



Good governance and innovation: Economic freedom matters

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ABSTRACT

The contribution of good governance to development has been extensively examined; however, the effects of good governance on innovation, a critical factor for achieving sustainable development in the volatility, uncertainty, complexity and ambiguity environment, have received limited attention. This study examines the effects of good governance on innovation and its channel mechanisms. Thus, using a two-way fixed effects regression model, we analyse data from a sample of 112 economies worldwide over the period 2011–2021. We determine that good governance, measured using the worldwide governance indicators, has positive effects on innovation. Moreover, based on the shaping effect of good governance on the external environment, we identify that economic freedom serves as a channel mechanism through which good governance impacts innovation. Furthermore, we observe that compared with advanced economies, the positive effects of good governance on innovation are more significant in samples of emerging markets and developing economies. These findings underscore the mechanisms through which good governance impacts innovation, drawing attention to the shaping effect of good governance on the external environment and offering empirical evidence for economies to enhance economic freedom and promote innovation.

1. Introduction

‘Good governance is perhaps the single most important factor in eradicating poverty and promoting development’ (Annan, 1998, p. 13).

The outbreak of the oil crisis in the 1970s triggered public distrust in government organisational structures and the exercise of power. Influenced by the neoliberal wave, the monopolistic position of governments in providing public services was weakened. Governance theory gradually emerged against this backdrop. Before the 1980s, the term governance was used synonymously with government in activities related to the public affairs of a nation (Rhodes, 1996). However, after the end of the Cold War in the 1990s, communication and cooperation between governments strengthened. Thus, a portion of governmental power and functions were transferred, leading to a gradual separation between the concepts of governance and government. Specifically, governance is considered a system of rules that functions when there is widespread support; meanwhile, government operates even in the face of widespread opposition (Rosenau et al., 1992). With the development of governance theory, the notion of good governance has become a focus of

attention owing to its success in addressing the concern with regard to achieving cooperation between government and citizens in the management of public affairs (Weiss, 2000). As the former Secretary-General of the United Nations, Kofi Annan stated at the beginning of this study regarding the connection between good governance and development, the prevailing opinion holds that good governance significantly contributes to development (Thomas, 2010).

Currently, good governance is regarded as one of the pillars for achieving the Sustainable Development Goals (SDGs) and is particularly closely linked to Goal 16 (i.e. promote just, peaceful and inclusive societies; Massey, 2022; United Nations, 2019). Regardless of the economic, social or environmental perspective, good governance has become the cornerstone for realising relevant blueprints (Detotto et al., 2021). In the era of volatility, uncertainty, complexity and ambiguity (VUCA), productivity growth has slowed down across various economies globally. Innovation has the potential to become the key for economies to address the challenges of the VUCA environment and achieve sustainable development. Schumpeter's theory of innovation posits that innovation is a creative destruction process that arises from

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the recombination of factors of production (Robra et al., 2023). This creative destruction process exhibits a strong dependence on good governance. For example, some scholars have examined the impact of corruption control (an important aspect of good governance) on innovation and argue that effective corruption control is beneficial for fostering innovation (Dincer, 2019; Mungiu-Pippidi, 2015). ‘If you know how corrupt a country is, you can predict fairly accurately how much innovation you will see there’ (Mungiu-Pippidi, 2015, p. 295).

However, some research gaps remain in the existing literature concerning the effects of good governance on innovation. First, although some literature has explored the impact of factors such as corruption control and institutions on innovation, the effects of good governance on innovation necessitate empirical evidence on a wider range of dimensions. For example, in the academic community, a consensus is yet to be reached on the impact of democracy, an important component of good governance, on innovation. Second, good governance plays an important role in shaping the external environment (Doornbos, 2001). Considering the susceptibility of innovation to the external environment, existing studies have not yet revealed the transmission mechanisms through which good governance, by shaping the external environment, further impacts innovation. Third, existing studies have not yet investigated the effect of good governance on innovation using a worldwide sample. In this case, the effects of good governance on innovation may be heterogeneous across different types of economies, requiring further examination.

Therefore, to bridge the existing research gaps, this study constructs a research framework based on the logic of *good governance* → *shaping of the external environment* → *innovation* to analyse the effects of good governance on innovation and its channel mechanisms. Specifically, the shaping effect of good governance on the external environment is primarily manifested in its ability to promote the free flow of factors of production, ultimately enhancing the economic freedom of economies (Helmsing, 2001). For example, one of the most widely employed indicators to measure good governance is the worldwide governance indicators (WGI) published by the World Bank. The sub-indicators included in the WGI measure an economy’s capacity for institutional quality, democracy, political stability and corruption control, among others. The performance of economies measured by these indicators in terms of good governance establishes institutions that guarantee the free flow of factors of production and reduces government intervention in the market. Therefore, we believe that good governance in an economy shapes an environment of economic freedom. Considering that innovation is a process of recombining factors of production, the high degree of freedom in the flow of factors of production owing to economic freedom will inevitably affect innovation. Based on the aforementioned discussion, we first explore the effects of good governance on innovation using the WGI and the Global Innovation Index (GII) released by the World Intellectual Property Organization (WIPO). We select 112 economies worldwide as our research sample from 2011 to 2021. Subsequently, we use the Economic Freedom of the World (EFW) index published by the Fraser Institute to investigate whether economic freedom is a channel mechanism through which good governance influences innovation. Furthermore, we investigate the heterogeneous effects of good governance on innovation in advanced economies and emerging markets and developing economies.

By addressing the research gaps in existing literature, our study makes three contributions to the knowledge discussion on good governance and innovation. First, our study underscores the significant contribution of good governance to innovation based on granular multidimensional indicators, contributing to guiding economies in improving their governance systems and practices. We observe that the Voice and Accountability component, covered by the WGI, does not affect innovation, thus supporting scepticism towards the Popper hypothesis. Second, considering the role of good governance in shaping the external environment, our study opens the black box of the mechanism through which good governance influences innovation. We believe that

good governance enhances economic freedom, which further positively impacts innovation. This finding will stimulate further attention to the shaping effect of good governance on the external environment. Third, the heterogeneous effects of good governance on innovation examined in this study can draw attention to good governance in emerging markets and developing economies, offering insights and policy recommendations for fostering and supporting innovation in these economies.

