Comparative Advantage (RCA) for the high-tech and medium-high industries, respectively. The RCA measures to what extent a country exports goods in high-tech or medium high-tech industries compared to the rest of the world and is mathematically expressed as:

$$RCA_{ijt} = \frac{X_{ijt} / \sum_{j=1}^{n} X_{ijt}}{\sum_{i=1}^{n} X_{ijt} / \sum_{i=1}^{n} \sum_{j=1}^{n} X_{ijt}}$$

[2] See Appendix Table A1 for a full description of the industries included.

where

RCA_{ijt} represents the RCA for industry j in country i,

X_{ijt} represents the exports in industry j by country i,

$\sum_{j=1}^{n} X_{ijt}$ represents the total exports by country i,

$\sum_{i=1}^{n} X_{ijt}$ represents the total exports in industry j, and

$\sum_{i=1}^{n} \sum_{j=1}^{n} X_{ijt}$ represents the total exports.

5.1.2 Intermediate Goods

Besides using total exports as a percentage of GDP, we analyze exports of intermediate goods as a percentage of GDP and calculate its RCA counterpart using the Balassa (1965) index. We believe that by not only examining total exports, but also exports of intermediate goods, we increase the likelihood of capturing exports of innovation resulting from vertical specialization[3] since intermediate goods capture the earlier and more innovative stages of exports compared to the exports of final goods as final goods may be exported from a different country than the innovating one. For example, China may export high-end computers, but a large part of the components and the technology come from other countries and the benefits may therefore be predominantly captured elsewhere (e.g. Dedrick and Kraemer, 2015).

5.2 R&D Expenditure

The business enterprise R&D expenditure data used in this study is retrieved from OECD (2017b). Similarly to the export data, this data is on the industry level and follows Galindo-Rueda and Verger's (2016) OECD Industry Classification into high-tech and medium-high tech industries. We can therefore apply similar arguments here for why we rely on high-tech industries as a proxy for radical innovation and medium high-tech industries as a proxy for incremental innovation. Moreover, we find this data to be advantageous, because it is aggregated firm data, which goes in line with the VoC framework's attempt to link micro-level behavior to macro-level outcomes via a focus on firms as the "key agents of adjustment" (Hall and Soskice, 2001, p. 6). Another advantage of this data is that it can be divided into both manufacturing and service industries. This allows us to capture the service industries, industries that are otherwise difficult to capture by patent or export data, and are therefore underrepresented in previous studies.

[3] "Countries' tendency to specialize in particular stages of a good's production" (World Trade Organization, 2015, p. 18).

On a different note, the data on R&D expenditure is only available from 2009 to 2013. However, since an evaluation of comparative advantage is merely a snapshot in time, we believe that a panel of four years is enough. Similarly to the export data, we use R&D expenditure as a percentage of GDP.

5.2.1 Revealed Allocation of R&D Expenditure

In addition to using the R&D expenditure data in absolute values, we calculate a version of the Balassa (1965) index, which we denote Revealed Allocation of R&D Expenditure (RARD), for the high-tech and the medium high-tech industries respectively. The RARD measures the extent to which a country's firms invest in R&D in high-tech or medium high-tech industries compared to the rest of the world and is mathematically expressed as:

$$RARD_{ijt} = \frac{Y_{ijt} / \sum_{j=1}^{n} Y_{ijt}}{\sum_{i=1}^{n} Y_{ijt} / \sum_{i=1}^{n} \sum_{j=1}^{n} Y_{ijt}}$$

where

$RARD_{ijt}$ represents the RARD for industry j in country i,

Y_{ijt} represents the business enterprise R&D expenditure in industry j by country i,

$\sum_{j=1}^{n} Y_{ijt}$ represents the total business enterprise R&D expenditure by country i,

$\sum_{i=1}^{n} Y_{ijt}$ represents the total business enterprise R&D expenditure in industry j, and

$\sum_{i=1}^{n} \sum_{j=1}^{n} Y_{ijt}$ represents the total business enterprise R&D expenditure.

