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ORIGINAL ARTICLE

Organizational slack and innovativeness: the moderating role of institutional transition in the Asian financial crisis

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Abstract

Research has suggested that organizational slack can positively or negatively affect the innovativeness of a firm; however, the point at which such slack has a more salient impact remains unclear. This study adds to the literature by highlighting how the effects of organizational slack may differ depending on institutional environments, a market-oriented or a government-driven institutional environment. We posit an inverted U-shaped relationship between organizational slack and innovati`veness. We further hypothesize that institutional environments moderate this relationship. We find broad support for these arguments in a comprehensive data set representing South Korean manufacturing firms from 1992 to 2009.

Keywords Organizational slack · Innovativeness · Institutional change

Introduction

Scholars in innovation and strategic management have been interested in organizational slack and its impact on innovativeness (Cheng and Kesner 1997; Singh 1986; Tan and Peng 2003), but they have provided no compelling theoretical or empirical results (Bradley et al. 2011a, b, c; Natividad 2013). The lack of results is evident in three perspectives found in the literature on the relationship between organizational slack and innovativeness. Organizational slack is a "pool of resources in an organization that is in excess of the minimum necessary to produce a given level of organizational output" (Nohria and Gulati 1996, p. 1246) and "potentially utilizable resources that can be diverted and redeployed for the achievement of organizational

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goals" (George 2005, p. 661). Based on this definition, some scholars have argued that organizational slack encourages a firm's innovativeness (Bourgeois III 1981; Cyert and March 1963; Kim et al. 2008; Penrose 1959). Others have suggested that organizational slack, which is a free resource pool, may render firms inert and reduce risk-taking activities, whereas lack of resources induces firms to engage in more innovative activities to achieve efficiency (Baker and Nelson 2005). Given these two opposing influences of organizational slack on innovativeness, Kim et al. (2008) have identified an inverted U-shaped relationship between organizational slack and innovativeness, suggesting that intermediate levels of organizational slack have an optimal effect on innovativeness, whereas lower or higher levels of organizational slack might reduce optimal levels of innovativeness. To date, these perspectives on the relationship between organizational slack and innovativeness have not been reconciled in the literature.

Not surprisingly, the relationship between organizational slack and innovativeness has been a topic of considerable inquiry in the field of strategic management (i.e. Kim et al. 2008; Tan and Peng 2003; Voss et al. 2008), but the issue has been discussed and empirically tested in the context of individual developed countries or developing economies. Several aspects of the interplay among organizational slack, innovativeness, and environments remain under examined (Gavetti et al. 2012). Little conceptual and empirical research has been devoted to the effect of organizational slack on innovativeness in the markets that have been experiencing significant institutional change because of national policies. In response, we extend the existing research by focusing on the institution-based view to understand the moderating effect of institutional transition on the relationship between organizational slack and innovativeness. Because institutional transition is defined as "fundamental and comprehensive changes introduced to the formal and informal rules of the game that affect organizations as players" (Peng 2003, p. 275), a change in the institutional environment over time should affect the nature of firms' strategic behavior, influencing firms' innovativeness regarding their slack resources (Bradley et al. 2011b; George 2005; Peng et al. 2008; Vanacker et al. 2017; Yuan et al. 2016). Therefore, in this study, we ask the following question: How do different institutional environments affect on the relationship between organizational slack and innovativeness?

To precisely examine the effects of the interaction between organizational slack and institutional environments, we used the ideal data set of South Korean manufacturing firms from 1992 to 2009. This setting is attractive because South Korea underwent a national discontinuous institutional transition in the wake of the 1997 Asian financial crisis (Jun et al. 2010) and "the case of South Korea is of particular interest, in that it grew so fast and so effectively up to 1997, and then fell so heavily" (Mathews 1998, p. 2). Specifically, in South Korea, when the 1997 Asian financial crisis damaged the country's economy, the International Monetary Fund (IMF) initiated strict conditions that forced a traditional government-driven economic institution to change, in a short period of time, to a more market-oriented economic institution. The IMF required the South Korean government to undertake a number of actions that had to be accompanied by institutional transitions (Chang et al. 2007; Yoo and Rhee 2013). Faced with this pressure, the South Korean government had to implement a rapid and comprehensive institutional shift toward a market-oriented

institutional environment (Henisz et al. 2005). Increasing South Korean firms' accountability and transparency was the primary purpose of these actions. Additionally, the South Korean government revised its financial accounting standards to align with international accounting standards and reinforced governmental supervision of external auditing. Therefore, the South Korean context offers an opportunity to enhance our understanding of a national discontinuous institutional change on firms' organizational slack and innovativeness.