The remainder of this study is organised as follows. Section 2 presents the literature review and hypotheses development. Section 3 describes the data and methodology. Section 4 presents the results and discussions, and Section 5 presents the conclusions.

2. Literature review and hypotheses development

2.1. Good governance, innovation and economic freedom

‘The rise of governance is partly due to secular shifts in political economy that have made heterarchy more significant than markets or hierarchies for economic, political, and social coordination’ (Jessop, 1998, p7). Unlike the concept of government, governance is a rule system that can only function effectively when supported by the majority (Rosenau et al., 1992). While governance theory addresses various problems that exist in traditional government management, it also inherently possesses certain limitations. For example, the effectiveness of governance relies on a certain level of state authority as a guarantee; otherwise, it may lead to the failure of the governance mode (Börzel and Risse, 2010). Therefore, how to address the limitations of governance theory has become a topic of concern among scholars. In this context, good governance has become the focus of scholars’ attention due to its successful response to avoiding the failure of governance mode by achieving cooperation between government and citizens in public affairs management (Mechkova et al., 2024; Weiss, 2000). As research on good governance deepens, increased consensus is observable regarding its positive role in sustainable development.

The 43rd session of the United Nations Human Rights Council examined the positive impacts of good governance on SDGs, particularly the close link between good governance and Goal 16 (i.e. promote just and peaceful and inclusive societies) of the SDGs (United Nations, 2019). The WGI published by the World Bank is a comprehensive index that measures the governance quality of an economy. Furthermore, it encompasses six components, namely, Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption. These components provide a holistic depiction of the good governance of an economy (Alsaleh et al., 2021; Koçak and Özer, 2021; Thomas, 2010).

Existing literature suggests that the good governance measured by the WGI is greatly significant for achieving sustainable development. Therefore, we analyse the consequences of good governance from three dimensions, namely, economic, social and environmental. In the dimension of economic consequences of good governance, the institutional quality and political environment reflected in good governance can influence the total private investment, bilateral trade and other international activities of the economy through signalling effects and protectionism (Berden et al., 2014; Morrissey and Udomkerdmongkol, 2012). Corruption and bureaucracy hinder innovation activities in an economy, while rule of law and high-quality public services are conducive to innovation activities (Sivak et al., 2011; Wen et al., 2023; Ngobo and Fouda, 2012). The social consequences of good governance are primarily reflected in areas such as international aid and donations, serving as a reference for decision-making by countries and donor organisations (Dietrich, 2013; Thomas, 2010). Specifically, the governance status and global rankings reflected by the WGI can serve as a basis for offering assistance and donations to countries and regions with good governance (De la Croix and Delavallade, 2014; Winters and Martinez, 2015). In the environmental consequences of good

governance, existing studies suggest that good governance indicates an increase in the costs of environmental degradation through the provision of public services, regulatory mechanisms and corruption control (Alsaleh et al., 2021; Hao, 2023; Hashmi et al., 2023), thereby ensuring the effective implementation of emission reduction policies, regulations and other environmental safeguards. Nevertheless, Kakar et al. (2023) held the opposite view, suggesting that although improving WGI is an important means to achieve economic growth, such growth accompanied by increased consumption of fossil fuels indicates that enhancing WGI may lead to environmental degradation.

A consensus exists regarding the perspective that good governance contributes to sustainable development (Maekawa, 2024). In the VUCA era, the SDGs face challenges across economies worldwide. Innovation, as an important means for economies in the VUCA era to address environmental uncertainty and achieve sustainability, is closely associated with good governance, that is, most economies with high levels of innovation tend to possess high-quality governance characteristics, including democracy, government stability and the rule of law (Lee et al., 2020). Therefore, some literature investigates the effects of important components of good governance, such as corruption control, on innovation. For example, Dincer (2019) examined the impact of corruption on innovation activities using annual data from 48 states in the United States between 1977 and 2006, suggesting that corruption slows down innovation activities in the long run. Furthermore, Mungiu-Pippidi's (2015) study supports this viewpoint, indicating that corruption leads to a biased allocation of public resources, thus negatively impacting innovation. Moreover, Ibanez et al. (2023) explored the relationship between various dimensions of good governance and innovation using samples from European Union member states, determining positive effects of good governance, measured by the WGI, on innovation. Table 1 presents some literature discussing the effects of good governance on innovation.

Although existing literature has begun to focus on the relationship between good governance and innovation, the channel mechanisms through which good governance impacts innovation still require further exploration. Specifically, WGI's six components, including Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption, can shape an environment conducive to higher economic freedom, thereby affecting innovation (Carlos Díaz-Casero et al., 2012). Economic freedom refers to the extent to which an economy relies on market forces rather than political action to allocate resources and includes two core elements, namely, (i) free trade and free competition among market participants and (ii) the free flow of factors of production such as labour and capital (Coyle et al., 2016; Tag and Degirmen, 2022). The higher the degree of economic freedom is, the lower the degree of government intervention in the economic activities of market participants will be, resulting in a more stable market and a greater likelihood for market entities to operate efficiently based on their own volition (Blau, 2017; Liu and Feng, 2022). Therefore, an environment of economic freedom shaped by good governance facilitates efficient mobility and effective allocation of production factors. In this scenario, environment of economic freedom shaped by good governance influences innovation activities that result from the recombination of production factors.

Based on the above discussion, existing literature on the effects of good governance on innovation still presents some research gaps. First, although some studies have explored the impacts of factors including control of corruption and democracy on innovation, the effects of good governance, as measured using the WGI, on innovation must be thoroughly examined. For example, there is no consensus on the effects of the democracy covered by the WGI on innovation, highlighting the necessity for increased empirical evidence. Second, most current studies interpret the consequences of good governance across economic, social and environmental dimensions; nevertheless, the attention paid to the channel mechanisms through which good governance impacts

Table 1
Some studies on the effects of good governance on innovation.