5.2.2 Including the Service Industries

Starting by analyzing only the manufacturing industries, we then extend the analysis to also include the service industries. This enables us to observe whether any differences appear when the service industries are included and to extend the analysis of institutions and comparative advantage beyond the manufacturing industries.

5.3 Control Variables

To increase the precision of our analysis, a set of control variables are included. We include a country's PPP adjusted GDP since a it has been found to attract trade (Tinbergen, 1962), it may stimulate the demand for high-tech goods (Meelen et al., 2017), and is the economic resources upon which innovators can draw (Taylor, 2009). In addition, we control for a country's FDI net

inflows as a percentage of GDP in the regressions on exports and RCA since FDI and exports are closely linked (Fontagné, 1999; Kojima, 1973; Liu et al., 2001; Marchant et al., 2002; Martinez et al., 2012). For instance, Fontagné (1999) found that FDI positively interacts with international trade. Lastly, we control for a country's level of globalization since a higher level of globalization may enable firms to circumvent the boundaries imposed by their national institutions, and because international linkages may play an important part of the rate of national innovation (Taylor, 2009). We use the KOF Globalization index by Dreher (2006) to measure globalization. Instead of including a country's overall globalization score, we include five of the six sub-categories: cultural proximity, information flows, personal contact, political globalization, and restrictions, as it allows us to observe each category on an individual basis. The sixth category is omitted, since it includes data on trade (our dependent variable) and FDI (included as a separate control variable above).

5.4 Empirical Regression Analysis

To test our hypotheses, the following regression equations are set up:

(1) $$Radical\ innovation_{it} = \beta_0 + \beta_1 LME_{it} + \beta_3 X_{it} + u_{it}$$

(2) $$Incremental\ innovation_{it} = \beta_0 + \beta_1 LME_{it} + \beta_3 X_{it} + u_{it}$$

(3) $$Radical\ innovation_{it} = \beta_0 + \beta_1 LME_{it} + \beta_2 CCE_{it} + \beta_3 X_{it} + u_{it}$$

where equation (1) tests H1, equation (2) tests H2, equation (3) tests H3, $Radical\ innovation_{it}$ represents a country's exports and R&D expenditure in high-tech industries, $Incremental\ innovation_{it}$ represents a country's exports and R&D expenditure in medium high-tech industries, LME_{it} represents a dummy variable equal to 1 for the countries that are defined as LMEs, CCE_{it} represents a dummy variable equal to 1 for the countries that are defined as CCEs, and X_{it} represents the control variables included in the analysis.

For a complete description of the dependent and independent variables included in the analysis, see Table 2 below and Appendix Table A2 and A3.

Table 2 Summary Statistics

		Mean	SD	Min	Max
Dependent variables					
Radical innovation (high-tech industries)	Total exports	.017	.019	0	.105
	RCA total exports	1.193	1.030	.027	4.241
	Intermediate goods exports	.006	.005	0	.039
	RCA intermediate goods exports	1.130	1.172	.048	8.668
	R&D manufacturing	.002	.003	0	.015
	RARD manufacturing	1.025	.799	.145	3.210
	R&D manufacturing and service	.002	.002	0	.015
	RARD manufacturing and service	1.275	1.119	.002	6.153
Incremental innovation (medium high-tech industries)	Total exports	.023	.028	0	.186
	RCA total exports	1.072	.571	.134	4.117
	Intermediate goods exports	.012	.020	0	.174
	RCA intermediate goods exports	1.108	.587	.057	4.362
	R&D manufacturing	.001	.001	0	.006
	RARD manufacturing	1.475	2.710	0	18.310
	R&D manufacturing and service	.001	.001	0	.006
	RARD manufacturing and service	1.475	2.411	0	18.340
Independent variables[4]					
Control variables	Cultural proximity	92.37	3.95	45.27	96.49
	Information flows	86.98	5.94	68.12	97.22
	Personal contact	77.87	6.03	62.34	87.21
	Political globalization	93.43	2.74	81.39	98.02
	Restrictions	87.20	6.34	66.60	97.80
	Ln FDI	0.94	1.07	-2.25	3.60
	Ln GDP	27.33	1.40	25.33	30.52

Source: Dreher (2006), OECD (2017a), OECD (2017b), World Bank (2017)

[4] Note that the dummy variables representing our institutional configurations are to be found in Appendix Table A2 and A3.

