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An Empirical Analysis of Institutional Coevolution in the European Union

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ABSTRACT

Institutional effectiveness is widely considered an important factor for the success of the European integration process. The article investigates how the coevolution of formal and informal institutions influenced economic performance within the European Union from 1980 to 2019. Results indicate that all countries have achieved strong formal institutional frameworks but still diverge mostly in terms of informal institutional development. Cluster analysis reveals how many Eastern European member countries experienced a fast and asymmetric institutional development to the advantage of political and judicial formal ones with modest economic effects. The opposite happened among many Central and Northern European member countries, which improved mostly their informal institutions through their interaction with robust formal institutional frameworks. Bootstrap panel Granger causality test and panel data analysis suggest that economic performance is positively influenced by informal institutions while the formal ones seem to be a necessary but not sufficient condition for economic progress. As the level of economic development increases, causality tends to reverse in favor of informal institutions. The analysis of institutional development trajectories reveals how better economic performance can be achieved when formal and informal institutions keep pace with one another. These insights are important to design European policies and reforms.

JEL Classification: O17, O52, O57, P51

1 | Introduction

Scholars provided abundant evidence that institutions matter for guaranteeing an inclusive long-run economic growth and an equitable distribution of opportunities and resources. It is not surprising that the effectiveness of institutional settings is considered an important factor for the success of the European Union (EU) project.

Despite institution being a term widely used, there is no unanimous consensus on its definition (Hodgson 2006). The definition and distinction between formal and informal institutions are even more challenging. Despite difficulties and ambiguities, institutions “tend to be distinguished between formal and

informal” (Andriani and Bruno 2022, 1–2). In this article, we use the terms formal and informal institutions coherently with Andriani and Bruno (2022, 2), who observe how “formal institutions generally refer to written and official regulations” while “informal institutions consist of socially shared ‘rules in force’, not necessarily codified, but still effective because they are based on some crucial enforcement mechanisms”.

A significant literature agrees on the importance of jointly considering the role of formal and informal institutions. However, a particularly relevant but underinvestigated aspect is how the joint development of formal and informal institutions influences economic performance over time. Consequently, this article provides a long-term dynamic analysis of the coevolution

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between formal and informal institutions and their impact on economic performance in 26 European member countries from 1980 to 2019.

Results indicate that the European countries diverged mainly in terms of formal institutional development at the beginning of the 1980s, with some Central and Northern countries being strong also in terms of informal institutions. By 2019, virtually all countries achieved strong formal institutional frameworks but continued to diverge in terms of informal institutional development. Cluster analysis reveals that Eastern European countries filled the gap thanks to their fast development in terms of political and judicial formal institutions. However, their economic performance remained modest. In general, countries with strong formal and informal institutional frameworks have achieved good economic performance. Consequently, it is crucial to investigate the institutional development path that allows to obtain this result and the causal relationship between institutions and economic performance.

Bootstrap panel Granger causality test and panel data analysis show that informal institutions positively influence economic performance, and the causal link tends to reverse as the level of economic development increases. Conversely, effective formal institutions seem to be a necessary but not sufficient condition to obtain long-run development. The analysis of the institutional development trajectories of European transition countries reveals how better outcomes can be achieved in the cases in which formal and informal institutions keep pace with one another. These results provide interesting insights to understand whether structural reforms, often aimed at formal institutions, are sufficient to guide countries towards socio-economic development paths.

The article proceeds as follows. In Section 2, the importance of institutions for economic development and the success of the European integration process are discussed. The methodologies used to investigate how the coevolution of formal and informal institutions influences economic performance are explained in Section 3. In Section 4, results are presented and commented. Section 5 concludes the study.

2 | Literature Review

2.1 | Types of Institutions and Socio-Economic Progress: An Overview

Institution is a term widely used in social sciences, but there is no unanimous consensus on its definition (Hodgson 2006). North (1990, 3) claims that “institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction [and] structure incentives in human exchange, whether political, social, or economic”. According to Ostrom (2005, 3) “broadly defined, institutions are the prescriptions that humans use to organize all forms of repetitive and structured interactions including those within families, neighborhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales”. However defined, scholars agree that institutions matter, with important economic, social, and political implications (e.g., Acemoglu and Robinson 2012; Greif 2012).

According to Roland (2004, 111), economists tend to classify institutions as “exogenously-given constraints on behavior” coherently with North’s approach or as “endogenously-appearing self-enforcing rules that are the equilibrium of a repeated game” as in Aoki (2001) or Greif (1993, 1994). Roland (2004) proposes an interesting classification, based on institutions’ rapidity of change and persistence, and distinguishes between “slow-moving” and “fast-moving” institutions. In the first category, there are values, beliefs, culture, and social norms, while in the second one, there are, for example, political institutions.

This type of classification overlaps with the more popular distinction between informal and formal institutions. North (1990, 4) distinguishes formal and informal constraints. The formers are “rules that human beings devise”, while the latter are, for example, “conventions and codes of behavior”. Despite the ambiguities and difficulties connected to a precise distinction between formal and informal institutions (Hodgson 2006), this classification is widely used in literature, and most scholars interpret formal institutions as codified regulations, laws, and standards enforced by the state or other official organizations, while informal institutions are spontaneous rules and norms that are socially shared, internalized, and community or self-enforced but not necessarily codified (Andriani and Bruno 2022). A debated issue is whether informal institutions should be considered as distinct from culture. According to some scholars, the two terms broadly overlap (Alesina and Giuliano 2015), while Williamson (2009, 374) claims that “culture is capturing one form of informal institutions”. Andriani and Bruno (2022, 2) confirm that “the distinction between culture and informal institutions remains an ongoing debate” and underline the importance to deepen the study of their interlink.

The analysis of the interaction between formal and informal institutions and their evolution is increasingly considered fundamental for understanding whether and how institutional settings may influence the development and resilience of economic systems (Neyapti 2013). Many empirical analyses testify a positive association between economic performance and the solidity and quality of institutional frameworks (e.g., Grogan and Moers 2001; Bergh and Bjørnskov 2021); however, it is not trivial to establish the causal relationship (Rodrik 2004). Many cross-sectional analyses suppose that the direction of causality goes from institutional quality to economic development. However, some scholars have identified both a direct and an inverse causality (Röthel and Leschke 2025), and institutional quality itself can be influenced by various socio-economic factors (Roupakias and Dimou 2021; Tran et al. 2021). Moreover, the impact of institutional quality appears to materialize over a longer time horizon than the impact that growth has on institutional quality (Chong and Calderon 2000). Law et al. (2013) found that institutional quality promotes economic development in higher income countries, whereas the causality reverses in lower income countries. Paldam and Gundlach (2008) argue, through a survey of the empirical evidence, that it is easy to find convincing evidence supporting both the direct and indirect causal links, and warn against taking for granted that institutional development guarantees the economic one, especially in the case of developing countries.

These results seem to underline the importance of a systemic approach that captures the co-evolution of the institutional and the economic dimensions. In addition to traditional micro-economic institutional approaches, systemic approaches that focus on coordination between institutions are increasingly gaining ground. Aoki (2001) underlines the role of informal complementary institutions for the proper working of formal institutions. Informal institutions are considered important for understanding how and why people adapt their behavior to respect formal institutions (Greif and Kingston 2011). Andriani et al. (2022, 68) claim that if cultural norms are interpreted as informal institutions, it is possible to understand how “formal rules are fulfilled in practice”. Platteau (2000) recognizes the fundamental role of social norms for the functioning of the legal system, and other contributions can be mentioned (e.g., Helmke and Levitsky 2004; Lauth 2015). Boettke et al. (2008) provide a framework for understanding how the interrelation between formal and informal institutions impacts development. They introduce the concept of “institutional stickiness” and claim that the grade of compatibility between formal and informal institutions is determinant for the success of new institutional arrangement and consequently for economic development. More recently, Amendolagine and von Jacobi (2023), by drawing on ecology, investigated whether the relationship between formal and informal institutions changes in different cultural ecosystems and found that the asymmetry between formal and informal institutions is more pronounced in cultural ecosystems dominated by extractive institutions, and this mismatch is detrimental to economic development.

Williamson (2009) notes that informal institutions are an important determinant of development, and formal institutions can be successful only when grounded on well-developed informal constraints. This suggests that each country is characterized by a proper institutional mix not easily transplantable in other countries, and where institutional setting is too unbalanced to the advantage of formal institutions poorly embedded in informal constraints, economic performance may deteriorate. Formal and informal institutions can display complex relationships. Knack and Keefer (1997) suggest that if formal institutional frameworks are weak, trust displays a substitutive effect. Formal enforceable contracts are expected to have a substitution effect when trustworthiness is lacking. However, McCannon et al. (2018) found that trust and contract enforcement are complements while Cruz-García and Peiró-Palomino (2019) claim that informal institutions are, per se, unable to replace formal institutions in the provision of credit.

There is growing awareness of the importance of analyzing institutional processes along with institutional structures. Indeed, the path of institutional reform may imply institutional volatility with controversial effects for economic performance (Bolen and Williamson 2019). Consequently, analyzing institutional development processes becomes important for a clearer understanding of the impact on economic development. As described by Scott (2010, 8–9), a “process approach” goes beyond the analysis of the relations among variables and “stresses issues of institutional emergence and change. It does not neglect the question of ‘what’ happened, but primarily addresses the question of ‘how’ things happen [and] assumes that ‘history matters,’ that how and when things occur influences what things happen”. This

approach can be particularly valuable in analyzing the interaction between formal and informal institutions. Indeed, it is not enough to associate a certain institutional mix with a certain economic performance at a particular point in time. It is also important to understand what type of co-evolution over time of formal and informal institutions could favor better socio-economic development, because each institutional framework and its future evolution is influenced by its history.