Exemplary references	Research sample	Focus on good governance	The relationship between good governance and innovation
Blind (2012)	21 OECD countries	<ul style="list-style-type: none"> Regulatory framework comprising various laws and regulations 	<ul style="list-style-type: none"> Different types of regulations generate various impacts on the innovation performance of economies
Mungiu-Pippidi (2015)	Member state of the European Union (EU)	<ul style="list-style-type: none"> The corruption control component in WGI 	<ul style="list-style-type: none"> In the EU, private sector's innovation capacity is positively correlated with corruption control
Gao et al. (2017)	156 countries worldwide	<ul style="list-style-type: none"> Democracy as measured by the binary index and the polity rights index 	<ul style="list-style-type: none"> The effects of democracy on innovation are not statistically significant
Dincer (2019)	48 contiguous U.S. states	<ul style="list-style-type: none"> Corruption as measured by the number of corruption convictions and corruption stories 	<ul style="list-style-type: none"> The co-integrating relationship between corruption and innovative activity was examined, and the results suggest that corruption slows down innovation
Wang et al. (2021)	132 countries worldwide	<ul style="list-style-type: none"> Democracy measured in terms of sixfold regime classification of political regime 	<ul style="list-style-type: none"> Democracy exerts a significant influence on innovation The influence of democracy on innovation is affected by economic development level, economic performance, globalisation and international trade
Ibanez et al. (2023)	25 European countries	<ul style="list-style-type: none"> The Voice and Accountability component in WGI The Political Stability component in WGI The Government Effectiveness component in WGI The Regulatory Quality component in WGI 	<ul style="list-style-type: none"> For EU countries, a positive correlation exists between good governance and innovation GDP per capita positively mediates between good governance and innovation

innovation is insufficient. Considering the role of good governance in shaping the external environment of economic freedom and the vulnerability of innovation to this environment, the mechanisms through which good governance further impacts innovation must be urgently uncovered by shaping economic freedom. Third, existing studies have not yet investigated the effects of good governance on innovation using a worldwide sample, and the heterogeneous effects of good governance on innovation in different types of economies require further exploration. Thus, we construct the research framework based on the logic of *good governance* → *economic freedom* → *innovation*. Using a worldwide sample, we aim to provide a more nuanced understanding of the channel mechanisms through which good governance affects innovation and further examine the heterogeneous effects of good governance on innovation.

2.2. Relationship between good governance and innovation

Good governance implies that the wealth and efforts of individuals in the economy are encouraged, which reduces the costs and risks

associated with the implementation of innovative activities by innovative actors and optimises the efficiency of the supply and allocation of resources, ultimately stimulating innovation in the economy. Considering that the WGI encompasses six components, we analyse each of these components to explore their effects on innovation, thus providing support for the ideas presented in this study.

The high performance of the Voice and Accountability component suggests a higher level of democracy in an economy. Therefore, based on the Popper hypothesis, we believe that the Voice and Accountability component is beneficial for innovation (Popper, 2005, 2012; Wang et al., 2021). First, when an economy demonstrates high performance in the Voice and Accountability component, it indicates a political environment that tends to uphold private property rights and offer protection of property rights. In such a scenario, innovative actors perceive lower transaction costs and higher benefits from engaging in innovation activities, thereby enhancing their intention to innovate. Second, the high performance of the Voice and Accountability component forms a free and open environment, allowing innovative actors to perceive greater freedom and encouragement for innovation. Thus, the free flow of factors of production within the market will be advantageous for enhancing the innovation capacity of the economy. This perspective reveals that for economies with high levels of Voice and Accountability, the encouragement and protection of freedom and property rights reflected by this component within the WGI framework contribute to better performance in innovation.

The performance of the Political Stability and Absence of Violence/Terrorism component reflects the stability of a government in an economy. Specifically, it is considered a measure of country risk, where low performance in this component indicates limited government commitment to specific policies and a tendency towards random policy fluctuations. This increased uncertainty in the business environment for innovative actors can result in inadequate domestic investment. Moreover, a low performance on the Political Stability and Absence of Violence/Terrorism component can cause several challenges, including heightened financing constraints for innovative activities, increased uncertainty regarding outcomes, increased risks of benefit appropriation and amplified spillover risks. Thus, such challenges can significantly discourage innovation (Waguespack et al., 2005; Wu et al., 2022). By contrast, when an economy achieves high performance in the Political Stability and Absence of Violence/Terrorism component, the long-term policy commitments of the government enhance the sustainable development prospects for innovative actors. Moreover, the improved market environment can offer valuable resource support for innovation activities. Therefore, high performance in the Political Stability and Absence of Violence/Terrorism component is advantageous for fostering innovation within the economy.

The Government Effectiveness component, reflecting the quality of government, public officials and public services in an economy, can optimise the external environment faced by innovative actors when implementing innovation activities, thus fostering innovation (Jiao et al., 2015; Wen et al., 2021). First, high-performance Government Effectiveness tends to support innovation as a value-creating activity for achieving sustainable development. Meanwhile, inefficient governments tend to engage in short-term opportunistic behaviours or prioritise maintaining monopolistic benefits to sustain their operations, which is detrimental to the development of innovation. Second, as the performance of an economy regarding Government Effectiveness improves, along with the government's enhanced capabilities in policy formulation, implementation and commitment, the associated risks of uncertainty decrease while the predictability of benefits for innovative actors engaging in innovation activities increases. Third, the inclusion of effective public services within the Government Effectiveness component can reduce non-productive costs associated with the implementation of innovation activities by innovative actors, thereby reducing the basis for R&D expenditure and promoting innovation activities in the economy.

When an economy achieves high performance in the Regulatory Quality component, its government strives to establish and enforce fair and reasonable regulatory frameworks, preventing issues such as unfair competition and monopolies, fostering a healthy and conducive market environment and enhancing the intention of innovative actors to create value. Furthermore, the favourable competitive atmosphere created by such regulatory quality further encourages the economy to develop a propensity for enhancing its competitiveness through innovation. For example, Kwon and Marco (2021) identified that 'antitrust regulation of patent consolidation is anticipated to positively affect competitors' follow-on innovation' (p. 1), using the four major software companies in the United States as their case study.

The Rule of Law component is a comprehensive reflection of intellectual property protection, fairness in judicial procedures and safeguarding of private property within a country or region, and its ability to stimulate innovation is evident. When high performance is achieved on the Rule of Law component, an economy shows a high level of protection for the generation of innovative ideas, process and final benefits, which reduces the risk costs and benefit expectations of innovation and therefore stimulates innovation. Moreover, abundant evidence supports the notion that the Rule of Law component can impact innovation. For example, Woo et al. (2015) asserted that moderate intellectual property protection promotes innovation by preventing benefit appropriation and facilitating knowledge spillovers to the public.