The remainder of the paper is organized as follows. First, we draw on the literature concerning an inverted U-shaped relationship between organizational slack and innovativeness. Next, we examine the impact of two different institutional environments on the inverted U-shaped relationship. Using panel data of 7778 South Korean firms during from 1992 to 2009, we test hypotheses and present empirical results. The last section summarizes our key contributions and provides implications for future research.

Theory and hypotheses

Organizational slack and innovativeness

In general, abundant resources provide firms with opportunities to innovate and respond more effectively to environmental changes. Excess resources may lead firms to increase autonomy and explore new opportunities without strict resource limitations, thereby undertaking more innovative activities. Organizational slack is a good example of excess resources because it refers to resources available to an organization (Kraatz and Zajac 2001) that exceed what it needs to main a given level of organizational output (Nohria and Gulati 1996). Organizational slack provides firms with the autonomy and resources necessary to explore new opportunities, thereby facilitating their risk-taking behaviors, such as investments in innovativeness.

Firms' innovative activities often force them to explore uncertainties that may or may not lead to an immediate payoff. For example, Samsung invests at least 9% of its sales revenue in annual research and development (R&D) activities to commercialize products scheduled to hit the market within 2 or more years. Only firms with considerable organizational slack can engage in uncertain, multiyear projects with considerable opportunity costs and uncertain outcomes (March 1991). Thus, because organizational slack provides a safety net that enables firms to pursue new projects with long investment horizons and less certain outcomes (Kim et al. 2008), firms with organizational slack are more likely to engage in innovative activities such as R&D investments (Cyert and March 1963). Similarly, proponents of the resource-based view have argued that organizational slack enables firms to engage in innovative activities because organizational slack buffers and counters risks and helps to enhance firms' ability to find new opportunities (Voss et al. 2008). Sufficient organizational slack can insulate firms against cash flow volatility, thereby allowing them to continue exploring various opportunities for innovativeness (Kim et al. 2008; O'Brien 2003).

However, organizational slack has also been found to have a negative effect on innovativeness. Baker and Nelson (2005) suggested that firms with organizational slack could be unwilling to explore opportunities and renew existing capabilities because the organizational slack renders firms inert. Following this line of thinking, Kraatz and Zajac (2001) argued that firms with too much organizational slack are "less likely to experience a sense of urgency regarding adaptation and more likely to perceive an increased (perhaps false) sense of certainty about the future" (p. 634). Organizational slack allows firms to sustain current operations rather than exploit excess resources and safety nets for adapting to competitive pressure or market dynamism (Bourgeois III 1981; Kim et al. 2008). In other words, organizations with few resources tend to allocate them more efficiently and effectively regarding innovative activities (Baker and Nelson 2005; George 2005; Kim et al. 2008). Firms with excess resources may therefore suffer from dampening opportunities for risk-taking activities such as innovation.

Additionally, one might argue that from an agency perspective, transferring organizational slack into innovativeness results in a conflict in the relationship between the principal and the agent because the agent may use organizational slack for less risky projects, such as unrelated diversification, rather than for innovation and experimentation (Denis et al. 1997; Jensen 1986). Because principals do not always monitor agents, agents may not always use organizational slack in ways that serve the firm's best interests. Instead, they may use organizational slack to maximize their own personal interests (Jensen 1986). Moreover, in the presence of excess resources, firms may become overly optimistic and feel less forced to invest in innovation (Cheng and Kesner 1997; Kim et al. 2008). According to this logic, organizational slack could have a negative effect on innovativeness.