6 Analysis

6.1 Exports and Revealed Comparative Advantage

Table 3, 4, and 5 display the results on exports and RCA in high-tech and medium high-tech industries with CMEs as the base institutional configuration. In Table 3 and 4 the CCEs are excluded (H1 and H2 are tested) and in Table 5 they are included (H3 is tested).

Examining the high-tech industries (Table 3), data cannot confirm that LMEs have a comparative advantage over CMEs for this proxy of radical innovation, since the coefficients for the LME-variable take on a range of positive, negative, and insignificant values. Analyzing the medium high-tech industries (Table 4) instead, the coefficients for the LME-variable are negative and significant, indicating that CMEs have a comparative advantage over LMEs for this proxy of incremental innovation.

When examining Table 5, our data cannot confirm that CCEs have a comparative advantage over LMEs and CMEs for this proxy of radical innovation. Furthermore, contrary to our expectations, only small differences appear when data on exports of intermediate goods are analyzed compared to when data on total exports is included.

Table 3 Impact of LMEs on exports and RCA in high-tech industries

	Total exports	**RCA total exports**	**Intermediate goods exports**	**RCA intermediate goods exports**
LME	-0.00656**	0.383*	-0.00247***	0.397
	(0.00312)	(0.205)	(0.000926)	(0.250)
ln FDI	0.000406	-0.0439	7.66e-05	-0.104
	(0.000982)	(0.0646)	(0.000291)	(0.0787)
ln GDP	-0.00339*	0.455***	-0.00139**	0.399**
	(0.00204)	(0.134)	(0.000606)	(0.164)
Restrictions	-0.000178	0.0178*	-3.34e-05	0.0146
	(0.000148)	(0.00972)	(4.39e-05)	(0.0118)
Personal contact	-0.000637	0.0638*	-0.000326**	0.0593
	(0.000536)	(0.0353)	(0.000159)	(0.0430)
Information flows	0.00133***	0.00905	0.000268***	0.00558
	(0.000254)	(0.0167)	(7.54e-05)	(0.0204)
Cultural proximity	-0.00357***	-0.219***	-0.000452*	-0.204***
	(0.000866)	(0.0569)	(0.000257)	(0.0694)
Political globalization	0.000904**	0.107***	0.000267**	0.126***
	(0.000360)	(0.0236)	(0.000107)	(0.0288)
Constant	0.308***	-8.536	0.0675**	-9.160
	(0.0984)	(6.474)	(0.0292)	(7.889)
Observations	342	342	342	342
R-squared	0.301	0.192	0.204	0.125
Fixed Effects	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses

Table 4 Impact of LMEs on exports and RCA in medium high-tech industries

	Total exports	**RCA total exports**	**Intermediate goods exports**	**RCA intermediate goods exports**
LME	-0.0192***	-0.753***	-0.00903***	-0.818***
	(0.00394)	(0.0886)	(0.00303)	(0.0825)
ln FDI	0.000885	-0.000708	0.000281	-0.00424
	(0.00124)	(0.0279)	(0.000954)	(0.0260)
ln GDP	-0.00979***	0.100*	-0.00548***	0.246***
	(0.00258)	(0.0580)	(0.00198)	(0.0540)
Restrictions	-0.000646***	9.19e-05	-0.000362**	0.00765*
	(0.000187)	(0.00420)	(0.000144)	(0.00391)
Personal contact	-0.00190***	-0.00655	-0.000968*	0.00798
	(0.000677)	(0.0152)	(0.000521)	(0.0142)
Information flows	0.00207***	-0.0188***	0.00126***	-0.0237***
	(0.000321)	(0.00722)	(0.000247)	(0.00672)
Cultural proximity	-0.00286***	0.0872***	-0.00271***	0.0660***
	(0.00109)	(0.0246)	(0.000841)	(0.0229)
Political globalization	5.39e-05	0.0160	0.000512	0.0415***
	(0.000454)	(0.0102)	(0.000350)	(0.00952)
Constant	0.589***	-8.684***	0.370***	-14.48***
	(0.124)	(2.798)	(0.0957)	(2.606)
Observations	570	570	570	570
R-squared	0.331	0.211	0.226	0.266
Fixed Effects	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

Table 5 Impact of CCEs on exports and RCA in high-tech industries

	Total exports	RCA total exports	Intermediate goods exports	RCA intermediate goods exports
LME	-0.0143***	-0.00243	-0.00337***	0.0608
	(0.00255)	(0.145)	(0.000709)	(0.167)
CCE	-0.00284	0.333*	-0.00211**	0.239
	(0.00304)	(0.172)	(0.000844)	(0.199)
ln FDI	0.00218***	0.0422	0.000455**	-0.0360
	(0.000809)	(0.0459)	(0.000225)	(0.0530)
ln GDP	-6.73e-05	0.384***	8.93e-05	0.386***
	(0.00143)	(0.0810)	(0.000397)	(0.0935)
Restrictions	-1.92e-05	0.0192**	1.90e-05	0.0194**
	(0.000151)	(0.00857)	(4.20e-05)	(0.00989)
Personal contact	-0.000576**	0.0155	-5.81e-05	0.0248
	(0.000268)	(0.0152)	(7.46e-05)	(0.0176)
Information flows	0.000528***	-0.0110	4.65e-05	-0.00174
	(0.000179)	(0.0101)	(4.97e-05)	(0.0117)
Cultural proximity	-8.46e-05	-0.0151	-3.98e-06	-0.0162
	(0.000227)	(0.0129)	(6.30e-05)	(0.0148)
Political globalization	0.00105***	0.0737***	0.000349***	0.0764***
	(0.000381)	(0.0216)	(0.000106)	(0.0249)
Constant	-0.0671	-16.87***	-0.0290	-18.62***
	(0.0713)	(4.044)	(0.0198)	(4.664)
Observations	510	510	510	510
R-squared	0.144	0.141	0.110	0.119
Fixed Effects	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

6.2 R&D Expenditure and Revealed Allocation of R&D Expenditure

Table 6, 7, and 8 display the results on R&D expenditure and RARD in high-tech and medium high-tech industries with CMEs as the base institutional configuration. In Table 6 and 7 the CCEs are excluded (H1 and H2 are tested) and in Table 8 they are included (H3 is tested).

Analyzing the high-tech industries (Table 6) and the coefficient for the LME-variable, the direction of the effect is in line with our expectations but only significant for the RARD in high-tech manufacturing industries. As the results are dominantly insignificant, data cannot confirm that LMEs have a comparative advantage over CMEs for this proxy of radical innovation. Looking at the medium high-tech industries (Table 7) instead, the coefficients for the LME-variable are negative and mostly significant. This indicates that CMEs have a comparative advantage over LMEs for this proxy of incremental innovation.

Examining Table 8, data cannot confirm that CCEs have a comparative advantage in radical innovation. Lastly, when extending the analysis to include not only manufacturing industries but also the service industries, only small differences appear.