The impacts of corruption on innovation have been widely explored. Therefore, based on the expropriation and rent-seeking mechanisms, we believe that achieving high performance on the Control of Corruption component is beneficial for innovation (Ellis et al., 2019; Huang and Yuan, 2020; Murphy et al., 1993). Specifically, when the level of corruption is high in an economy, public officials tend to engage in rent-seeking from innovative actors to satisfy their personal interests. Thus, the high-risk and long-term nature of innovation activities provides increased opportunities for public officials to engage in rent-seeking and extortion. First, corrupt officials may extort innovative actors during the pre-approval and examination processes of innovation, increasing the upfront costs for these actors. Second, corrupt officials may seize their innovation rents, leading to the encroachment of innovation value and increase of post-innovation risks for innovative actors; evidently, corruption impedes innovation. Thus, the Control of Corruption component within the WGI framework can optimise the innovation environment of an economy (Anokhin and Schulze, 2009), thereby enhancing its innovation capacity and intention. By reducing non-productive expenditures and the risks associated with the leakage of innovation income, the Control of Corruption component facilitates an environment conducive to innovation.

In conclusion, each of the six components of the WGI can shape a favourable external environment for innovation within an economy, thereby offering incentives for innovation. Accordingly, we propose the following hypotheses.

H1. : Good governance positively influences innovation.

H2. : Each component of good governance contributes positively to innovation.

2.3. Channel mechanism of economic freedom

Previous research has argued that higher levels of economic freedom, as an open, fair and free market environment, can undeniably serve as a crucial factor in supporting market entities to engage in value-creating activities such as innovation (Carlos Díaz-Casero et al., 2012; Hall and Sobel, 2008; Liu and Feng, 2022). Therefore, given that good governance optimises the market environment of economic freedom and thereby influences innovation, we believe that economic freedom can serve as a channel mechanism for the relationship between good governance and innovation.

First, good governance is a continuous commitment to economic

freedom, as it can ultimately optimise the EFW of an economy by shaping its market environment (Carlos Díaz-Casero et al., 2012; Wang et al., 2021). Specifically, (i) the components of Voice and Accountability and Political Stability and Absence of Violence/Terrorism in the WGI suggest that when an economy has a higher level of good governance, it possesses characteristics of democracy and stability, resulting in lower government intervention in market activities and favouring market stability. (ii) The components of Government Effectiveness and Rule of Law in the WGI imply that when an economy achieves high performance in good governance, its judicial services become increasingly robust, institutions adhere to social norms to a large extent and public officials follow social and legal norms more closely. This contributes to the enhancement of judicial independence and regulatory efforts, thereby facilitating the free flow of factors of production within the market. (iii) Finally, the components of Regulatory Quality and Control of Corruption in the WGI indicate that when an economy achieves high performance in good governance, it exhibits strong support for the private sector, demonstrates better anti-monopoly measures and reduces the likelihood of public officials engaging in private property appropriation, facilitating the realisation of trade freedom and monetary freedom. Therefore, markets with high levels of EFW can be shaped by good governance.

Moreover, economic freedom is a necessary guarantee for enhancing the innovation intention and capability of innovative actors within an economy. Regarding innovation intention, a favourable economic competition environment, on the one hand, reduces government intervention and market barriers, leading to increased active competition within the market. On the other hand, it decreases the likelihood of the 'bad money drives out good' law by Gresham (Chown, 1994). In such circumstances, innovative actors are more interested in enhancing their competitiveness through innovation to escape competition rather than engaging in activities without value (Bennett, 2021). Therefore, the higher the EFW of an economy is, the stronger the intention to engage in innovative activities will be (Lehmann and Seitz, 2017; Schumpeter, 1942). In terms of innovation capability, a favourable competition environment can attract more investments to an economy. Furthermore, economic freedom can promote the flow of factors of production within the market, thereby enhancing resource allocation efficiency (Sufian and Habibullah, 2011). This finding implies that economic freedom can enhance an economy's capacity concerning resources and ultimately incentivise innovation.

Therefore, we believe that economic freedom can serve as a channel mechanism through which good governance influences innovation, bridging the promoting role of good governance on innovation. When an economy achieves good governance, with its democratic and stable government, high-quality and rule-based political environment, as well as protection of the private sector, it can promote the freedom of that economy, thus forming an environment conducive to innovation. This favourable external environment of economic freedom further influences the free flow and efficient allocation of human capital and knowledge and funds within the market, as well as the inclination of economic entities towards innovation costs, expected returns and competitiveness building, enhancing the innovation intention and capability of the economy, thereby stimulating innovation. Accordingly, we present Hypothesis 3.

H3. : Good governance influences innovation by shaping an environment of economic freedom.

3. Data and methodology

3.1. Sample and data

This study aims to empirically analyse the effects of good governance on innovation and further examine the channel role of economic freedom. The data on good governance are derived from the World

Bank's WGI project. Furthermore, the data on innovation are sourced from the GII report published by WIPO. The commonly used data on economic freedom primarily include the EFW index published by the Fraser Institute and the Heritage Foundation, which effectively reflect the economic freedom of an economy. However, the EFW index of the Fraser Institute, when compared to that of the Heritage Foundation, has been more widely employed in academia recently (Angulo-Guerrero et al., 2017). Therefore, in line with this trend, this study employs the EFW index published by the Fraser Institute. The selection of the study period and sample depends on data availability. Since the GII index changed its scoring method in 2011 (i.e. it was on a 10-point scale until 2011 and changed to a 100-point scale thereafter), the study period is determined as 2011–2021 by matching the data from WGI, GII and EFW. After excluding countries and regions with missing data, a balanced panel dataset comprising 112 economies and 1232 observations is obtained.

3.2. Measurements

3.2.1. Dependent variable

The GII, as published by WIPO, uses a multi-layered analytical framework based on the input–output model to fit a range of multidimensional indicators related to innovation. The GII serves as a measurement of the innovation level of economies and holds significant influence as a reference for various countries and regions in formulating economic plans and innovation policies. Despite the various versions of the GII report, the majority of the indicators used are objective (i.e. quantitative or hard) indicators. From 2011 to 2021, the average number of objective indicators per year was 58, accounting for 71.6 % of the total number of indicators, which to some extent ensures the objectivity of the measurement results. Furthermore, there were 22.2 % composite indicators and 6.2 % survey (qualitative) indicators, enhancing the comprehensiveness and systematic nature of the measurement (Alsaleh et al., 2021). In this study, GII is used as the dependent variable, denoted as *gii*.