Organizational slack, then, may both facilitate and reduce firms' innovative activities. Clearly, from the perspective of efficient innovation, both arguments ("more organizational slack leads to more innovativeness" and "less organizational slack leads to more innovativeness") need qualification by further study. The approach to reconciling these opposing views is a curvilinear or inverted U-shaped relationship between organizational slack and innovativeness: both too much and too little organizational slack may restrain firms' innovative activities (Kim et al. 2008; Nohria and Gulati 1996). Therefore, one might argue that organizational slack initially encourages firms' innovativeness, but beyond a certain point, organizational slack discourages it. Thus, we hypothesize the following:

Hypothesis 1 The relationship between organizational slack and innovativeness is an inverted U-shape; both too much and too little organizational slack negatively affects innovativeness, and a moderate level of slack has a positive effect on innovativeness.

The moderating effect of institutional transition

According to Vanacker et al. (2017), who noted that the economic, legal, and political institutions influence how managers make decisions regarding the deployment and use of resources, considering the effects of institutional environments should

be an important topic of research on organizational slack and innovativeness. Institutional environments significantly influence on firms' resource values and business rules in the markets in which the firms operate (Guler and Guillén 2010; Peng et al. 2008). Specifically, the development of formal or informal institutional environments determines the extent to which firms must allocate their resources (North 1990).

Even though numerous studies have addressed institutional conditions, they have produced little insight into how firms respond to institutional change with regard to innovativeness (Greenwood and Hinings 1996; Hoffman 1999; Newman 2000). Because innovative strategies are related to the long-term investment of financial resources, the relationship between firms' resources and innovativeness would be affected by transitions in institutional environments over time. Scholars have provided the rationale for the effect of institutional transition on firms' utilization of their resources to make innovative decisions (e.g., R&D investment decisions) such as suggesting that a market evolution based on institutional transition increases opportunities for firms to assign their resources to innovativeness. Therefore, institutional environments, especially institutional transitions, affect the extent to which a firm utilizes its organizational slack for innovativeness.

To examine the moderating effect of institutional environments, we used the sample of South Korean manufacturing firms during the period 1992–2009 because the literature has considered the Asian financial crisis to be a critical inflection point in institutional development (Choi et al. 2014; Kim et al. 2010). Before the Asian financial crisis, because of poorly functioning external capital markets in South Korea, firms had difficulty in using their financial resources for innovative purposes (Laeven 2003). Some non-market institutional factors in business environments that played a role in these difficulties were heavy government involvement and inconsistencies and tensions between a traditional government-driven and a new market-oriented institutional environment (Choi et al. 2014; Kim et al. 2010). Conversely, after the Asian financial crisis, the market-oriented institutional environment had immense potential to reduce the role of politics in the economy, and the South Korean government's efforts and IMF's pressure to restructure institutions were designed to improve firms' discretionary opportunities to use their own resources for innovativeness (Park and Kim 2008). Consequently, the market-oriented institutional environment that followed the Asian financial crisis allowed firms to exercise more managerial discretion and autonomy because of market liberalization. Firms attempted innovative strategies to design new institutional environments with their organizational slack, which may be deemed "a discretionary amount of liquid monetary resources" (Natividad 2013, p. 847). Under the changed institution that resulted from the newly introduced policies, firms could no longer expect myriad government privileges; instead, they were forced to align with free-market mechanisms governed by international standards.

The dramatic institutional changes in business environments, particularly financial market liberalization, induced South Korean firms to change their strategies, including their orientation to innovation, to survive in changed institutional environments (Greenwood and Hinings 1996; Hoffman 1999; Newman 2000; Yoo and Rhee 2013). The improved market-oriented institutional

environment could clearly contribute to a reduction in market uncertainty when firms invested their financial resources in innovativeness. Because the market-oriented mechanism may increase the use of excess resources for innovativeness, the positive impact of organizational slack on innovativeness is greater in a market-oriented institutional environment than in a government-driven institutional environment. In addition, because the market-oriented institutional environment pushes firms to increase transparency and encourages the monitoring of managers, the negative effects of organizational slack on innovativeness that result from agency problems decreased during the period following the Asian financial crisis. The market-oriented institutional environment after the Asian financial crisis likely included greater portions of organizational slack for firms' innovativeness, leading us to hypothesize the following:

Hypothesis 2 A market-oriented institutional environment will positively moderate the relationship between organizational slack and innovativeness such that the positive side of the inverted U-shape will become stronger and the negative side weaker during a market-oriented institutional environment rather than during a government-oriented institutional environment.