2.2 | How Institutions Matter: The Case of the European Integration Process

If institutions matter for economic development, they do matter even more in an integration process between heterogeneous European countries (Masuch et al. 2018). Consequently, it is not surprising that candidate countries to join the EU need to meet some accession criteria that imply a certain solidity and effectiveness of the institutional setting (i.e., Copenhagen Criteria and other membership obligations defined in the *acquis communautaire*). Although the prospect of joining the EU leads many countries to improve their institutional framework, an actual institutional development and socio-economic progress cannot be taken for granted. In 2015, the European Central Bank (ECB) claimed that “the quality of domestic institutions and governance affects economies’ per capita income growth” (ECB 2015, 34), and weak institutional settings contribute to hamper economic convergence.

Most scholars agree that the European integration process allowed to reach a certain degree of economic convergence in terms of beta-convergence (i.e., catching-up processes by fast growing poor countries) and/or sigma-convergence (i.e., reduction of economic disparities among countries), despite the negative impacts of the financial crisis (Micallef 2020). However, it is debatable whether European member countries have somehow converged also in political, cultural or institutional terms. Casagrande and Dallago (2021) observe how different institutional frameworks coexist and persist within the Eurozone. Beyaert et al. (2019) analyze institutional convergence across Eurozone and found that no convergence has taken place and detected a general institutional degradation in the European periphery. In this regard, Schönfelder and Wagner (2019) claim that the European institutional convergence is far more challenging than economic convergence. Similarly, Alesina et al. (2017) claim that better results were achieved in terms of economic than institutional or cultural convergence.

These debates often underestimate the importance of not equating and confusing economic convergence with cultural and institutional convergence. Although there is no doubt that convergence to economic prosperity is an objective shared by all countries, different cultural and institutional settings are compatible with pursuing this result. Moreover, European treaties do not aim to eliminate national identities, coherently with the EU motto “united in diversity”. Institutional convergence should be understood in terms of institutional effectiveness and not as convergence towards a certain type of institutional setting. Institutional effectiveness means the ability of a given institutional framework to function correctly according to the pre-established objectives, for the benefit of all the subjects

involved. Consequently, institutional effectiveness is not a synonym of economic performance, despite we can expect it can foster it. In the case of formal institutions, the typical example is an effective political and judicial system free from corruption phenomena. As to informal institutions, institutional effectiveness takes the form of a socio-economic context that favors a harmonious coordination between individuals and social groups. Clearly, institutional effectiveness thus conceived does not presuppose the supremacy of any economic system or cultural approach but the coherence between objectives and results. Since all EU countries have ratified treaties which establish common objectives and values and are committed to achieving certain institutional standards, it is possible to compare the effectiveness of institutions according to common criteria while respecting cultural peculiarities.

3 | Analytical Framework and Methodology

3.1 | A Framework for the Analysis of Institutional Settings

The article investigates the relationship between different institutional settings and economic performance. An institutional setting is characterized by a particular combination of formal and informal institutions. In order to map the possible combinations of formal and informal institutions, we rely on the four categories provided by Williamson (2009), who sorts institutions according to their strength: (1) strong formal/strong informal, (2) weak formal/strong informal, (3) strong formal/weak informal, and (4) weak formal/weak informal. In this article, the strength of an institution should be interpreted in qualitative terms, as its capacity to promote a political and socio-economic development that is compatible with the unique identity of each country. As already discussed in Section 2.2, the respect for institutional variety is a basic principle of EU which, not by chance, has as its motto “united in diversity” and in its fundamental values advocates substantially inclusive institutions, the protection of human rights, and a balance between individual freedoms and social justice. The institutional strength is measured by a formal and informal institutional indices.

3.2 | Formal and Informal Institutional Indices

A crucial issue is the identification of appropriate methodologies and indicators for estimating the formal and informal institutional indices. The lack of a unanimous definition of institution and the difficulty in distinguishing and defining formal and informal institutions make this task challenging. Although formal institutions are considered generally easier to measure, it is not clear whether proxies of institutions measure their strength or simply reflect their outcomes. According to Voigt (2013), it is important to evaluate institutional performance by considering not only *de jure* institutions as formally defined by legislation but also *de facto* institutions, which represent the grade of effective enforcement of formal constraints. The degree of enforcement of formal rules may depend on the strength of informal institutions (Hodgson 2006). This makes it difficult to isolate the effect of formal institutions. Measuring informal institutions may be even more challenging. Many contributions about informal

institutions are descriptive studies (e.g., Acemoglu et al. 2001), while empirical investigations are less common. Moreover, analyses are often based on subjective data influenced by contingent factors and outcomes of institutions. For this reason, Voigt (2018) suggests a more intensive use of experiments to measure informal institutions. Important steps forward in this direction have been achieved by Falk et al. (2016, 2018), who introduce experimentally validated survey datasets not suitable, however, for dynamic comparisons. This forces researchers to rely on the databases available, such as the repeated cross-sectional longitudinal surveys provided by the world values survey (WVS) or the European value study (EVS).

Significant additional research is needed to find better proxies to measure formal and informal institutions. However, while keeping these issues in mind, Bentkowska (2021, 732) observes that the current proxies of institutions can be accepted, since “they still bring us closer to understanding how actual institutions work. Such variables are shaped not only by deeply rooted informal institutions but also by the quality and performance of formal institutions”. As the goal of our analysis is an assessment of institutional development within the EU, measuring the effectiveness of institutions becomes crucial. Indeed, the real goal of the European project is to promote inclusive institutions, as defined by Acemoglu and Robinson (2012, 74–75): “to be inclusive, economic institutions must feature secure private property, an unbiased system of law, and a provision of public services that provides a level playing field in which people can exchange and contract”.

Formal institutions are sometimes interpreted as political institutions and measured using as proxies indicators of constitutional rules that constrain governments such as plurality, proportional representation, judicial independence, and constitutional review (see Glaeser et al. 2004, and Williamson 2009). The choice of the formal institutions to be measured depends on the objectives of the research and can also concern the economic system. Indeed, different formal institutions cause different features and strengths in different economic systems, as comparative economic studies prove. For example, property rights are considered a fundamental institution for promoting economic performance. In this regard, Williamson and Kerekes (2011) consider formal rules in securing property rights and use the average protection against risk of expropriation as a proxy. Cruz-García and Peiró-Palomino (2019) measure the impact of formal and informal institutions on the provision of private credit. In measuring formal institutions, they adopt a multidimensional perspective by considering the strength of political institutions (degree of autocracy/democracy) and economic-judicial institutions for the protection of property rights (judicial independence, impartiality of the courts, protection of property rights, military interference in rule of law and politics, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of properties, reliability of police, and business costs of crime). This multidimensional analysis of formal institutions seems particularly suitable for assessing the strength of formal institutions in the context of the EU, because it is in line with the institutional objectives fixed by the European treaties, and therefore it will be adopted in this article. Formal institutional settings will be considered in their various dimensions (political, judicial, and economic) using indicators suitable for

an evaluation of their inclusiveness and how they evolved in the long-run: judicial independence, checks on government, impartial administration, access to justice, civil liberties, social rights and equality, protection of property rights, and business freedom (see Table A in the Supporting Information for a detailed description of these indicators).

In the relevant literature, the most recurrent measures of informal institutions concern social capital, trust, and culture. These factors often intersect in the definition of informal institutions and are considered important determinants of economic prosperity (Fukuyama 1996). Putnam (1993) proposes some measures of social capital as a proxy of informal constraints (see also Aron 2000). Cruz-García and Peiró-Palomino (2019) and Bentkowska (2021) use the level of social trust as a proxy of informal constraints and social capital. Batinti et al. (2019) use social capital as a proxy of informal institutions to demonstrate its ability to improve governmental functions' long-term economic commitments, transparency, and accountability. Makrychoriti et al. (2022) use trust as an informal institutional factor able to mitigate the negative economic impact of financial stress. Often, culture is considered a proxy of informal institutions in empirical investigations. Usually, culture is measured in its four components: trust, respect, individual self-determination (control), and obedience.

The conceptualization and measurement of cultural traits is not trivial and other definitions exist. A consolidated literature refers to Hofstede (1980, 2001), who interprets culture as a construct of the human mind aimed to manage a complex reality. Hofstede's multidimensional concept of culture is widely considered able to properly characterize people's mental models. Although there is no lack of criticisms, Hofstede's approach attracted recently also the interest of economists (Beugelsdijk and Welzel 2018). Hofstede proposes different quantifiable dimensions useful for empirical investigations. We consider in particular four of them, because they are the most used and proper for economic analysis: power distance, uncertainty avoidance, individualism versus collectivism, and femininity versus masculinity. Power distance measures the degree of social acceptance of unequal social hierarchical relations; sometimes this is connected to the concept of obedience. Uncertainty avoidance reflects the social preference for order, lower ambiguity, consistency, more transparency, and better values predictability. Individualism versus collectivism reflects the capacity of single persons to take responsibility and to be free from social or groups' pressures; sometimes this is associated to self-determination. Societies in which femininity prevails are societies in which welfare, equal opportunities, inclusion, and social relationships are emphasized. Andriani et al. (2022) use Hofstede to describe in detail the dimensional concepts of culture for assessing whether tax compliance is culturally driven. Other approaches have focalized on religiosity (Torgler 2006) or other historical factors (Alesina et al. 2013) in the analysis of culture.

We draw on the consolidated literature by considering social capital and culture as important components of informal institutions. We use social trust as a proxy of social capital and individual self-determination, respect, obedience, uncertainty avoidance, individualism versus collectivism, power distance, and femininity versus masculinity as proxies of culture (see

Table B in the Supporting Information for a detailed description of these indicators, which are among the most used in the literature cited in this section). This because we aim at reconciling Hofstede's approach with the dimensions proposed by Williamson (2009) and Tabellini (2010) for the conceptualization and measurement of cultural traits. Indeed, these dimensions are not incompatible, and often, some of them recur together in the literature (e.g., Andriani et al. 2022).