3.2.2. Independent variables

The WGI, as presented in the WGI project report by the World Bank, provides data support for measuring and comparing good governance in economies by integrating heterogeneous data from multiple sources, which has been widely used by scholars for empirical research (Thomas, 2010). This study employs the WGI as the independent variable, denoted as *gov*. Furthermore, we incorporate the six components into the empirical analysis, namely, (i) Voice and Accountability (denoted as *gov_1*), (ii) Political Stability and Absence of Violence/Terrorism (denoted as *gov_2*), (iii) Government Effectiveness (denoted as *gov_3*), (iv) Regulatory Quality (denoted as *gov_4*), (v) Rule of Law (denoted as *gov_5*) and (vi) Control of Corruption (denoted as *gov_6*). The connotations of each component are as follows:

- The Voice and Accountability component measures the extent of citizens' participation in government elections, as well as the level of freedom of expression, association, and media.
- The Political Stability and Absence of Violence/Terrorism measures the degree of political instability, politically-motivated violence, and terrorism.
- The Government Effectiveness component measures the quality of government public services, the ability to formulate and implement policies, and the credibility of policy commitments.
- The Regulatory Quality component measures the ability of the government to formulate and implement policies and regulations that permit and promote private sector development.
- The Rule of Law component captures the extent of confidence and adherence of agents to social rules, including property rights protection, judiciary, and crime and violence.

- The Control of Corruption component measures the extent to which public power is exercised for personal gain, including various forms of corruption.

3.2.3. Mechanism variable

This study follows previous research and adopts the EFW published by the Fraser Institute, denoted as *efw*, to measure economic freedom. Moreover, the EFW effectively quantifies the extent to which an economy relies on market mechanisms rather than political actions for resource allocation (Angulo-Guerrero et al., 2017).

3.2.4. Control variables

Building upon previous research on innovation at the national and regional levels (Dincer, 2019; Gao et al., 2017), we control for some variables that may potentially impact innovation, covering the level of economic development, industrial structure, urbanisation level, degree of openness and foreign direct investment (FDI) level. Specifically, the level of economic development is represented by GDP per capita (*pergdp*), and the industrial structure (*indu*) is measured using the proportion of industrial value added to GDP. Furthermore, the urbanisation level (*city*) is measured using the proportion of urban population, and degree of openness (*open*) is represented by the proportion of trade volume to GDP. Finally, the FDI level (*fdi*) is measured using the proportion of net inflows of FDI to GDP.

Table 2 provides the types, symbols, descriptive statistics and sources for each of the variables in this study.

3.3. Model

To explore the effects of good governance on innovation, we construct a two-way fixed effects model as shown in Eq. (1):

$$efw_{i,t} = \beta_0 + \beta_1 gov_{i,t} + \beta Controls_{i,t} + Econ_i + Year_t + \varepsilon_{i,t}, \quad (1)$$

where $gii_{i,t}$ denotes the level of innovation of economics *i* in year *t*. $X_{i,t}$ represents the level of good governance of economics *i* in year *t*, including *gov*, *gov_1*, *gov_2*, *gov_3*, *gov_4*, *gov_5* and *gov_6*. $Controls_{i,t}$ represents the control variables, and $\varepsilon_{i,t}$ is the error term. Moreover, we control for the unit (*Econ*) and year (*Year*) fixed effects. Eq. (1) is used to test Hypotheses 1 and 2.

Furthermore, to validate the role of economic freedom as a channel mechanism through which good governance affects innovation, this study constructs Eq. (2) to examine the effects of independent variables on mechanism variables. Under the assumption that Hypothesis 1 is verified and good governance positively influences economic freedom as well as based on existing discussions on the relationship between economic freedom and innovation (Lehmann and Seitz, 2017; Sufian and Habibullah, 2011), then it can be verified that economic freedom plays a channel role, thereby validating Hypothesis 3 (Dell, 2010; Zhang, 2020).

Table 2
Definition of variables and descriptive statistics.

Type	Variable	Mean	Standard deviation	Min.	Max.	Sources
Dependent variable	<i>gii</i>	38.08	11.72	13.60	68.40	WIPO
Independent variables	<i>gov</i>	0.199	0.857	-2.015	1.867	WGI
	<i>gov_1</i>	0.144	0.921	-1.907	1.752	WGI
	<i>gov_2</i>	-0.0367	0.901	-3.006	1.639	WGI
	<i>gov_3</i>	0.317	0.899	-2.349	2.325	WGI
	<i>gov_4</i>	0.363	0.873	-2.008	2.255	WGI
	<i>gov_5</i>	0.233	0.945	-1.799	2.125	WGI
	<i>gov_6</i>	0.177	1.014	-1.698	2.399	WGI
Mechanism variable	<i>efw</i>	7.120	0.803	4.053	9.059	Fraser Institute
Control variables	<i>pergdp</i>	17.71	20.93	0.432	108.4	World Bank
	<i>indu</i>	27.18	9.767	2.759	74.81	World Bank
	<i>city</i>	64.61	21.02	16.21	100	World Bank
	<i>open</i>	89.74	59.96	-16.62	442.6	World Bank
	<i>fdi</i>	4.707	16.83	-117.4	279.3	World Bank

$$efw_{i,t} = \beta_0 + \beta_1 gov_{i,t} + \beta Controls_{i,t} + Econ_i + Year_t + \varepsilon_{i,t} \quad (2)$$

where $efw_{i,t}$ represents economic freedom of economics *i* in year *t*. The symbols for the other variables are the same as in Eq. (1). When β_1 significantly positive, it indicates that good governance has a positive effect on economic freedom.

4. Results and discussions

4.1. Preliminary results

4.1.1. Effects of good governance on innovation

First, we examined Hypothesis 1, suggesting that good governance promotes innovation. Table 3 presents the regression results on the effects of good governance on innovation. In Column (1), where only fixed effects are controlled, the coefficient of *gov* is significantly positive at the $p < 0.01$ level, indicating a positive association between higher levels of good governance in an economy and higher levels of innovation. To further validate this finding, we employed a stepwise regression approach and introduced control variables in Columns (2)–(6). The results consistently demonstrate that the coefficient of *gov* remains significantly positive at the 1% level. In economic terms, based on the results from Column (6), a one-unit increase in good governance corresponds to a 2.1738 increase in innovation levels for an economy, representing an approximate 5.7% improvement compared to the average innovation level of 38.08 during the study period. These findings indicate a positive effect of good governance on innovation, thus confirming Hypothesis 1.