Table 6 Impact of LMEs on R&D expenditure and RARD in high-tech industries

	R&D manufacturing	**RARD manufacturing**	**R&D manufacturing and service**	**RARD manufacturing and service**
LME	0.00167	1.621**	0.000845	1.282
	(0.00104)	(0.727)	(0.000899)	(0.984)
ln GDP	-0.00352**	-1.490	-0.00223	-0.693
	(0.00176)	(1.223)	(0.00153)	(1.671)
Restrictions	-2.54e-05	-0.0162	-7.51e-06	-0.00851
	(4.20e-05)	(0.0293)	(3.70e-05)	(0.0405)
Personal contact	-0.000292	-0.0459	-0.000203	-0.0143
	(0.000224)	(0.156)	(0.000195)	(0.214)
Information flows	-0.000283**	-0.125	-0.000209*	-0.0928
	(0.000133)	(0.0923)	(0.000114)	(0.125)
Cultural proximity	-0.000480*	-0.386**	-0.000236	-0.196
	(0.000255)	(0.178)	(0.000220)	(0.241)
Political globalization	-0.000508*	-0.250	-0.000241	0.00835
	(0.000295)	(0.206)	(0.000255)	(0.279)
Constant	0.243**	117.7	0.144	47.69
	(0.105)	(73.27)	(0.0910)	(99.62)
Observations	90	90	138	138
R-squared	0.373	0.263	0.172	0.082
Fixed Effects	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

Table 7 Impact of LMEs on R&D expenditure and RARD in medium high-tech industries

	R&D manufacturing	**RARD manufacturing**	**R&D manufacturing and service**	**RARD manufacturing and service**
LME	-0.00168**	-3.904*	-0.00127**	-2.554
	(0.000700)	(2.174)	(0.000556)	(1.680)
ln GDP	0.00119	4.672	0.000882	3.263
	(0.00113)	(3.517)	(0.000909)	(2.746)
Restrictions	3.13e-06	0.0820	-1.38e-06	0.0527
	(2.65e-05)	(0.0824)	(2.14e-05)	(0.0647)
Personal contact	6.99e-05	0.257	4.78e-05	0.190
	(0.000150)	(0.466)	(0.000119)	(0.361)
Information flows	4.29e-05	0.191	3.23e-05	0.114
	(8.81e-05)	(0.274)	(7.02e-05)	(0.212)
Cultural proximity	0.000203	0.694	0.000161	0.498
	(0.000175)	(0.542)	(0.000138)	(0.417)
Political globalization	0.000104	0.972	7.95e-05	0.719
	(0.000192)	(0.595)	(0.000154)	(0.464)
Constant	-0.0703	-328.0	-0.0526	-232.5
	(0.0680)	(211.1)	(0.0546)	(164.8)
Observations	201	201	261	261
R-squared	0.189	0.068	0.141	0.050
Fixed Effects	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

Table 8 Impact of CCEs on R&D expenditure and RARD in high-tech industries

	R&D manufacturing	**RARD manufacturing**	**R&D manufacturing and service**	**RARD manufacturing and service**
LME	-0.000579	0.456	-0.000501	0.790
	(0.00129)	(0.467)	(0.000963)	(0.556)
CCE	-0.000122	0.629	-0.000488	0.264
	(0.00205)	(0.743)	(0.00153)	(0.885)
ln GDP	-0.00130	0.0596	-0.00103	-0.132
	(0.000933)	(0.338)	(0.000703)	(0.406)
Restrictions	-9.87e-06	-0.0181	7.90e-06	-0.0126
	(6.46e-05)	(0.0234)	(4.79e-05)	(0.0276)
Personal contact	-0.000322**	-0.00655	-0.000233**	-0.0133
	(0.000159)	(0.0577)	(0.000116)	(0.0669)
Information flows	-4.75e-05	0.0208	-8.76e-05	-0.0288
	(0.000164)	(0.0593)	(0.000122)	(0.0705)
Cultural proximity	1.34e-05	-0.145	6.04e-05	-0.0813
	(0.000324)	(0.117)	(0.000239)	(0.138)
Political globalization	-8.40e-05	0.0225	9.26e-06	0.0985
	(0.000210)	(0.0761)	(0.000155)	(0.0897)
Constant	0.0752	10.51	0.0497	7.451
	(0.0683)	(24.73)	(0.0509)	(29.35)
Observations	105	120	188	188
R-squared	0.372	0.181	0.230	0.067
Fixed Effects	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