It is important to reflect on the possible connections between formal and informal institutions as defined above. Trust, respect, individual self-determination (control), and obedience are considered able to represent the rules that govern interaction among individuals also in the economic context (e.g., Williamson and Kerekes 2011; Tabellini 2010). In particular, the first three components are considered able to promote the protection of property rights, while it is widely thought that obedience may be connected to higher rates of property expropriation and inversely linked to positive rates of innovation and entrepreneurship. Clearly, there may be connections with the political, judicial, and economic dimensions used to classify formal institutions. Power distance and femininity may influence distributive policies and the welfare system, uncertainty avoidance may promote effective and efficient political and judicial systems, individualism and self-determination may promote innovation and business freedom. However, once again, it is not trivial to identify a causal relationship because it is probable that formal and informal institutions coevolve with economic development, as previously discussed.

3.3 | Data and Composite Indicators

We collected long-term data, from 1980 to 2019. The data concern institutional and socio-economic indicators that have been used in the empirical analysis (see Tables A, B, and D in the Supporting Information). The choice of this time interval is due to both theoretical and empirical factors. Indeed, for many indicators, it is difficult to find data before the 1980s, and the pandemic that started in 2020 requires a specific analysis that we leave to further research. Since the databases have different coverages, we have managed missing values according to the criteria suggested by the *Asia-Pacific Trade and Investment Report of the United Nations Economic and Social Commission for Asia and the Pacific* (ESCAP): Missing values have been imputed using linear interpolation, or the nearest non-missing value where interpolation was not feasible; however, no information has been used from other countries for imputing the missing values (see Mikic 2009, 182). The data refer to all countries that are or have been members of the EU in the considered period (therefore also the UK) with the exception of Malta and Cyprus, for which there was not enough data.

The article relies on the distance to frontier (DTF) score methodology for the construction of the formal and informal institutional indices. This methodology, proposed within the World Bank Doing Business project, allows us to compute absolute scores that can be compared over time (WB 2018). Firstly, indicators are normalized and rescaled using the linear transformation $(\text{worst} - y) / (\text{worst} - \text{frontier})$. The frontier corresponds to the best performance obtainable for the indicator y . For each indicator, the worst and the

best values are not determined by countries' performance. Indeed, all formal and informal indicators are based on data that are responses to questionnaires, with the minimum and maximum scores set by the interviewer and are constant in time. The scores are computed on a scale from 0 to 100, where 0 is the worst performance and 100 the best performance, the frontier. This implies that formal and informal institutional indices can range from 0 (weakest performance in terms of institutional effectiveness) to 100 (strongest performance).

All the scores obtained for individual indicators (11 indicators for informal institutions and 8 for formal institutions; see Tables A and B in the Supporting Information), for each country and each year from 1980 to 2019, are subsequently aggregated to compute a composite index for informal institutions (II) and another one for formal institutions (FI). Indicators have been aggregated using weights based on principal components analysis (OECD and JRC 2008). In the next section, these composite indicators have been used to analyze the co-evolution of formal and informal institutions and economic performance. All figures have been produced using MATLAB.

4 | Empirical Results

4.1 | The Dynamics of Institutional Settings and Economic Performance Among European Clusters

In Figure 1, the European member countries have been mapped according to their institutional setting, coherently with the analytical framework described in Section 3.1. To each member country (see Table C for countries' codes in the Supporting Information) corresponds a particular combination of formal and informal institutional index scores (see all scores in the Supporting Information Table E). This combination is mapped into one of the quadrants of Figure 1, where the strengths of formal and informal institutions are reported. The choice of thresholds that identifies the quadrants (strong with index > 60 and weak with index < 30) is consistent with Williamson (2009). To grasp the connection between institutional effectiveness and economic performance, each combination is associated to a color that corresponds to the level of real GDP per capita at chained PPPs for a given year in a given country (see Table D for a detailed description of this variable, which is considered to be the most suitable for comparing living standards across countries and years, see Feenstra et al. 2015). We compare II and FI scores for each country in 1980 and 2019.

It has been possible to construct a tree of hierarchical clusters for both years, starting from the combinations of FI and II scores associated to each country. Countries that are part of the same cluster have a similar institutional setting in terms of combination of FI and II scores. In Figure 1, a symbol is associated to each country. Each symbol corresponds to a particular cluster, so that countries that belong to the same cluster have the same symbol.

Results indicate that in 1980 most of the member countries had strong FI, while II was on average less strong, although not weak. The dispersion of the scores was greater in terms of

FI than II. A positive association seems to exist between the strength of both formal and informal institutions and economic performance and a geographical coherence in the composition of clusters.

We enumerate clusters from 1 to 5. Cluster 1 has the highest average level of real GDP per capita at chained PPPs within the cluster, while 5 has the lowest level. In 1980, Clusters 1 (diamonds) and 2 (squares) are composed of Nordic countries plus Germany; Cluster 3 (circles) is composed mainly of Mediterranean and Central European countries plus the Anglo-Saxon ones, while Clusters 4 (stars) and 5 (triangles) are composed of transition countries of Eastern Europe. In 2019, all countries present strong formal institutional settings, but the heterogeneity in the effectiveness of informal institutions persists. Cluster analysis points out the entry of many transition countries into Group 3. From a geographical point of view, there seems to be now a clear difference in terms of institutional performance between Northern European countries (including the Netherlands and Germany) and the rest of Europe, with Slovenia as an interesting outlier. The positive association between the strength of both formal and informal institutions and economic performance is persisting. There is an evident generalized improvement in terms of economic performance, but the gap between Group 1 and 5 increased (see Tables F and G in the Supporting Information).

4.1.1 | The Interrelations Between Formal and Informal Institutions

Table 1 allows to analyze the potential roots of the changes in Figure 1 and to investigate the connections between formal and informal institutions. Scores have been aggregated according to clusters in 1980. Ireland and Luxembourg have been excluded as outlier countries. Indeed, Ireland GDP dynamics has been strongly influenced by an exceptional inflow of extra-EU FDI, important EU transfers, and a low taxation regime. Luxembourg has also enjoyed the benefits of significant European investments and the presence of important European institutions, as well as the strong development of the financial sector. These peculiarities make Ireland and Luxembourg poorly comparable with the other EU member countries, and, consequently, they will not be considered further in the analysis (see, for example, Puzzello and Gomis-Porqueras 2018). Colors help to associate areas of mutual influence between formal and informal institutions. The scores of all the indicators have been calculated so that higher values correspond to better institutional effectiveness as foreseen by the theory discussed in Section 3.2.

Clusters 4 and 5 have improved significantly their FI with the exception of the business freedom component. The dynamics of the business freedom indicator seem coherent in particular with the economic performance of the clusters, their level of social trust, and their capacity to be free from social or groups' pressures (individualism vs. collectivism). Obedience and self-determination are the II components that improved most in Clusters 4 and 5. It is worth noting that within Clusters 1 and 2, social trust and respect have improved significantly. The impression is that the transition phase implied a significant change in the *de jure* political and juridical institutions, but the *de facto* economic environment and many components of II did not experience a turning point.