Method

Sample

The purpose of this study is to examine how firms' organizational slack for innovativeness is affected by the different institutional environments, such as government-driven and market-oriented institutional environment. To do so, we collected comprehensive data of South Korean manufacturing firms from Korea Investors Service (KIS) database, the equivalent of Standard & Poor's or Moody's in the United States (Chang and Rhee 2011; Chang and Hong 2000; Kim et al. 2010) The data for this study consists of 7778 manufacturing firms which operated sometimes in 1992–2009 periods in South Korea. We strengthen our design by using all companies listed on the South Korea stock exchange and on unlisted companies with asset worth more than 6 billion *won* within the manufacturing industry, thereby eliminating potential selection concern. The unlisted companies are viewed as "statutory audited companies" in South Korea. Using two-digit South Korean Standard Industrial Classification (KSIC) codes, we identified multiple industries from high-tech (i.e. manufacture of electronics or medical) to low-tech (i.e. manufacture of food products or wood and paper products). Table 1 describes the distribution of industry in the sample.

Our data structure are unbalanced panel data because there is no requirement that the firm-year observations data be all available for each firms during the entire periods from the KIS database.

Table 1 Industry distributions in the samples

Industry	Freq.	Percent
10. Manufacture of food products	3099	5.00
11. Beverages	440	0.71
12. Tobacco products	43	0.07
13. Textiles, except apparel	1672	2.70
14. Wearing apparel, clothing accessories and fur articles	1728	2.79
15. Tanning and dressing of leather, luggage and footwear	504	0.81
16. Wood and of products of woods and cork: Except furniture	371	0.60
17. Pulp, paper and products	1564	2.52
18. Printing and reproduction of recorded media	566	0.91
19. Cork, hard-coal and lignite fuel briquettes and refined petroleum products	404	0.65
20. Chemicals and chemical products except pharmaceuticals and medical chemicals	5299	8.55
21. Pharmaceuticals, medicals and botanical products	2245	3.62
22. Rubber and plastic products	3590	5.79
23. Other non-metallic mineral products	2954	4.75
24. Basic metal products	4557	7.35
25. Fabricated metal products, except machinery and furniture	3746	6.04
26. Electronic components, computer, radio, television and communication equipment and apparatuses	5705	9.20
27. Medical, precision and optical instruments, watches and clocks	2081	3.36
28. Electrical equipment	3706	5.98
29. Other machinery and equipment	8917	14.38
30. Motor vehicles, trailers and semitrailers	6363	10.26
31. Other transport equipment	1364	2.20
32. Furniture	500	0.81
33. Other manufacturing	603	0.97
Total	62,012	100

Measures

Dependent variable

Innovativeness

We measured innovativeness by R&D intensity of the firm as the percentage of R&D expenditures over asset. Whereas prior research has used sales as denominator for R&D intensity (Gentry and Shen 2013; Zhang et al. 2007), assets were used here because some control variables were calculated using firm sales. To avoid bias from outliers, we winsorize both tails of the R&D intensity by 0.01%. Since firms are not required to break out R&D expenditures from sales and general administrative (SG&A) expenses if they are less than 10% of SG&A, we replaced the missing values in R&D expenditures with zero by assuming that firms invested very little

(less than 10% of SG&A) in R&D, following previous research (Bharadwaj et al. 1999; Chari and Chang 2009; Chari et al. 2007; Gentry and Shen 2013). This is also consistent with common practice in financial research (Minton and Schrand 1999; O'Brien 2003; Opler et al. 1999).

Independent variables

Organizational slack

We measured organizational slack by the firms' unabsorbed slack, which is defined as the ratio of quick assets to total liabilities and used by previous research as proxy for organizational slack (Greve 2003; Kim et al. 2008; Vanacker et al. 2013; Voss et al. 2008). It is because unabsorbed slack is highly discretionary and can be rapidly turned into new use (Bourgeois III 1981; Greve 2003). It gives firms a degree of freedom in allocating it to alternate use.