Second, we further examined the effects of the six components of good governance on innovation, and Table 4 presents the results. In Column (1) of Table 4, the coefficient of *gov_1* (Voice and Accountability) is not significantly negative, indicating that this component has no direct positive effect on innovation. Although this finding does not support the Popper hypothesis, it aligns with the research conclusion of Gao et al. (2017), suggesting that the impact of democracy on innovation is not statistically significant globally. One possible reason is that democracy requires a considerable amount of time to reform institutions and drive innovation. In Columns (2)–(6) of Table 4, the estimated coefficients for *gov_2* (Political Stability and Absence of Violence/Terrorism), *gov_3* (Government Effectiveness), *gov_4* (Regulatory Quality), *gov_5* (Rule of Law) and *gov_6* (Control of Corruption) are 0.5793 ($p < 0.05$), 1.0712 ($p < 0.01$), 1.4255 ($p < 0.01$), 1.4224 ($p < 0.01$) and 1.1619 ($p < 0.01$), respectively. These empirical results largely validate our previous analysis and provide further support for Hypothesis 2.

4.1.2. Robustness checks

To ensure the reliability of the results obtained from the baseline regression, we conducted robustness checks using the following three

Table 3
Baseline regression results.

	Dependent variable: <i>gii</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>gov</i>	2.2516*** (3.584)	2.1252*** (3.426)	1.9599*** (3.180)	1.9633*** (3.184)	2.1114*** (3.453)	2.1738*** (3.528)
<i>pergdp</i>		0.1740*** (5.597)	0.1267*** (3.881)	0.1279*** (3.888)	0.1099*** (3.350)	0.1085*** (3.305)
<i>indu</i>			0.0872*** (4.409)	0.0872*** (4.407)	0.0737*** (3.726)	0.0738*** (3.731)
<i>city</i>				0.0185 (0.309)	0.0404 (0.679)	0.0434 (0.730)
<i>open</i>					0.0279*** (4.817)	0.0274*** (4.710)
<i>fdi</i>						-0.0032 (-0.829)
Constant	37.6315*** (276.166)	34.5749*** (61.472)	33.0762*** (50.633)	31.8597*** (7.976)	28.5997*** (7.127)	28.4675*** (7.088)
Observations	1232	1232	1232	1232	1232	1232
R ²	0.977	0.978	0.978	0.978	0.978	0.978
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

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

Table 4
Effects of the six components of good governance on innovation.

	Dependent variable: <i>gii</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>gov_1</i>	-0.3135 (-0.674)					
<i>gov_2</i>		0.5793** (2.128)				
<i>gov_3</i>			1.0712*** (2.901)			
<i>gov_4</i>				1.4255*** (3.306)		
<i>gov_5</i>					1.4224*** (2.888)	
<i>gov_6</i>						1.1619*** (2.743)
<i>pergdp</i>	0.1110*** (3.364)	0.1089*** (3.303)	0.1111*** (3.377)	0.1055*** (3.207)	0.1150*** (3.493)	0.1083*** (3.291)
<i>indu</i>	0.0783*** (3.944)	0.0768*** (3.872)	0.0728*** (3.662)	0.0758*** (3.834)	0.0755*** (3.814)	0.0771*** (3.896)
<i>city</i>	0.0366 (0.611)	0.0383 (0.641)	0.0311 (0.521)	0.0697 (1.155)	0.0329 (0.552)	0.0361 (0.605)
<i>open</i>	0.0268*** (4.581)	0.0280*** (4.771)	0.0264*** (4.538)	0.0257*** (4.415)	0.0273*** (4.685)	0.0274*** (4.697)
<i>fdi</i>	-0.0015 (-0.394)	-0.0018 (-0.467)	-0.0027 (-0.691)	-0.0023 (-0.603)	-0.0031 (-0.799)	-0.0031 (-0.811)
Constant	29.2693*** (7.253)	29.1091*** (7.231)	29.4290*** (7.322)	26.8320*** (6.583)	29.0949*** (7.240)	29.0834*** (7.234)
R ²	0.978	0.978	0.978	0.978	0.978	0.978
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

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

approaches.

(1) *Adjusting the investigation period.* The GII report uses data from multiple heterogeneous sources to measure the innovation levels of economies. Since the GII reports before 2010 presented GII scores on a scale of 10, the study period chosen for this paper is from 2011 to 2021. The GII report continuously optimises and adjusts the indicators it covers to adapt to ongoing social development. After 2013, the measurement framework of the GII report has largely taken shape (Lanvin et al., 2013). Therefore, we adjusted the study period to 2013–2021 and re-examined the regression. Columns (1) and (2) of Table 5 presents the results. After adjusting the study period, the coefficient of *gov* remains significantly positive, which is consistent with the previous findings.

(2) *Mitigating endogeneity.* Using ordinary least squares to examine

the effects of good governance on innovation may encounter endogeneity concerns. First, the good governance of an economy can affect innovation, while innovation itself may also have a reverse effect. For example, the development of information and communication technologies generated through innovation activities can facilitate good governance by enhancing digitalisation, implying a potential reciprocal causality between good governance and innovation. Second, we cannot disregard the existence of omitted variable issues, whereby other factors affecting innovation may be correlated with good governance. Third, the measurement of good governance and innovation levels in an economy is a complex systemic endeavour, and both the dependent and independent variables employed in this study possess a certain degree of measurement error. Consequently, when examining the impact of good

Table 5
Results of robustness checks.