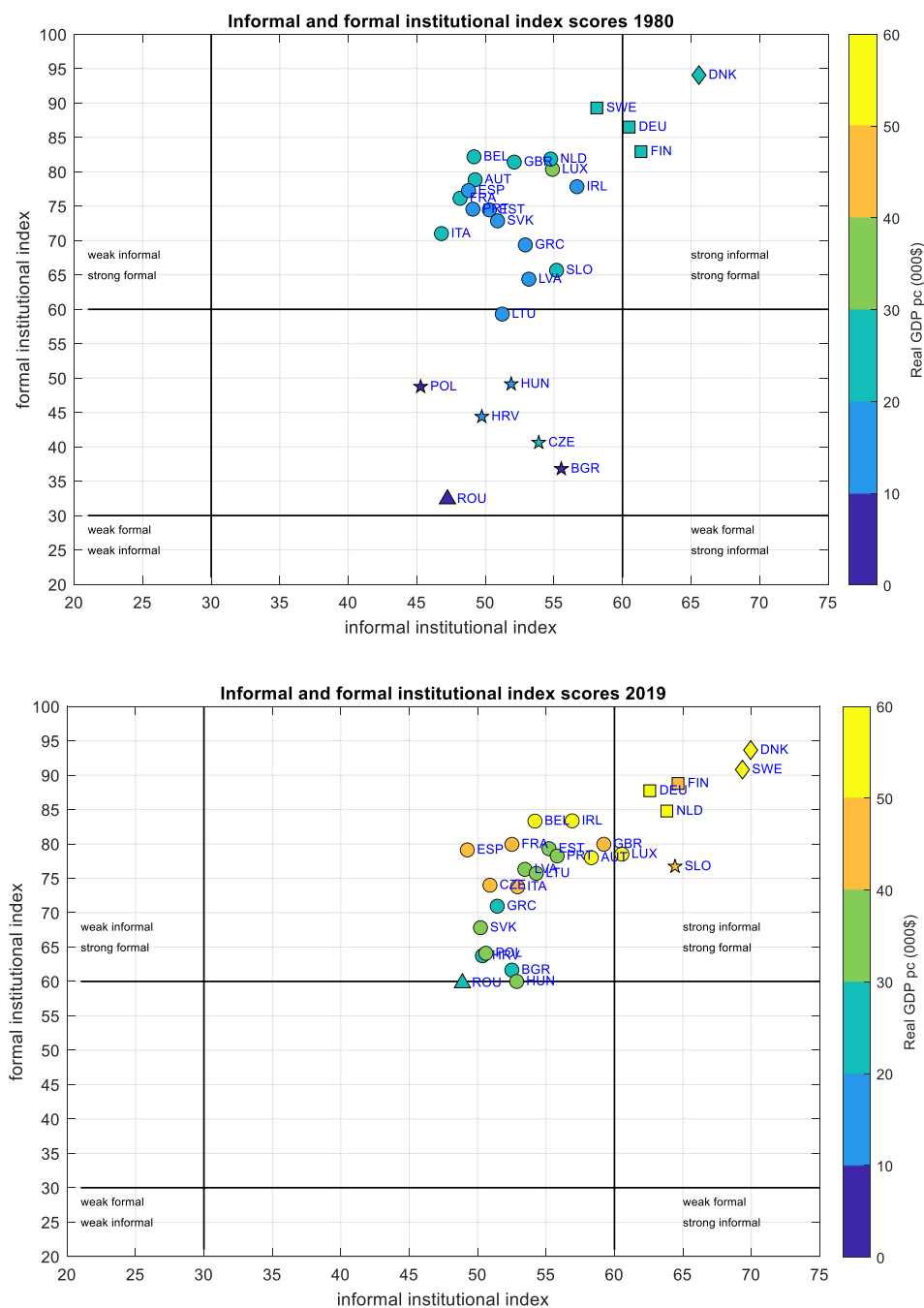


FIGURE 1 | Institutional settings and economic performance. Countries have been mapped according to their institutional setting. To each member country (see Table C in the Supporting Information for countries' codes) corresponds a particular combination of formal (FI) and informal institutional index (II) scores (see all scores in the Supporting Information Table E). Each combination is associated with a color that corresponds to the level of real GDP per capita at chained PPPs. II and FI scores for each country in 1980 and 2019 are compared. A symbol is associated with each country. Each symbol corresponds to a particular cluster (see Table F in the Supporting Information), so that countries that belong to the same cluster have the same symbol. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

4.2 | Causality Between Institutional Effectiveness and Economic Performance

4.2.1 | Bootstrap Panel Granger Causality Analysis

So far, we have observed associations and not causal links. The causal relationship between institutions and economic development has been widely investigated in the literature, and “the main conclusion that has emerged is that institutions are

positive and statistically significant determinants of economic development” (Law et al. 2013, 612). In time series analysis, causal links have often been investigated using the Granger causality test. It is a statistical hypothesis test that allows us to investigate whether one time series is useful in forecasting another one (Granger 1969). Intuitively, an evolving variable X is said to Granger-cause another one Y if the prediction of Y based on past values of both X and Y is improved with respect to the case in which only Y past values are considered.

TABLE 1 | Average scores' differences 2019–1980 for clusters in 1980.

Delta FI components	Clusters 4 and 5	Cluster 3	Clusters 1 and 2	Delta II components	Clusters 4 and 5	Cluster 3	Clusters 1 and 2
Access to justice	28	0	0	Social trust	−4	5	14
Civil liberties	38	3	−1	Self-determination (control)	9	6	5
Impartial administration	14	4	−1	Respect	2	12	25
Checks on government	38	4	1	Obedience	10	4	4
Judicial independence	25	4	2	Uncertainty avoidance	−1	4	4
Social rights and equality	14	9	8	Individualism vs. collectivism	−3	1	5
Protection property rights	12	6	1	Power distance	2	2	2
Business freedom	−6	−1	14	Femininity vs. masculinity	−1	−1	−1

Note: Average scores' differences between 2019 and 1980 have been aggregated according to clusters in 1980. Colors associate areas of mutual influence between formal (FI) and informal (II) institutions, according to the theoretical analysis discussed in Section 3.2. In particular, trust, respect, and individual self-determination (control) are considered able to promote the protection of property rights (yellow). Power distance and femininity may influence distributive policies and the welfare system (gray). Uncertainty avoidance may promote effective and efficient political and judicial systems (white). Individualism and self-determination may promote innovation and business freedom, while obedience may be connected to higher rates of property expropriation and inversely linked to positive rates of innovation and entrepreneurship (light blue).

This time series test has been extended also to panel analysis (e.g., panel and pooled Granger causality tests). However, this extension is possible only by assuming homogeneity across cross-section units, and this might be a quite unrealistic hypothesis especially in datasets composed by interrelated countries. Among the different techniques proposed to deal with this issue, an interesting one is the panel-data approach proposed by Kónya (2006) for analyzing causality between export and growth among OECD countries. This approach has been used by other scholars in similar contexts (e.g., Kar et al. 2011; Boubtane et al. 2013; Haghnejad et al. 2020; Keshavarzian and Tabatabaieinasab 2021). Since we can expect a similar if not a higher degree of interrelation among EU member countries, we applied Kónya's bootstrap panel Granger causality test to investigate casual links between FI, II, and economic performance, on the basis of the algorithms provided by Haghnejad et al. (2020). This approach does not assume panel homogeneity and allows to test for Granger causality on each single panel country by taking into account the simultaneous correlation across countries. This is possible thanks to the use of seemingly unrelated regressions (SUR) equation system instead of finite-order vector autoregressive (VAR) model, and the computation of Wald tests with country specific bootstrap critical values generated by simulations based on a resampling method. In details, if there is contemporaneous correlation between countries, equations cannot be estimated one-by-one using OLS. Indeed, it is necessary to use feasible generalized least squares (FGLS), maximum likelihood methods, or SUR estimator. SUR estimator is more efficient than OLS in the case of correlations within the system. The systems to be estimated by SUR procedure is composed by two

sets of equations (as in Kónya 2006) with countries $i = 1, \dots, N$, time $t = 1, \dots, T$, l is the lag ($l = 1, \dots, mly \text{ or } mlx$) and ε the error term:

$$\begin{aligned} y_{1t} &= \alpha_{11} + \sum_{l=1}^{mly1} \beta_{11l} y_{1t-l} + \sum_{l=1}^{mlx1} \gamma_{11l} x_{1t-l} + \varepsilon_{11t} \\ y_{2t} &= \alpha_{12} + \sum_{l=1}^{mly1} \beta_{12l} y_{2t-l} + \sum_{l=1}^{mlx1} \gamma_{12l} x_{2t-l} + \varepsilon_{12t} \\ &\dots \end{aligned} \quad (1)$$

$$\begin{aligned} y_{Nt} &= \alpha_{1N} + \sum_{l=1}^{mly1} \beta_{1Nl} y_{Nt-l} + \sum_{l=1}^{mlx1} \gamma_{1Nl} x_{Nt-l} + \varepsilon_{1Nt} \\ x_{1t} &= \alpha_{21} + \sum_{l=1}^{mly2} \beta_{21l} y_{1t-l} + \sum_{l=1}^{mlx2} \gamma_{21l} x_{1t-l} + \varepsilon_{21t} \\ x_{2t} &= \alpha_{22} + \sum_{l=1}^{mly2} \beta_{22l} y_{2t-l} + \sum_{l=1}^{mlx2} \gamma_{22l} x_{2t-l} + \varepsilon_{22t} \\ &\dots \\ x_{Nt} &= \alpha_{2N} + \sum_{l=1}^{mly2} \beta_{2Nl} y_{Nt-l} + \sum_{l=1}^{mlx2} \gamma_{2Nl} x_{Nt-l} + \varepsilon_{2Nt} \end{aligned} \quad (2)$$

As explained by Kónya (2006, 981), each regression has different predetermined variables and contemporaneous correlation is the only link among equations. Moreover, x_t and y_t are not expected to be stationary so it is possible to consider simply log variables within regressions. In country, i , there is one-way Granger causality running from X to Y if in (1) not all γ_{1i} 's are zero but in (2) all β_{2i} 's are zero, there is one-way Granger causality from Y to X if in (1) all γ_{1i} 's are zero but in (2) not all β_{2i} 's are zero, there is two-way Granger causality between Y and X if neither all β_{2i} 's nor all γ_{1i} 's are zero, and there is no Granger causality between Y and X if all β_{2i} 's and γ_{1i} 's are zero (Kónya 2006, 980). The determination of the number of lags influences deeply the results.

Kónya (2006) and other scholars suggest as a strategy to fix a maximum number of lags and then test the best number of lags according to a model specification criterion (e.g., Akaike information criterion—AIC; Schwartz criterion—SC). For computational tractability, the same lag structure is considered valid for all countries. The procedure that allows to perform Wald tests with country specific bootstrap critical values on the Systems 1 and 2 is described step-by-step in Kónya (2006). We applied the same procedure in our analysis, on the basis of the algorithms provided by Haghnejad et al. (2020).

Firstly, we computed the logarithms of all the variables involved in the test. Then, we made sure of the presence of cross-sectional dependence through the Lagrange multiplier test statistic of Breusch and Pagan (1980). The null hypothesis of no dependence was rejected with p -values close to zero. We tested

Granger causality from II to GDP, FI to GDP, II to FI, GDP to II, GDP to FI, and FI to II. This in order to test the bidirectionality of causal links. Coherently with the literature that uses similar databases, we tested a maximum of four lags and used AIC as model specification criterion. According to AIC, the best models consider only one lag and at most two in Case II is the dependent variable.

In Table 2, we report only the p -values of tests in order to facilitate comparison among all the countries (test statistics and bootstrap critical values are reported in the Supporting Information, Tables H, I, and J). Countries have been ordered according to clusters in 1980 to facilitate the analysis of results. The null hypothesis is that X does not cause Y, so the rejection of this hypothesis implies Granger causality. Numbers in bold indicate cases of rejection of the null hypothesis at 1%, 5%, or 10%.

TABLE 2 | Bootstrap panel Granger causality analysis— p -values.