Moderating variable

Institutional environments

We defined institutional environments as two types: a government-driven institutional environment and a market-oriented institutional environment. Asian financial crisis in 1997 was an important institutional inflection point that facilitated market-oriented institutional change forced by IMF. South Korean economy after Asian financial crisis had fundamentally different institutional characteristics than before the crisis. Since any delayed effect of policy changes after the financial crisis must be considered, the government driven institutional period before market-oriented institutional change was considered to include 1999. In fact, the regulation change in South Korea that forced all firms listed on the South Korean Stock Exchange to adopt American-style monitoring board structure with outside directors was achieved in the middle of 1999 (Choi et al. 2007, 2014). South Korean government implemented most of the public supporting in the financial sector by the end of 1999. In addition, since the global financial crisis of 2009 is considered as an exogenous unexpected shock and affects South Korean firms' innovation, we included the period from 2000 to 2009 as the period after the Asian financial crisis. Thus, we divided the periods of our study and coded "0" for 1992–1999 and "1" for 2000–2009 periods.

Control variables

We included *prior R&D intensity, Industry average R&D, growth, ROE, size, advertising intensity, age, liability, current ratio,* and *industry dummy* for control variables, which may affect firms' innovativeness. Literature shows that *previous investments in R&D* can affect the level of R&D investments (Kim et al. 2008). We measured previous investment in R&D as the R&D intensity from previous year. We

also control for *industry average of R&D intensity* based on two-digit KSIC codes. As a firm's position in the firm's product life cycle may affect the level of innovativeness, we controlled for sales *growth* (Larrañeta et al. 2014; Mudambi and Swift 2011). *ROE* was controlled for a firm's financial performance. Firm *size* was measured by the natural logarithm of total assets. *Advertising intensity* has been primarily used as proxies for the presence of intangible assets. We measured advertising intensity of the firm as the percentage of advertising expenditures over sales. Firm *age*, measured by the difference between the year when a firm was observed in our sample and the year when a firm was founded, was also controlled. In addition, we controlled for the effects of liability and current ratio on innovativeness (Bourgeois III 1981; George 2005; Greve 2003; Singh 1986; Tan and Peng 2003). *Liability* is the resource that can be generated from the environment by raising additional debt and equity capital, measured by the ratio of liability to total equity. Because pursuing innovativeness is an inherently risky strategy and South Korean firms used to rely on debt financing, we controlled liability. *Current ratio* was measured as the firm's availability of current assets over its current liabilities, measures the cash constraints a firm faces (Feldman et al. 2016; Kaplan and Zingales 1997; Kaul 2012). Given its high variation, we took the national logarithm of the liability and current ratio. *Industry*, a dummy variable indicating whether a firm belonged to a high-tech industry (1) or low-tech industry (0) by using the Organization for Economic Cooperation and Development (OECD) classification.

All independent and control variables are lagged by a year relative to the dependent variable. As such, the independent and control variables covered from 1992 to 2008, whereas the dependent variable covered from 1993 to 2009.

Analysis

Because we have panel data, the ordinary least squares (OLS) method is not appropriate because it does not correct for within-firm autocorrelation and heteroskedasticity. To control for these issues, we employ the generalized least squares (GLS) method. Additionally, we conducted modified Wald statistic for groupwise heteroskedasticity and the Wooldridge test for serial correlation in our unbalanced panel (Wooldridge 2010) and found the presence of heteroskedasticity and serial dependence in our GLS models. Therefore, we used the Huber–White sandwich estimator of variances, clustered on firm ID, to yield robust standard error formulas for reducing bias as adjusted for inflated standard errors (Thompson 2011).

Results

Tables 2 and 3 present descriptive statistics and correlations for all variables, which are reported in the model. We conducted a variance inflation factors (VIFs) test to check for multicollinearity. The individual VIF measures were below 2.50, with a mean VIF of 1.55. These values are lower than the generally accepted

Table 2 Descriptive statistics

Variables	Mean	SD	Min	Max
1. Innovativeness	0.467	0.729	0	4.316
2. Prior R&D intensity	0.466	0.735	0	5.229
3. Industry average R&D	0.421	0.262	0	1.156
4. Growth	4.775	0.367	0.315	14.035
5. Size	22.466	1.379	20.118	27.641
6. AD intensity	0.522	1.465	0.001	9.551
7. Age	15.750	11.076	3	92
8. Liability	6.544	0.358	6.166	13.246
9. Current ratio	4.874	0.658	3.032	6.995
10. Industry	0.575	0.494	0	1
11. Institution	0.793	0.405	0	1
12. Organizational slack	4.115	0.753	1.674	6.504

threshold of 10 and indicate that the model is not very representative of multicollinearity. Thus, we ignored any concern about multicollinearity.