To summarize, data cannot confirm H1 or H3, i.e. that LMEs or CCEs have a comparative advantage in radical innovation. On the contrary, data support H2, i.e. that CMEs have a comparative advantage in incremental innovation. In other words, it appears that the CME model offer firms medium high-tech industry-specific opportunities, which translate into a comparative advantage for CMEs over LMEs in incremental innovation.

7 Discussion

The aim of this study was to investigate whether certain institutional configurations have a comparative advantage in radical or incremental innovation. Using exports and R&D expenditure in high-tech industries as proxies for radical innovation and exports and R&D expenditure in medium high-tech industries as proxies for incremental innovation, our results indicate that CMEs have a comparative advantage over LMEs in incremental innovation. However, we did not find any evidence that LMEs have a comparative advantage over CMEs in radical innovation.

These results move beyond the common understanding that economic prosperity is synonymous with liberalization and deregulation. This has implications for economic policy aimed at improving nations' technological capabilities, as it implies that the CME model seems to provide firms with medium high-tech industry-specific opportunities. Therefore it may be wise to design policies that build on this comparative advantage, or conversely, those that address its comparative disadvantages.

As we did not find any evidence that LMEs have a comparative advantage in radical innovation, our results question whether a comparative advantage in radical innovation is exclusive to LMEs. This ties back to e.g. Akkermans et al. (2009) as well as Crouch et al. (2009), who suggested that LMEs may have a comparative advantage in some industries where radical innovation is dominant, and CMEs in others.

A similar reasoning may apply to CCEs. Although they have institutions that invest heavily in research and development and have a leading performance in high-tech industries, we did not find that CCEs have a comparative advantage over both LMEs and CMEs in radical innovation. In other words, these countries' world-leading technology is not necessarily a result of their institutional characteristics. Instead, their institutions may merely strengthen the innovation that has already occurred.

In an attempt to improve on previous researchers' work, we analyzed not only total exports but also exports of intermediate goods exports, as it may better capture innovation. However, including exports of intermediate goods in our analysis instead of total exports yielded merely small differences. Therefore, we believe that further research is necessary in order to establish whether this is a credible measure of innovation. We also extended the analysis to include R&D expenditure in manufacturing as well as service industries. Again, only small differences appeared

when both industries were included. This suggests that the findings of previous studies, which arguably only apply to manufacturing industries, may apply also to service industries.

7.1 Limitations

There are some important limitations of our study. Taking them into account may contribute to a better understanding of the link between institutional configurations and comparative advantages in innovation.

First, taking the criticism towards Hall and Soskice's (2001) binary division of countries as well as the debate on institutional stability into consideration, we analyzed only the countries that have been consistently classified as LMEs and CMEs in the literature. In the same fashion, we also introduced CCEs as a third institutional configuration. However, this approach inherits the vulnerability of Hall and Soskice's classification, namely that it may become outdated. If future research breaks our 'principle of consistency' and suggests that any of the countries under investigation no longer fit the institutional configuration assigned, the validity of our classification will become compromised.

Second, another concern is that we use countries as proxies for their overall institutional characteristics. This may be problematic if the individual institutions within a nation are not aligned with the overall LME and CME constellations. Some researchers have explored this already (see e.g. Rafiqui, 2010). Although being potentially important, analyzing this was beyond the scope of this study.

Third, as this study applies the VoC framework and a principle of consistency, the findings are limited to nine OECD countries. A larger sample of countries may yield more comprehensive results.