Clusters 1980	Countries	II → GDP	GDP → II	FI → GDP	GDP → FI	II → FI	FI → II
Clusters 4 and 5	BGR	0.094*	0.844	0.599	0.808	0.786	0.17
	HRV	0.796	0.876	0.03**	0.823	0.824	0.423
	CZE	0.007***	0.929	0.325	0.905	0.779	0.001***
	HUN	0.265	0.415	0.833	0.153	0.398	0.714
	POL	0.491	0.814	0.969	0.101	0.056*	0.001***
	ROU	0.071*	0.852	0.297	0.967	0.742	0.026**
Cluster 3	AUT	0.772	0.028**	0.321	0.796	0.068*	0.013**
	BEL	0.011**	0.024**	0.777	0.659	0.063*	0.112
	EST	0.106	0.07*	0.226	0.016**	0.879	0.122
	FRA	0.733	0.001***	0.843	0.303	0.137	0.816
	GRE	0.055*	0.112	0.872	0.591	0.248	0.328
	ITA	0.013**	0.864	0.322	0.579	0.202	0.832
	LVA	0.008***	0.089*	0.016**	0.626	0.972	0.383
	LTU	0.01**	0.132	0.02**	0.446	0.893	0.728
	NLD	0.03**	0.02**	0.781	0.141	0.463	0.022**
	PRT	0.384	0.028**	0.003***	0.139	0.609	0.429
	SVK	0.021**	0.472	0.171	0.711	0.681	0.317
	SLO	0.02**	0.774	0.033**	0.299	0.003***	0.36
	ESP	0.943	0.167	0.456	0.752	0.395	0.593
	GBR	0.622	0.091*	0.663	0.04**	0.009***	0.012**
	DEN	0.606	0.025**	0.423	0.606	0.554	0.125
Clusters 1 and 2	FIN	0.636	0.033**	0.442	0.211	0.447	0.088*
	DEU	0.408	0.055*	0.365	0.222	0.003***	0.046**
	SWE	0.491	0.354	0.568	0.925	0.899	0.763

Note: In the table, the bootstrap p -values for each country are reported. Countries have been ordered according to clusters in 1980 to facilitate the analysis of results. Different causal links (the arrows) between formal institutions (FI), informal institutions (II), and economic performance (GDP) have been tested. Bold numbers indicate $p < 0.1$. To highlight significance levels, we used the following notation:

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

According to the results, 79% of the countries present a causal link between II and GDP and/or between GDP and II, thus confirming the importance of the link between II and GDP. In the case of Belgium, Latvia and the Netherlands, a virtuous circle is even generated between GDP and II. Definitely less important is the link between FI and GDP (in one direction or the other), which is significant only for 29% of the countries. The link between II and FI is significant (in one direction or another) in 42% of the countries. A virtuous circle between II and FI is present in Poland, Austria, the UK, and Germany. Analyzing the results on a clusters basis, it can be noted that a positive effect of GDP on the II is achieved only in Clusters 1–3, although II have a positive effect on GDP in half of the countries in Clusters 4 and 5. Three quarters of the countries in Clusters 1 and 2 show a significant effect of GDP on II but not of II on GDP. These results seem to indicate that II promote growth and are in turn influenced by economic development. In this context, FI can promote growth directly (especially in Cluster 3), but first of all, they promote the development of II, as happens for half of the countries in Clusters 4 and 5. The significance of the link between FI and II is confirmed also for higher income countries (Clusters 1 and 2) but only at the 5% and 10%.

4.2.2 | Panel Data Analysis: Estimating the Impact of Institutional Effectiveness on Economic Performance

Granger causality test does not detect interdependency between variables nor does it provide detailed information on the strength of the causal connections. For these reasons, we conducted a panel data analysis by adding other typical determinants of economic performance: employment share (EMP), labor productivity (GHW), human capital (HC), gross capital formation (GCF), and government consumption (GC) (for more details see Table D in the Supporting Information). The descriptive statistics of the variables used in the panel data analysis are reported in Table K in the Supporting Information. We computed the logarithms of all the variables and used first differences to detrend data. The computation of the variance inflation factor (VIF) confirmed that the magnitude of multicollinearity is negligible (all values are around 1; according to James et al. (2013), as a rule-of-thumb, values greater than 5 yet detect a multicollinearity issue).

In the literature, many contributions analyze the connection between institutional and economic variables through panel data regression models and different estimation methods. Since with a dataset composed by cross-sectional time series, data heteroscedasticity and autocorrelation issues are frequent, it is necessary to control for entity and time fixed effects (FEs). In the literature, the most used models are FEs and random effects (REs) regression models, panel autoregressive distributed lag (ARDL) model or the generalized method of moments (GMM) model (e.g., Arbolino and Boffardi 2017; Hassan et al. 2019; Alexeev and Chernyavskiy 2021; Rahi et al. 2023). We started the analysis by considering a basic empirical equation for countries $i = 1, \dots, N$, time $t = 1, \dots, T$:

$$GDP_{it} = \alpha_i + \beta_1 FI_{it} + \beta_2 II_{it} + \beta_3 GHW_{it} + \beta_4 EMP_{it} + \beta_5 HC_{it} + \beta_6 GCF_{it} + \beta_7 GC_{it} + \delta_t + \varepsilon_{it} \quad (3)$$

The intercept α_i is the unobserved country specific effect while δ_t captures time effect. We tested this equation by considering different FE model specifications. To investigate the relationship between FI and II, we considered also the interaction term between these two regressors. We added also various lags for the GDP and the Regressors II and FI to investigate if the impact of institutional effectiveness on GDP occurs with a certain delay. The comparison between different model specifications confirmed that the interaction term between II and FI is not significant, while the only significant lagged variables are GDP for one single lag and II for the fourth one. We reached the same conclusions also by analyzing different RE model specifications. Table 3 reports the results of the FE and RE estimates of Equation (3) by considering only the significant lags. There are the estimates of the entity and time FEs regression, with clustered standard errors so that to take both autocorrelation and heteroskedasticity into account. The estimates of the RE model are reported with robust standard errors. Hausman test result indicates the FE model as the preferred one. This is not surprising. Indeed, with aggregate data, FE is usually more convincing than RE (Wooldridge 2013).

Regressions that contain institutional variables are often affected by the problem of endogeneity (Hassan et al. 2019). This is because institutions are by their nature endogenous (Acemoglu et al. 2005). As explained by Li et al. (2021, 339) “dynamic endogeneity arises when the current value of an independent variable is affected by past values of the dependent variable, violating the assumption of strict exogeneity in fixed effects estimators”. In this case, scholars rely on the least squares dummy variable (LSDV) bias-corrected estimator, differenced GMM, or system GMM estimators. In many contributions, FE models are compared to GMM estimators. However, the appropriateness of these alternative estimators depends on the magnitude of the bias, which is influenced by the size of cross-section (N) and time series (T). Since the “endogeneity bias” goes to zero as T becomes larger (Hayakawa 2015), GMM is preferable to LSDV only with a large N and short T (Perić 2019). According to Judson and Owen (1999, 13), “when $T = 30$, LSDV performs just as well or better than the viable alternatives”. As a consequence, the GMM model would not be suitable for our analysis as our data present $T > N$ with $T > 30$. However, since the issue of endogeneity and the cases in which the bias can be considered negligible are part of an ongoing debate, we preferred to compare our regression results with a GMM estimator, while keeping in mind the limitations due to a small N. As noted by Soto (2009), the GMM estimator has become very popular in empirical growth literature despite the typical number of cross-units in economic growth samples being small and the consequences for the properties of the system GMM estimator being quite unexplored. However, Soto's simulations seem to testify that “a small number of individuals—that is, the number of countries typically available in panel studies—does not seem to have important effects on the properties previously outlined about the system GMM estimator” and “other widely used estimators—the fixed effect and the difference GMM—are systematically outperformed by the system GMM estimator” (Soto 2009, 10).

Consequently, we decided to consider also GMM estimator. Since GMM estimator performs well with a large N and short T (Perić 2019), following some examples in the literature (e.g., Hassan et al. 2019), we reduced T by considering the mean

TABLE 3 | FE, RE, and GMM estimates.

	Fixed effects (FEs) model			Random effects (REs) model			System GMM		
	Coefficient	Clustered std. err.	<i>p</i>	Coefficient	Robust std. err.	<i>p</i>	Coefficient	Corrected std. err.	<i>p</i>
cons	0.006	(0.004)	0.165	0.005	(0.003)	0.099*	0.012	(0.010)	0.247
FI	0.020	(0.029)	0.496	0.007	(0.031)	0.819	−0.417	(0.220)	0.058*
II	0.771	(0.251)	0.005***	0.687	(0.247)	0.005***	0.388	(0.168)	0.021**
GHW	0.745	(0.041)	0.001***	0.711	(0.049)	0.001***	0.419	(0.115)	0.001***
EMP	0.866	(0.106)	0.001***	0.996	(0.079)	0.001***	0.359	(0.161)	0.025***
HC	−0.409	(0.608)	0.508	−0.177	(0.595)	0.766	0.238	(0.501)	0.635
GCF	−0.006	(0.018)	0.723	0.000	(0.025)	0.987	0.028	(0.038)	0.456
GC	−0.050	(0.061)	0.423	−0.052	(0.056)	0.350	−0.221	(0.050)	0.001***
GDP t-1	0.110	(0.058)	0.07*	0.107	(0.043)	0.013**	0.472	(0.105)	0.001***
II t-4	−0.508	(0.196)	0.016**	−0.441	(0.172)	0.01***	−0.067	(0.016)	0.001***
Hausman test: <i>p</i> -value 0.0056							AR1	0.013	
R ²			0.723	R ²			0.6332	AR2	0.298
F test			224,79	Wald test			2369,07	Wald test	7891,72
<i>p</i> -value			0	<i>p</i> -value			0	<i>p</i> -value	0

Note: The table reports FE, RE, and GMM estimates. The dependent variable is GDP. In the first column, all regressors are reported: FI (formal institutional index), II (informal institutional index), GHW (labor productivity), EMP (employment share), HC (human capital index), GCF (gross capital formation), GC (government consumption) and the first lag for GDP and the fourth lag for II. To highlight *p*-value significance levels, we used the following notation.