Table 4 shows the results of our hypotheses. Model 1 in Table 4 presents a baseline model, which contains only control variables. Model 2 in Table 4 shows the result of Hypothesis 1 for the inverted U-shaped relationship between organizational slack of firms and their innovativeness. The result of Model 2 in Table 4 shows a positive coefficient on the organizational slack term and a negative coefficient on its squared term. Specifically, the result shows that the coefficient of organizational slack is positive and significant ($p = 0.000$), while the coefficient of its squared term is negative and significant ($p = 0.000$), representing the inverted U-shaped relationship between organizational slack and innovativeness. Thus, Hypothesis 1 was supported. To illustrate curvilinear relationship, we plotted the marginal effect of degree of organizational slack on innovativeness in Fig. 1 that showed an inverted U-shaped curve. In line with Plassmann and Khanna (2007) and Wang et al. (2017), we decided that the turning point is 3.974 $(= 0.120)/(-2 * \quad (-0.0151))$.

In Model 3 and Model 4 in Table 4, we introduced the interaction effect of a market-oriented institutional environment (periods after 1999) between organizational slack and innovativeness. In Hypothesis 2, we expected that, as the institutional environments develop, the positive effect of organizational slack on innovativeness would be strengthened and the negative effect of organizational slack on innovativeness would be mitigated.

In Model 3 in Table 4, the coefficient for the interaction term between market-oriented institutional environment and organizational slack was positive and significant ($p = 0.078$), suggesting that a market-oriented institutional environment strengthens the positive relationship between organizational slack and innovativeness. To gain further insights into the moderator of a market-oriented institutional environment, we graphed the interaction between organizational slack and market-oriented institutional environment at the standard deviation above and below the mean of

Table 3 Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12
1. Innovativeness	1.000											
2. Prior R&D intensity	0.734	1.000										
3. Industry average R&D	0.356	0.369	1.000									
4. Growth	0.078	0.059	0.056	1.000								
5. Size	−0.156	−0.132	−0.123	−0.272	1.000							
6. AD intensity	0.001	0.009	−0.015	−0.017	0.108	1.000						
7. Age	−0.153	−0.138	−0.132	−0.178	0.545	0.113	1.000					
8. Liability	−0.050	−0.050	−0.114	0.049	−0.135	−0.036	−0.161	1.000				
9. Current ratio	0.083	0.085	0.158	−0.010	−0.001	0.087	0.072	−0.466	1.000			
10. Industry	0.290	0.291	0.762	0.052	−0.099	−0.006	−0.098	−0.043	0.093	1.000		
11. Institution	0.100	0.098	0.279	0.053	−0.031	−0.068	−0.046	−0.187	0.105	0.036	1.000	
12. Organizational slack	0.041	0.038	0.159	−0.030	0.077	0.084	0.081	−0.455	0.692	0.083	0.138	1.000

$N = 62{,}012$ Correlations with absolute values larger than 0.017 are significant at $p < 0.01$