	Dependent variable: <i>gii</i>			
	(1)	(2)	(3)	(4)
<i>gov</i>	1.4513** (2.015)	1.5290** (2.135)	3.6234*** (3.243)	3.6163*** (4.590)
<i>L.gii</i>				0.7353*** (14.172)
<i>pergdp</i>		0.1032*** (2.770)	-0.0580 (-1.075)	0.0245 (0.765)
<i>indu</i>		0.0469** (1.994)	0.1178*** (3.999)	0.0086 (0.302)
<i>city</i>		0.1083 (1.425)	-0.5743*** (-7.717)	-0.0193 (-0.878)
<i>open</i>		0.0189*** (2.727)	0.0308*** (3.623)	-0.0054 (-0.663)
<i>fdi</i>		-0.0037 (-0.938)	0.0012 (0.317)	-0.0011 (-0.181)
Constant	37.7068*** (243.711)	25.8828*** (5.065)		10.4024*** (4.125)
Observations	1008	1008	1120	1120
R ²	0.982	0.983	0.204	-
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Cragg–Donald Wald F statistic			1428.316	
Kleibergen–Paap rk Wald F statistic			762.489	
AR(1)				-6.7163 (0.000)
AR(2)				0.7743 (0.439)
Sargan test				93.4704 (0.1272)

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

governance on innovation worldwide, challenges associated with endogeneity arise. Drawing on previous research, to address the impact of endogeneity, we used the lagged one-period *gii* as an instrumental variable and conducted regression analysis using two-stage least squares. The results, as shown in Column (3) of Table 5, reveal that the coefficient of *gov* remains significantly positive at the 1 % level when employing instrumental variable regression, indicating that the improvement of good governance can effectively promote innovation. In the test for weak instrument identification, the Cragg–Donald Wald F statistic is 1428.316, and the Kleibergen–Paap rk Wald F statistic is 762.489, both exceeding the critical values at the 10 % significance level for weak instrument problems, suggesting that no weak instrumental variable problem exists.

(3) *Conducting dynamic panel regression analysis.* The lagged one-period dependent variable, *gii*, was incorporated into the model, and the system Gaussian mixture model (GMM) was employed for estimation. This study performed an over-identification test (Sargan test) on the system GMM to examine the validity of instrumental variable settings, as shown in Column (4) of Table 5. The coefficient of *gov* was significantly positive at the 1 % level. The Sargan test assumes that all instrumental variables are valid, and the resulting *p*-value (0.1272) is >0.1 , indicating acceptance of the null hypothesis at a 10 % significance level, which in turn suggests the effectiveness of the instrumental variables. Moreover, the presence of disturbance autocorrelation was examined using the Arellano–Bond test to assess the model specification. The *p*-value for the AR (1) test is <0.05 , while the *p*-value for the AR (2) test is >0.1 , implying the absence of disturbance autocorrelation.

4.2. Mechanisms: economic freedom

The empirical findings from the previous section have revealed that good governance promotes innovation. In this subsection, we will further analyse the potential mechanisms through which good governance affects innovation. In this study, the theoretical logic of

Hypothesis 3 is that good governance shapes the external environment of economic freedom, thereby influencing innovation. As discussed in Section 2, from the perspectives of innovation intention and innovation capability enhancement, economic freedom reduces government intervention and market barriers while decreasing the likelihood of the ‘bad money drives out good’ law, thereby increasing the innovation intention of innovation agents. Furthermore, economic freedom facilitates the free flow of factors of production, enhances resource allocation efficiency and thus improves the innovation capability of innovation agents. Therefore, economic freedom is beneficial for innovation. To validate Hypothesis 3, additional evidence is required to show that good governance can promote economic freedom. Therefore, we investigate the effects of good governance and its various components on economic freedom. Table 6 presents the results of our investigation, using Eq. (2). Column (1) in Table 6 displays the significant positive impact of good governance on economic freedom. A one-unit increase in good governance leads to a 0.8163 increase in economic freedom. Columns (2)–(7) in Table 6 reveal that each component of good governance significantly promotes economic freedom at the 1 % level. The aforementioned regression results indicate a significant positive effect of good governance on economic freedom, indicating that higher levels of good governance are associated with greater economic freedom. Therefore, Hypothesis 3 is verified.

4.3. Heterogeneity analysis

As mentioned in the previous section, economic freedom is the channel mechanism through which good governance affects innovation. Emerging markets and developing economies face more challenges in terms of good governance when compared to advanced economies. Characteristics such as imperfect market mechanisms, weak law enforcement and inadequate protection of intellectual property rights are often observed in emerging markets and developing economies. Consequently, greater room for improvement exists in enhancing good governance and shaping the external environment of economic freedom in these emerging markets and developing economies. Once the level of good governance in emerging markets and developing economies improves, the impacts on shaping economic freedom will become increasingly apparent, thereby enhancing the willingness and ability of innovative actors to innovate. If the conclusion that good governance impacts innovation through shaping the external environment of economic freedom holds true, then the positive effects of governance on innovation should be more significant in emerging markets and developing economies than in advanced economies.

Therefore, based on the classification of economies by the International Monetary Fund, we divided the sample into two groups, namely, advanced economies and emerging markets as well as developing economies and conducted group tests. The results are shown in Columns (1)–(2) of Table 7. The results indicate significant differences in the estimated values of the *gov* coefficient between the two groups, suggesting that the positive effects of good governance on innovation are more significant in samples of emerging markets and developing economies compared with advanced economies. Thus, the results of heterogeneity analysis are consistent with our expectations, offering additional support from another perspective that economic freedom serves as the channel mechanism through which good governance impacts innovation.

5. Conclusions

Existing studies have extensively discussed the contribution of good governance to sustainable development (Massey, 2022). The achievement of SDGs primarily depends on good governance. Innovation, as a crucial pathway to achieve sustainable development, can effectively mitigate the adverse consequences of the VUCA environment. While existing studies have investigated the impacts of corruption control (an

Table 6
Effects of good governance on economic freedom.