****p* < 0.01.

***p* < 0.05.

**p* < 0.1.

values every 5 years (so that $T=8$ and $T < N$). We preferred to estimate two-step system GMM (Blundell and Bond 1998) instead of difference GMM as it simultaneously estimates in differences and levels and it is considered more efficient (Jung et al. 2015; Hassan et al. 2019). Also in the case of the GMM estimator, the addition of an interaction term between II and FI turned out to be not significant and the only significant lags are the first one for GDP and the fourth one for II, thus confirming the validity of the model specification used for the FE and RE estimations. Results are reported Table 3. Sargan test confirms the robustness of the instrumental variables as exogenous variables, while Arellano–Bond test AR(2) exclude the presence of omitted variables.

All estimates (FE, RE, and GMM models) identify II as a significant determinant of GDP together with EMP, GHW (and GC in the GMM model). It is surprising how II remains significant in all estimates with a high value of the coefficient despite the presence of other important determinants of GDP (such as GHW and EMP), while HC and GCF are never significant. This result seems consistent with the intuition that institutions are a prerequisite for long-run development (Acemoglu et al. 2005). It is interesting to observe how different the impact of II and FI on GDP is. Indeed, only in the GMM model FI is weakly significant and shows a negative impact on GDP. This may be linked to the greater capacity of the GMM model to capture the endogeneity of the institutional impact, which in the case

of FI may occur in a latent and delayed way both with respect to the II and to the GDP, as already intuited from the results of Table 2 (in which FI has a significant influence on GDP and/or II in 54% of the countries). It is worth emphasizing the role of country institutional characteristics in determining the results of this analysis. Indeed, in our case, there is a clear and more immediate co-evolution between II and GDP, since most countries considered in the analysis already have a solid institutional framework (from a formal and informal point of view). Conversely, the role of FI remains more difficult to be grasped and tied to countries with poor economic performance (and controversial institutional developments). These factors could help explain the significant but negative impact of the fourth lag of the II obtained in all estimates and the lack of significance of the coevolution between II and FI when all countries are considered. These observations indicate the limits of the panel analysis (which necessarily draws conclusions for all the countries considered) and the need to deepen these results with more detailed investigations of the institutional trajectories at the level of country clusters.

4.3 | The Role of Institutional Trajectories and Coevolution

Our analysis has yet to clarify how robust institutional frameworks can be achieved both in terms of formal and informal institutions.

This requires analyzing not only institutional structures but also institutional processes. To do this, it is important to analyze the evolution of the trajectory of institutional development over time. In Figure 2, II and FI scores in 1980, 1989, 1999, 2009, and 2019 are reported. Points are connected by lines so that to obtain a trajectory for each member country. Colors identify the cluster to which each country belongs: Circles indicate the situation in 1980 and stars in 2019; asterisks are intermediate points. Figure 2 seems to indicate an institutional development path that initially favors the development of formal institutions as a prerequisite for the development of informal ones. This is actually what happened to many transition countries that have “reached” Cluster 3, while various countries in Cluster 3 seem to develop towards Clusters 1 and 2 (for a detailed analysis of the institutional trajectories of each country see in the Supporting Information Figure A). A virtuous circle between the development of FI and II seems to be triggered only starting from Cluster 3. Figure 2 shows how improvements in terms of FI and II tend to keep pace with one another, as the level of economic development of countries increases. In the case of countries in Clusters 1 and 2, the development of II tends to become more pronounced than that of FI.

To investigate whether a more balanced coevolution between formal and informal institutions could ensure better economic performance, we need to focus on those European countries that experienced an institutional transformation in the period 1980–2019 (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia). We identify for these countries the initial and final combinations of II and FI scores. In a bidimensional chart, these combinations represent two pairs of coordinates that can be connected with a straight line. We then calculate the angular coefficient of each straight line and transform it into a degree value. In Figure 3, 45° correspond to a slope equal to 1,

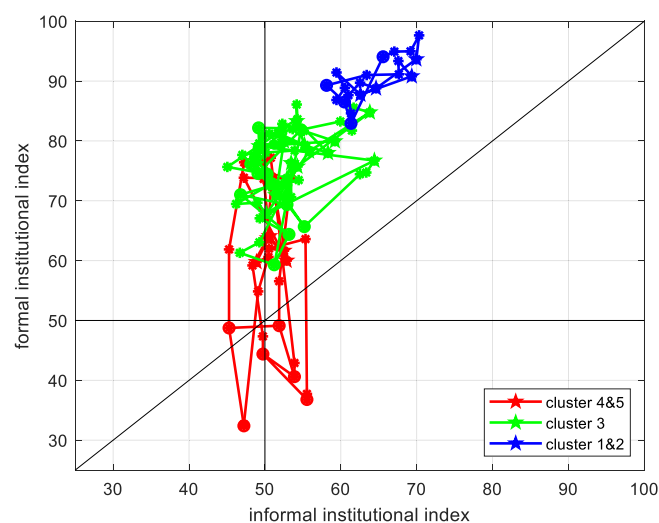


FIGURE 2 | Trajectories of institutional development for all clusters (1980, 1989, 1999, 2009, and 2019). In the figure, informal institutional index (II) and formal institutional index (FI) scores in 1980, 1989, 1999, 2009, and 2019 are reported. Points are connected by lines so that to obtain a trajectory for each country. Colors identify the cluster to which each country belongs. Circles indicate the situation in 1980 and stars in 2019. Asterisks are the intermediate points. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

and therefore, it is the case in which the effectiveness of formal and informal institutions coevolves at the same pace. For values above 45°, the effectiveness of formal institutions grows faster, while for values below 45°, the opposite occurs. Figure 3 shows the 11 coordinates corresponding to the European transition countries. It is possible to design a curve to fit the points through polynomial interpolation. The curve indicates that the maximum percentage change in terms of GDP per capita is associated to a degree value around 60, which corresponds to an institutional development slightly in favor of formal institutions (as it is to be expected in transition countries), but still rather balanced, considering that most countries have degree values greater than 80. Since the European transition countries are few, these findings should be welcomed as an interesting starting point coherent with many findings of literature.

The effectiveness of formal institutions can be influenced by their compatibility with informal institutions. It cannot be excluded that this compatibility materializes through a more balanced coevolution. This may be a relevant aspect for tailoring transition paths and seems coherent with Bolen and Williamson (2019) who suggest paying attention to how liberalization processes occur, in order to avoid institutional volatility and ensuring proper and stable institutional reform paths. As

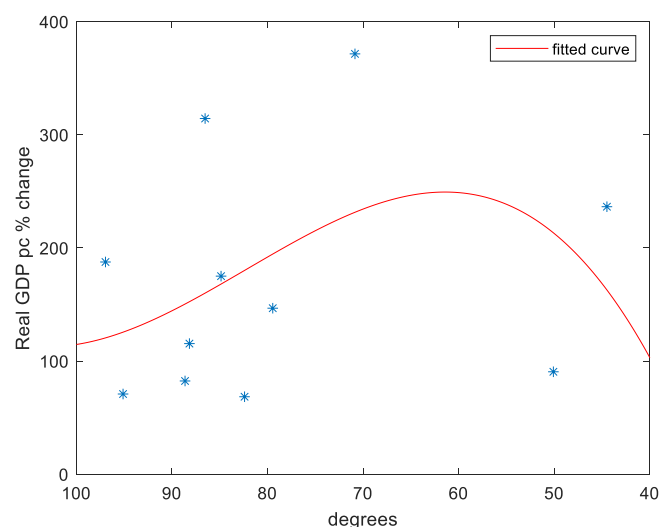


FIGURE 3 | Coevolution of FI, II and economic performance among European transition countries. In the figure, stars correspond to the European transition countries (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia). For each country, the initial and final combinations of informal institutional index (II) and formal institutional index (FI) scores represent two pairs of coordinates that can be connected with a straight line. We calculated the angular coefficient of each straight line and transformed it into a degree value. 45° correspond to a slope equal to 1, that is, the effectiveness of FI and II coevolves at the same pace. For values above 45°, the effectiveness of FI grows faster, while for values below 45°, the opposite occurs. The 11 coordinates corresponding to the European transition countries allow to design a curve to fit the stars through polynomial interpolation. The curve indicates that the maximum percentage change in terms of GDP per capita is associated to a degree value around 60, which corresponds to an institutional development slightly in favor of FI. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

claimed by Prijon (2012, 210) “the success of transition is strongly linked with country’s history and cultural bases; it depends on country’s openness to specific reforms and on the approach of transition (shock therapy or gradualism)”. Our data would indicate Slovenia, Estonia, and Poland as those transition countries that showed greater balanced co-evolution between formal and informal institutions with good economic performance. Several authors consider Estonia and Poland as successful transition stories (e.g., Panagiotou 2001 and Laar 2008 for Estonia; Belka 2001 and Jackson et al. 2003 for Poland). Also, Slovenia has been considered a successful transition (Mencinger 2001) even if the debate on this aspect is open (e.g., Prijon 2012). Open remains also the debate about which transition strategy (shock therapy or gradualism) guarantees the greatest probability of success in the transition process. Without going into the details of these debates, it is important to note that successful transition processes do not take place where the development of formal and informal institutions has not been enough harmonious, and the countries that today have the best economic performance show high values both in terms of formal and informal institutional indices.

5 | Conclusions

This article analyzed how the long-run coevolution of formal and informal institutions influenced the institutional effectiveness and the economic performance of 26 European member countries from 1980 to 2019. According to our results, although almost all member countries have achieved a solid formal institutional framework, the countries that have developed mostly their informal institutions are the ones that have most improved in terms of economic performance. The cluster analysis essentially identified three macro-groups: Eastern countries in transition which have developed mostly their formal institutions with moderate economic performance; a large group of Central-Eastern European and Mediterranean countries which started from fairly solid formal institutional frameworks and have developed their formal and informal institutions and reached good economic performance; and finally, a small group of Central-Nordic countries which have developed mostly their informal institutions on the basis of a solid institutional framework both from a formal and informal point of view.