Fourth, acknowledging that high-tech industries and medium high-tech industries may not be the most accurate proxies, we face the same limitations as previous research regarding the difficulty to measure radical and incremental innovation. For instance, telecommunications, one of the industries that Hall and Soskice (2001) identify to rely on radical innovation, is classified as a medium low-tech industry according to the OECD Industry Classification. Since we only include high-tech and medium high-tech industries, this industry is, thus, not included in our analysis. Moreover, R&D expenditure was included as a complement to export data in an attempt to capture innovation in service industries as export data may not be able to do so. However, R&D expenditure may still fail to capture other types of innovation, such as non-exported innovation

as well as the rate of innovation that results from R&D expenditure, or the innovation that stems from other sources. Furthermore, dividing industries into 'mostly radical' (i.e. high-tech industries) and 'mostly incremental' (i.e. medium high-tech industries) can be questioned. Researchers have challenged this distinction by pointing towards the industry life cycle approach that shows that radical innovation tends to appear in the early phases of an industry's life cycle while incremental innovation tends to emerge in later stages of the same (Abernathy and Utterback, 1978; Akkermans et al., 2009; Boschma and Capone, 2015; Taylor, 2004). While acknowledging the relevance of this debate, our study has not been able to factor this into the analysis due to limited resources. Instead, we encourage a continued search for other measures of innovation as more data becomes available.

8 Conclusion

This paper was motivated by the contradictory results of previous research on the relationship between institutions and comparative advantage in innovation. Accordingly, we have tested the impact of three types of institutional configurations: Liberal Market Economies (LMEs), Coordinated Market Economies (CMEs), and Creative Corporatist Economies (CCEs) on radical and incremental innovation, in an attempt to answer the following research question:

> Are there institutional configurations that contribute to a comparative advantage in radical innovation and those that contribute to a comparative advantage in incremental innovation?

The results indicate that CMEs have a comparative advantage over LMEs in incremental innovation. In other words, CMEs, but not LMEs, seem to provide firms with medium high-tech industry-specific opportunities.

However, the results do not confirm that LMEs have a comparative advantage over CMEs in radical innovation. This allows us to challenge the notion that LMEs are the single best model for having a comparative advantage in radical innovation. For this reason, we included the CCEs in our analysis, but did not find any evidence that they have a comparative advantage over LMEs and CMEs in radical innovation.

Going forward, future research may continue to refine the current measures of innovation. Here, data on exports of intermediate goods as well as the service industries may prove worthwhile to explore further. Also, it ought to be interesting to expand the analysis to include more countries, especially the Mixed Market Economies, in an attempt to assess whether institutional complementarities are really key, or whether a combination of liberal and coordinated institutional features may lead to equally high performance in radical and incremental innovation.

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10 Appendix

Table A1 OECD Industry Classification

Category	Industry	Nr	Activity	Data
High-tech industries	Basic pharmaceutical products and pharmaceutical preparations	21	Manufacturing	Exports and R&D
	Computer, electronic and optical products	26	Manufacturing	Exports and R&D
	Air and spacecraft and related machinery	303	Manufacturing	Exports and R&D
	Software publishing	582	Service	R&D
	Scientific research and development	72	Service	R&D
Medium high-tech industries	Chemicals and chemical products	20	Manufacturing	Exports and R&D
	Weapons and ammunition	252	Manufacturing	R&D
	Electrical equipment	27	Manufacturing	Exports and R&D
	Machinery and equipment n.e.c.	28	Manufacturing	Exports and R&D
	Motor vehicles, trailers and semi-trailers	29	Manufacturing	Exports and R&D
	Other transport equipment	30	Manufacturing	Exports
	Railway locomotives and rolling stock	302	Manufacturing	R&D
	Manufacture of military fighting vehicles	304	Manufacturing	R&D
	Manufacture of transport equipment n.e.c.	309	Manufacturing	R&D
	Medical and dental instruments and supplies	325	Manufacturing	R&D
	Computer programming, consultancy and related activities	62	Service	R&D
	Information service activities	63	Service	R&D

Source: Galindo-Rueda and Verger (2016)