	Dependent variable: <i>efw</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>gov</i>	0.8163*** (14.478)						
<i>gov_1</i>		0.2210*** (4.834)					
<i>gov_2</i>			0.1359*** (5.077)				
<i>gov_3</i>				0.4388*** (12.778)			
<i>gov_4</i>					0.5102*** (12.698)		
<i>gov_5</i>						0.5470*** (11.831)	
<i>gov_6</i>							0.3186*** (7.752)
<i>pergdp</i>	-0.0039 (-1.304)	-0.0027 (-0.842)	-0.0035 (-1.065)	-0.0030 (-0.974)	-0.0049 (-1.614)	-0.0015 (-0.477)	-0.0037 (-1.157)
<i>indu</i>	0.0071*** (3.937)	0.0089*** (4.587)	0.0085*** (4.343)	0.0065*** (3.539)	0.0079*** (4.298)	0.0077*** (4.166)	0.0085*** (4.424)
<i>city</i>	0.0105* (1.921)	0.0088 (1.495)	0.0084 (1.431)	0.0056 (1.011)	0.0198*** (3.515)	0.0065 (1.159)	0.0079 (1.356)
<i>open</i>	-0.0008 (-1.561)	-0.0012** (-2.165)	-0.0008 (-1.381)	-0.0012** (-2.218)	-0.0014*** (-2.669)	-0.0009 (-1.567)	-0.0009 (-1.608)
<i>fdi</i>	-0.0006* (-1.723)	0.0000 (0.013)	-0.0000 (-0.119)	-0.0004 (-1.246)	-0.0003 (-0.736)	-0.0006 (-1.605)	-0.0004 (-1.133)
<i>Constant</i>	6.2334*** (16.958)	6.4363*** (16.232)	6.4841*** (16.379)	6.6030*** (17.662)	5.6605*** (14.901)	6.4682*** (17.145)	6.4743*** (16.601)
Observations	1232	1232	1232	1232	1232	1232	1232
<i>R</i> ²	0.961	0.955	0.955	0.960	0.960	0.959	0.956
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES

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

Table 7
Results of the regression of subgroups.

	(1) Emerging markets and developing economies	(2) Advanced economies
<i>gov</i>	2.5127*** (3.717)	0.1890 (0.147)
<i>pergdp</i>	0.5737*** (8.214)	-0.1596*** (-3.854)
<i>indu</i>	0.0240 (1.162)	0.2065*** (2.870)
<i>city</i>	0.1198* (1.781)	0.2074 (1.182)
<i>open</i>	0.0342*** (4.567)	0.0015 (0.178)
<i>fdi</i>	-0.0073 (-0.602)	-0.0038 (-1.058)
<i>Constant</i>	17.8431*** (4.458)	37.5729*** (2.746)
Observations	847	385
<i>R</i> ²	0.9312	0.9611
Country FE	YES	YES
Year FE	YES	YES

important aspect of good governance) on innovation, a dearth of systematic examination of the effects of good governance on innovation remains. Therefore, based on the shaping effect of good governance on the external environment, we examine the effects of good governance on innovation and its channel mechanisms. Using a sample of 112 economies worldwide from 2011 to 2021, we find an overall positive effect of good governance on innovation. Regarding the various components of good governance, the results indicate that the Voice and Accountability component covered by the WGI does not have a significant effect on innovation, thus questioning the Popper hypothesis. However, the other five components, namely, Political Stability and Absence of Violence/

Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption, demonstrate a significant positive impact on innovation. Furthermore, this study’s findings suggest that economic freedom serves as a channel mechanism through which good governance influences innovation. We consider that the possible reason for this is that good governance can shape an environment of economic freedom with high fluidity of factors of production. Since innovation is a process of recombining factors of production that heavily rely on the external environment, a market environment characterised by economic freedom promotes innovation. Therefore, good governance can influence innovation by shaping the external environment of economic freedom.

5.1. Theoretical implications

The theoretical implications of this study are primarily reflected in the following four aspects. First, this study enriches the literature on good governance and innovation, offering empirical evidence from economies worldwide. Good governance and innovation are crucial in today’s VUCA environment. This study employs comprehensive indicators to examine the positive impacts of good governance on innovation, contributing to economies in addressing challenges in the VUCA environment by enhancing innovation levels. Second, this study adds to the existing literature by emphasising that economic freedom serves as a channel mechanism through which good governance impacts innovation. Moreover, it enhances the understanding of how good governance impacts innovation, thereby contributing to raising awareness of the environmental shaping effects of good governance on economies. Third, we observe that the Voice and Accountability component, covered by the WGI, does not affect innovation, thus supporting scepticism towards the Popper hypothesis. Fourth, this study holds significant reference value for enhancing good governance in emerging markets and developing economies. We determine that the positive effects of good governance on innovation are more significant in samples of emerging

markets and developing economies compared with advanced economies. Therefore, this finding provides new ideas and directions for enhancing the innovation capabilities of emerging markets and developing economies.

5.2. Practical implications

The empirical findings of this study may provide policy implications from four perspectives. First, all economies are recommended to establish modern governance systems, including enhancing the democratisation of administrative decision-making, improving the quality of regulation, refining laws and regulations, combating corruption, strengthening political stability and enhancing government efficiency. Furthermore, continuous improvement in good governance will increase the confidence of organisations and individuals to engage in innovation, attract more innovative investments and thereby enhance the level of innovation in the economy. Second, each economy should have a profound understanding of the array of potential impacts brought about by good governance and comprehend its role in shaping the external environment through systemic thinking. Therefore, economies should formulate relevant strategies, fully leveraging the shaping effects of good governance on the economy and society to bring about positive impacts. Third, economic freedom is an essential prerequisite for promoting the efficient allocation of factors of production and ensuring the sustained occurrence of innovation. Moreover, it advocated that economies moderately reduce government intervention in the market and continuously strengthen the dominant role of the market in resource allocation, thereby enhancing resource allocation efficiency and achieving the development of innovation through a high level of economic freedom. Fourth, economies should make sustained efforts in advancing the process of democratisation, promoting citizen participation and deepening political reforms, thereby achieving the significant positive impact of democracy on innovation.

5.3. Limitations and future research

Our analysis includes two limitations that need further investigation. First, as an exploration of the impact of good governance on innovation channel mechanisms, this study selects only economic freedom for analysis based on the logic of the shaping effect of good governance on the external environment. However, more market factors can be considered to examine the aforementioned relationship. In future studies, the mechanisms through which good governance impacts innovation must be further explored. Second, the research sample used in this study includes 112 economies, and the analysis of heterogeneity among economies under different institutions exceeds the scope of this study. Future work could be developed around this topic.

Ethics approval statement

This article does not contain any studies with human participants or animals performed by any of the authors.

CRediT authorship contribution statement

Baoying Zhu: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Mingyan Yang:** Conceptualization, Investigation, Methodology, Writing – original draft. **Xu Chu:** Investigation, Methodology, Writing – original draft.

Declaration of competing interest

The authors have no conflicts of interest to declare.

Data availability

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

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