The bootstrap Granger causality analysis shed light on the causal links between formal and informal institutions and economic performance. Informal institutions influence economic performance especially in contexts where formal institutions are quite robust, while the influence of economic performance on the effectiveness of informal institutions increases as economic and institutional development improve, with positive feedbacks between institution types. The panel data analysis identifies only informal institutions as true determinants of economic performance, beyond other typical economic growth determinants.

Which kind of co-evolution of formal and informal institutions allows for greater economic performance? An in-depth analysis of the formal and informal institutional development trajectories of transition countries suggests that more balanced institutional

development of formal and informal institutions is associated with better economic performance.

In the case of the EU, it therefore becomes essential not to underestimate the strong connection between informal institutions and economic performance and their co-evolution. Structural reforms, often aimed at formal institutions, are not sufficient to guide countries towards better and stable socio-economic development paths. The literature recognizes that informal institutions are sticky and subject to inertia, that changing them is quite difficult (Elert et al. 2017) and that attempts often lead to unforeseen and unwanted consequences. Informal institutions are rooted in the national and local cultures of countries, although initiatives fostering social practices that promote collective well-being can be effective in promoting the evolution of informal institutions, particularly through generational change (Jütting et al. 2007). Successful reform policies, rapid growth, and high social mobility may also affect informal institutions; the same may be true for rapid technological change and major international events. In this sense, informal institutions could be considered at least partially endogenous to the economy. However, informal institutional changes proceed generally very slowly (Williamson 2000), sometimes imperceptibly, and their comprehension is still weak. For these reasons, it is fair to treat informal institutions as exogenous, leaving the analysis of potential endogeneity in the context of the European integration process to further research. It is necessary an in-depth study about how the effectiveness of formal and informal institutions influence different economic areas and different markets. Some transition countries show that the development of formal political and juridical institutions risks being fruitless when a balanced endogenous project of socio-economic and cultural development is not properly implemented.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

- Acemoglu, D., S. Johnson, and J. A. Robinson. 2001. “The Colonial Origins of Comparative Development: An Empirical Investigation.” *American Economic Review* 91, no. 5: 1369–1401.
- Acemoglu, D., S. Johnson, and J. A. Robinson. 2005. “Institutions as a Fundamental Cause of Long-Run Growth.” In *Handbook of Economic Growth, Volume 1A. Chapter 6*, edited by P. Aghion and S. N. Durlauf, 386–414. Elsevier.
- Acemoglu, D., and J. A. Robinson. 2012. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. Crown Publishers.
- Alesina, A., and P. Giuliano. 2015. “Culture and Institutions.” *Journal of Economic Literature* 53, no. 4: 898–944.
- Alesina, A., P. Giuliano, and N. Nunn. 2013. “On the Origins of Gender Roles: Women and the Plough.” *Quarterly Journal of Economics* 128, no. 2: 469–530.
- Alesina, A., G. Tabellini, and F. Trebbi. 2017. “Is Europe an Optimal Political Area?”

- Alexeev, M., and A. Chernyavskiy. 2021. "The Impact of Institutional Quality on Manufacturing Sectors: A Panel Data Analysis." *Economic Systems* 45, no. 3: 100891 1–17.
- Amendolagine, V., and N. von Jacobi. 2023. "Symbiotic Relationships Among Formal and Informal Institutions: Comparing Five Brazilian Cultural Ecosystems." *Economic Systems* 47, no. 3: 101092.
- Andriani, L., and R. L. Bruno. 2022. "Introduction to the Special Issue on Institutions and Culture in Economic Contexts." *Journal of Institutional Economics* 18, no. 1: 1–14.
- Andriani, L., R. L. Bruno, E. Douarin, and P. Stepien-Baig. 2022. "Is Tax Morale Culturally Driven?" *Journal of Institutional Economics* 18, no. 1: 67–84.
- Aoki, M. 2001. *Toward a Comparative Institutional Analysis*. MIT press.
- Arbolino, R., and R. Boffardi. 2017. "The Impact of Institutional Quality and Efficient Cohesion Investments on Economic Growth Evidence From Italian Regions." *Sustainability* 9, no. 8: 1432 1–17.
- Aron, J. 2000. "Growth and Institutions: A Review of the Evidence." *World Bank Research Observer* 15, no. 1: 99–135.
- Batinti, A., L. Andriani, and A. Filippetti. 2019. "Local Government Fiscal Policy, Social Capital and Electoral Payoff: Evidence Across Italian Municipalities." *Kyklos* 72, no. 4: 503–526.
- Belka, M. 2001. "Lessons From Polish Transition." In *Poland Into the New Millennium*, edited by R. Rapacki and G. Blazyca, 13–32. Edward Elgar.
- Bentkowska, K. 2021. "Response to Governmental COVID-19 Restrictions: The Role of Informal Institutions." *Journal of Institutional Economics* 17, no. 5: 729–745.
- Bergh, A., and C. Bjørnskov. 2021. "Does Economic Freedom Boost Growth for Everyone?" *Kyklos* 74, no. 2: 170–186.
- Beugelsdijk, S., and C. Welzel. 2018. "Dimensions and Dynamics of National Culture: Synthesizing Hofstede With Inglehart." *Journal of Cross-Cultural Psychology* 49, no. 10: 1469–1505.
- Beyaert, A., J. García-Solanes, and L. Lopez-Gomez. 2019. "Do Institutions of the Euro Area Converge?" *Economic Systems* 43, no. 3–4: 100720.
- Blundell, R., and S. Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87, no. 1: 115–143.
- Boettke, P., C. Coyne, and P. Leeson. 2008. "Institutional Stickiness and the New Development Economics." *American Journal of Economics and Sociology* 67, no. 2: 331–358.
- Bolen, J. B., and C. R. Williamson. 2019. "The Path of Reform: The Consequences of Institutional Volatility." *Kyklos* 72, no. 3: 400–425.
- Boubtane, E., D. Coulibaly, and C. Rault. 2013. "Immigration, Unemployment and GDP in the Host Country: Bootstrap Panel Granger Causality Analysis on OECD Countries." *Economic Modelling* 33: 261–269.
- Breusch, T., and A. Pagan. 1980. "The LM Test and Its Applications to Model Specification in Econometrics." *Review of Economic Studies* 47: 239–254.
- Casagrande, S., and B. Dallago. 2021. "Benchmarking Institutional Variety in the Eurozone: An Empirical Investigation." *Economic Systems* 45, no. 1: 1–13 (100838).
- Chong, A., and C. Calderon. 2000. "Causality and Feedback Between Institutional Measures and Economic Growth." *Economics and Politics* 12, no. 1: 69–81.
- Cruz-García, P., and J. Peiró-Palomino. 2019. "Informal, Formal Institutions and Credit: Complements or Substitutes?" *Journal of Institutional Economics* 15, no. 4: 649–671.
- ECB. 2015. "Real Convergence in the Euro Area: Evidence, Theory and Policy Implications." *ECB Economic Bulletin*, no. 5: 30–45.
- Elert, N., M. Henrekson, and M. Stenkula. 2017. "Innovation and Entrepreneurship in the European Union - A Reform Agenda." In *Institutional Reform for Innovation and Entrepreneurship – An Agenda for Europe*, edited by N. Elert, M. Henrekson, and M. Stenkula, 25–86. Springer.
- Falk, A., A. Becker, T. Dohmen, B. Enke, D. Huffman, and U. Sunde. 2018. "Global Evidence on Economic Preferences." *Quarterly Journal of Economics* 133, no. 4: 1645–1692.
- Falk, A., A. Becker, T. J. Dohmen, D. Huffman, and U. Sunde. 2016. "The Preference Survey Module: A Validated Instrument for Measuring Risk, Time, and Social Preferences. IZA Discussion Paper No. 9674."
- Feenstra, R. C., R. Inklaar, and M. P. Timmer. 2015. "The Next Generation of the Penn World Table." *American Economic Review* 105, no. 10: 3150–3182.
- Fukuyama, F. 1996. *Trust: The Social Virtues and the Creation of Prosperity*. Simon & Schuster.
- Glaeser, E. L., R. La Porta, F. Lopez-De-Silanes, and A. Shleifer. 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth* 9: 271–303.
- Granger, J. 1969. "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods." *Acta Physica Polonica B* 37: 424–438.
- Greif, A. 1993. "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition." *American Economic Review* 83, no. 3: 525–548.
- Greif, A. 1994. "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies." *Journal of Political Economy* 102, no. 5: 912–950.
- Greif, A. 2012. *Institutions and the Path to the Modern Economy: Lessons From Medieval Trade*. Cambridge University Press.
- Greif, A., and C. Kingston. 2011. "Institutions: Rules or Equilibria?" In *Political Economy of Institutions, Democracy and Voting*, edited by N. Schofield and G. Caballero, 13–43. Springer-Verlag.
- Grogan, L., and L. Moers. 2001. "Growth Empirics With Institutional Measures for Transition Countries." *Economic Systems* 25, no. 4: 323–344.
- Haghnejad, A., S. Samadi, K. Nasrollahi, K. Azarbayjani, and I. Kazemi. 2020. "Market Power and Efficiency in the Iranian Banking Industry." *Emerging Markets Finance and Trade* 56, no. 13: 3217–3234.
- Hassan, A. S., D. F. Meyer, and S. Kot. 2019. "Effect of Institutional Quality and Wealth From Oil Revenue on Economic Growth in Oil-Exporting Developing Countries." *Sustainability* 11, no. 13: 3635 1–14.
- Hayakawa, K. 2015. "The Asymptotic Properties of the System GMM Estimator in Dynamic Panel Data Models When Both N and T Are Large." *Econometric Theory* 31, no. 3: 647–667.
- Helmke, G., and S. Levitsky. 2004. "Informal Institutions and Comparative Politics: A Research Agenda." *Perspectives on Politics* 2, no. 4: 725–740.
- Hodgson, G. M. 2006. "What Are Institutions?" *Journal of Economic Issues* 40, no. 1: 1–25.
- Hofstede, G. 1980. *Culture's Consequences: International Differences in Work-Related Values*. Sage Publications.
- Hofstede, G. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organisations Across Nations*. Sage Publications.
- Jackson, J. E., J. Klich, and K. Poznańska. 2003. "Economic Transition and Elections in Poland." *Economics of Transition (London, England)* 11, no. 1: 41–66.
- James, G., D. Witten, T. Hastie, and R. Tibshirani, eds. 2013. *An Introduction to Statistical Learning: With Applications in R*. Springer.