Table A2 Definition of Dependent Variables

	Variable	Explanation	Data source
Radical innovation (high-tech industries)	Total exports	A country's total exports in high-tech industries as a percentage of GDP. Years 1995-2015.	OECD (2017a), World Bank (2017)
	RCA total exports	A country's RCA in total exports in high-tech industries. Years 1995-2015.	OECD (2017a)
	Intermediate goods exports	A country's exports of intermediate goods in high-tech industries as a percentage of GDP. Years 1995-2015.	OECD (2017a), World Bank (2017)
	RCA intermediate goods exports	A country's RCA in exports of intermediate goods in high-tech industries. Years 1995-2015.	OECD (2017a)
	R&D manufacturing	A country's business enterprise R&D expenditure in high-tech manufacturing industries as a percentage of GDP. Years 2009-2013.	OECD (2017b), World Bank (2017)
	RARD manufacturing	A country's RARD in high-tech manufacturing industries. Years 2009-2013.	OECD (2017b)
	R&D manufacturing and service	A country's business enterprise R&D expenditure in high-tech manufacturing and service industries as a percentage of GDP. Years 2009-2013.	OECD (2017b), World Bank (2017)
	RARD manufacturing and service	A country's RARD in high-tech manufacturing and service industries. Years 2009-2013.	OECD (2017b)
Incremental innovation (medium high-tech industries)	Total exports	A country's total exports in medium high-tech industries as a percentage of GDP. Years 1995-2015.	OECD (2017a), World Bank (2017)
	RCA total exports	A country's RCA in total exports in medium high-tech industries. Years 1995-2015.	OECD (2017a)
	Intermediate goods exports	A country's exports of intermediate goods in medium high-tech industries as a percentage of GDP. Years 1995-2015.	OECD (2017a), World Bank (2017)
	RCA intermediate goods exports	A country's RCA in exports of intermediate goods in medium high-tech industries. Years 1995-2015.	OECD (2017a)
	R&D manufacturing	A country's business enterprise R&D expenditure in medium high-tech manufacturing industries as a percentage of GDP. Years 2009-2013.	OECD (2017b), World Bank (2017)
	RARD manufacturing	A country's RARD in medium high-tech manufacturing industries. Years 2009-2013.	OECD (2017b)
	R&D manufacturing and service	A country's business enterprise R&D expenditure in medium high-tech manufacturing and service industries as a percentage of GDP. Years 2009-2013.	OECD (2017b), World Bank (2017)
	RARD intermediate	A country's RARD in medium high-tech manufacturing and service industries. Years 2009-2013.	OECD (2017b)

Table A3 Definition of Independent Variables

	Variable	Explanation	Data source
Institutional configurations	CCE	Dummy variable representing the countries that are defined as Creative Corporatist Economies.	Based on our analysis of previous studies[5]
	LME	Dummy variable representing the countries that are defined as Liberal Market Economies.	Based on our analysis of previous studies[6]
Control variables	ln FDI	The logarithmic representation of a country's foreign direct investment, net inflows, % of GDP	World Bank (2017)
	ln GDP	The logarithmic representation of a country's gross domestic product (PPP adjusted), current US$.	World Bank (2017)
	Cultural proximity	A country's "Cultural Proximity" score in the KOF Index of Globalization.	Dreher (2006)
	Information flows	A country's "Information Flows" score in the KOF Index of Globalization.	Dreher (2006)
	Personal contact	A country's "Personal Contact" score in the KOF Index of Globalization.	Dreher (2006)
	Political globalization	A country's "Political Globalization" score in the KOF Index of Globalization.	Dreher (2006)
	Restrictions	A country's "Restrictions" score in the KOF Index of Globalization.	Dreher (2006)

[5] Ornston (2013), Schneider and Paunescu (2012)

[6] Hall and Gingerich (2009), Hall and Soskice (2001), Meelen et al. (2017), Schneider and Paunescu (2012), Witt et al. (2017)