- Judson, R. A., and A. L. Owen. 1999. "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists." *Economics Letters* 65, no. 1: 9–15.
- Jung, H., H. U. Kwon, and G. Jeon. 2015. "An Alternative System GMM Estimation in Dynamic Panel Models." *Journal of Economic Theory and Econometrics* 26, no. 2: 57–78.
- Jütting, J., D. Drechsler, S. Bartsch, and I. de Soysa, eds. 2007. *Informal Institutions. How Social Norms Help or Hinder Development*. OECD Development Centre Studies.
- Kar, M., Ş. Nazlıoğlu, and H. Ağır. 2011. "Financial Development and Economic Growth Nexus in the MENA Countries: Bootstrap Panel Granger Causality Analysis." *Economic Modelling* 28, no. 1–2: 685–693.
- Keshavarzian, M., and Z. Tabatabaieinasab. 2021. "Application of Bootstrap Panel Granger Causality Test in Determining the Relationship Between Renewable and Non-Renewable Energy Consumption and Economic Growth: A Case Study of OPEC Countries." *Technology and Economics of Smart Grids and Sustainable Energy* 6, no. 10: 1–11.
- Knack, S., and P. Keefer. 1997. "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation." *Quarterly Journal of Economics* 112, no. 4: 1251–1288.
- Kónya, L. 2006. "Exports and Growth: Granger Causality Analysis on OECD Countries With a Panel Data Approach." *Economic Modelling* 23: 978–982.
- Laar, M. 2008. "Leading a Successful Transition: The Estonian Miracle." *European View* 7, no. 1: 67–74.
- Lauth, H.-J. 2015. "Formal and Informal Institutions." In *Routledge Handbook of Comparative Political Institutions*, edited by J. Gandhi and R. Ruiz-Rufino, 56–69. Routledge.
- Law, S. H., T. C. Lim, and N. W. Ismail. 2013. "Institutions and Economic Development: A Granger Causality Analysis of Panel Data Evidence." *Economic Systems* 37, no. 4: 610–624.
- Li, J., H. Ding, Y. Hu, and G. Wan. 2021. "Dealing With Dynamic Endogeneity in International Business Research." *Journal of International Business Studies* 52: 339–362.
- Makrychoriti, P., F. Pasiouras, and M. Tasiou. 2022. "Financial Stress and Economic Growth: The Moderating Role of Trust." *Kyklos* 75, no. 1: 48–74.
- Masuch, K., B. Anderton, R. Setzer, and N. Benalal. 2018. "Structural Policies in the Euro Area." European Central Bank. Occasional paper series, No.210.
- McCannon, B. C., C. T. Asaad, and M. Wilson. 2018. "Contracts and Trust: Complements or Substitutes?" *Journal of Institutional Economics* 14, no. 5: 811–832.
- Mencinger, J. 2001. "Why Is Transition in Slovenia Often Considered a Success Story." *Journal des Économistes et des Études Humaines* 11, no. 1: 1–16.
- Micallef, B. 2020. "Real Convergence in Malta and in the EU Countries After the Financial Crisis." *Journal of Economic Integration* 35, no. 2: 215–239.
- Mikic, M. 2009. "Asia Pacific Trade and Investment Report 2009: Trade-Led Recovery and Beyond. Technical Report, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)."
- Neyapti, B. 2013. "Modeling Institutional Evolution." *Economic Systems* 37, no. 1: 1–16.
- North, D. C. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.
- OECD, and JRC. 2008. *Handbook on Constructing Composite Indicators: Methodology and User Guide*. OECD.
- Ostrom, E. 2005. *Understanding Institutional Diversity*. Princeton University Press.
- Paldam, M., and E. Gundlach. 2008. "Two Views on Institutions and Development: The Grand Transition vs the Primacy of Institutions." *Kyklos* 61, no. 1: 65–100.
- Panagiotou, R. A. 2001. "Estonia's Success: Prescription or Legacy?" *Communist and Post-Communist Studies* 34, no. 2: 261–277.
- Perić, B. Š. 2019. "Do the Most Frequently Used Dynamic Panel Data Estimators Have the Best Performance in a Small Sample? A Monte Carlo Comparison." *Croatian Operational Research Review* 10, no. 1: 45–54.
- Platteau, J.-P. 2000. *Institutions, Social Norms, and Economic Development*. Harwood Academic Publishers.
- Prijon, L. 2012. "Successfulness of Slovenian Economic Transition?" *Slovak Journal of Political Sciences* 12, no. 3: 210–223.
- Putnam, R. D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press.
- Puzzello, L., and P. Gomis-Porqueras. 2018. "Winners and Losers From the Euro." *European Economic Review* 108: 129–152.
- Rahi, A. F., M. A. F. Chowdhury, J. Johansson, and M. Blomkvist. 2023. "Nexus Between Institutional Quality and Corporate Sustainable Performance: European Evidence." *Journal of Cleaner Production* 382: 135188 1–14.
- Rodrik, D. 2004. "Institutions and Economic Performance – Getting Institutions Right." *CESifo DICE Report* ISSN 1613-6373, ifo Institut für Wirtschaftsforschung an der Universität München, München 2, no. 2: 10–15.
- Roland, G. 2004. "Understanding Institutional Change: Fast-Moving and Slow-Moving Institutions." *Studies in Comparative International Development* 38, no. 4: 109–131.
- Röthel, T., and M. Leschke. 2025. "Unveiling the Mutual Dynamics: Institutions, Education and Economic Growth Over 138 Years in OECD Countries." *Kyklos* 78, no. 1: 243–270.
- Roupakias, S., and S. Dimou. 2021. "Immigration, Diversity and Institutions." *Kyklos* 74, no. 3: 396–416.
- Schönfelder, N., and H. Wagner. 2019. "Institutional Convergence in Europe." *Economics: The Open-Access, Open-Assessment E-Journal* 13, no. 3: 1–23.
- Scott, W. R. 2010. "Reflections: The Past and Future of Research on Institutions and Institutional Change." *Journal of Change Management* 10, no. 1: 5–21.
- Soto, M. 2009. "System GMM Estimation With a Small Sample." UFAE and IAE Working Papers 780.09, Unitat de Fonaments de L'anàlisi Econòmica (UAB) and Institut D'anàlisi Econòmica (CSIC).
- Tabellini, G. 2010. "Culture and Institutions: Economic Development in the Regions of Europe." *Journal of the European Economic Association* 8, no. 4: 677–716.
- Torgler, B. 2006. "The Importance of Faith: Tax Morale and Religiosity." *Journal of Economic Behavior & Organization* 61, no. 1: 81–109.
- Tran, N. T. M., M. P. Cameron, and J. Poot. 2021. "How Robust Is the Evidence on the Impact of Diasporas on Institutional Quality in Home Countries?" *Kyklos* 74, no. 1: 126–152.
- Voigt, S. 2013. "How (Not) to Measure Institutions." *Journal of Institutional Economics* 9, no. 1: 1–26.
- Voigt, S. 2018. "How to Measure Informal Institutions." *Journal of Institutional Economics* 14, no. 1: 1–22.
- WB. 2018. "Doing Business 2018: Distance to Frontier and Ease of Doing Business Ranking." Technical Report, World Bank Group Flagship Report.

Williamson, C. R. 2009. "Informal Institutions Rule: Institutional Arrangements and Economic Performance." *Public Choice* 139, no. 3: 371–387.

Williamson, C. R., and B. Kerekes. 2011. "Securing Private Property: Formal Versus Informal Institutions." *Journal of Law & Economics* 54, no. 3: 537–572.

Williamson, O. E. 2000. "The New Institutional Economics: Taking Stock, Looking Ahead." *Journal of Economic Literature* 38, no. 3: 595–613.

Wooldridge, J. M. 2013. *Introductory Econometrics: A Modern Approach*. Fifth ed. Cengage Learning.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table A:** Description of the indicators of the formal institutional index. **Table B:** Description of the indicators of the informal institution index. **Table C:** Member countries considered in the analysis with countries codes. **Table D:** Description of the other indicators used in the analysis. **Table E:** DTF scores for II and FI and real GDP pc values reported in Figure 1. **Table F:** Clusters and countries in 1980 and 2019. **Table G:** Average level of real GDP per capita at chained PPPs for each cluster in 1980 and 2019. **Table H:** Test statistics, Bootstrap critical values and p -value for each country: case II $\leftrightarrow$ GDP. **Table I:** Test statistics, Bootstrap critical values and p -value for each country: case FI $\leftrightarrow$ GDP. **Table J:** Test statistics, Bootstrap critical values and p -value for each country: case II $\leftrightarrow$ FI. **Table K:** Descriptive statistics—for each variable, 960 observations for 24 countries in 40 years. **Figure A:** Trajectories of institutional development (1980, 1989, 1999, 2009, 2019) in the clusters.