Table 4 Results of GLS: Effect of organizational slack on innovativeness

Variables	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
Prior R&D intensity	0.608***	0.607***	0.607***	0.607***
	(0.00585)	(0.00585)	(0.00585)	(0.00585)
Industry average R&D	0.208***	0.215***	0.214***	0.214***
	(0.0184)	(0.0184)	(0.0184)	(0.0184)
Growth	0.0288***	0.0267***	0.0263***	0.0263***
	(0.00769)	(0.00772)	(0.00774)	(0.00774)
Size	−0.0234***	−0.0241***	−0.0242***	−0.0242***
	(0.00234)	(0.00235)	(0.00235)	(0.00235)
AD intensity	0.00397*	0.00418*	0.00427*	0.00427*
	(0.00177)	(0.00177)	(0.00177)	(0.00177)
Age	−0.00241***	−0.00233***	−0.00233***	−0.00233***
	(0.000228)	(0.000227)	(0.000227)	(0.000227)
Liability	−0.0307***	−0.0279***	−0.0289***	−0.0289***
	(0.00634)	(0.00642)	(0.00648)	(0.00647)
Current ratio	0.0125**	0.0206***	0.0204***	0.0204***
	(0.00412)	(0.00544)	(0.00545)	(0.00544)
Industry	0.0670***	0.0649***	0.0651***	0.0651***
	(0.00817)	(0.00817)	(0.00817)	(0.00817)
Institution	0.0191***	0.0213***	−0.0246	−0.00192
	(0.00457)	(0.00459)	(0.0266)	(0.0139)
Organizational slack		0.120***	0.116***	0.126***
		(0.0208)	(0.0209)	(0.0212)
Organizational slack squared		−0.0151***	−0.0158***	−0.0171***
		(0.00254)	(0.00258)	(0.00278)
Institution * Organizational slack			0.0117+	
			(0.00662)	
Institution * Organizational slack squared				0.00146+
				(0.000818)
Constant	0.629***	0.363***	0.402***	0.383***
	(0.0925)	(0.102)	(0.106)	(0.103)
Observations	62,012	62,012	62,012	62,012
Number of id	7778	7778	7778	7778

Robust standard errors clustered at the firm-level in brackets

***$p<0.001$, **$p<0.01$, *$p<0.05$, +$p<0.10$

market-oriented institutional environment (Aiken et al. 1991). The marginal effect was plotted in Fig. 2a.

Model 4 in Table 4 shows that the coefficient for the interaction term between market-oriented institutional environment and its squared term of organizational slack was positive and significant ($p=0.074$), which suggests that the

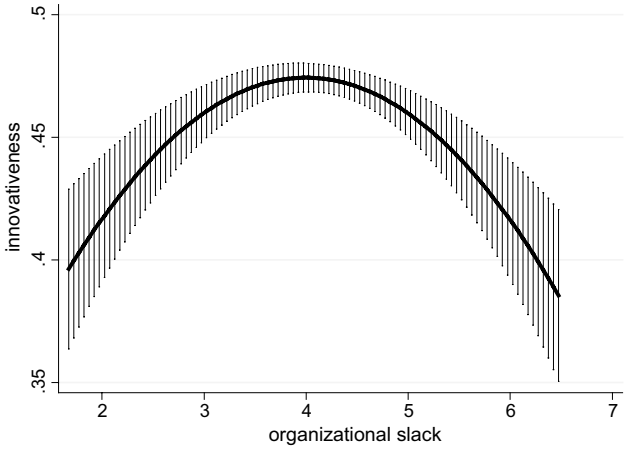

Fig. 1 Effect of organizational slack on innovativeness. Vertical bars represent 95% confidence intervals

market-oriented institutional environment mitigates the negative effects from organizational slack. Thus, Hypothesis 2 was supported. The finding indicates that for the period after the Asian financial crisis than before the crisis, the positive relationship between organizational slack and innovativeness becomes stronger, and the negative relationship between organizational slack and innovativeness becomes weaker, eventually turning positive. The marginal effect was plotted in Fig. 2b.

Robustness test

To ensure the robustness of the results, we took a regression using subgroup analysis testing Hypothesis 2, and the results are in Model 2 and 4 in Table 5. As shown in Model 2, we found that the coefficient for the squared term of organizational slack are not statistically significant before the financial crisis, but in Model 4, the inverted U-shaped relationship is statistically significant for organizational slack after the financial crisis. Therefore, the results confirmed support for Hypothesis 2.

Discussion and conclusion

In the study, we investigated how organizational slack influences innovativeness and how a change of institutional environment from a government-driven to a market-oriented one in South Korea moderated the effect of organizational slack on innovativeness. These are areas that have been the focus of relevant studies. Prior research has focused mainly on the importance of organizational slack on innovativeness in developed economies with relatively stable institutions or in developing economies with inefficient and dysfunctional market institutions. Little research has been conducted on economies that are experiencing significant institutional reforms. We used a sample of South Korean manufacturing firms from 1992 to 2009 because an institutional change in South Korea has been occurring since the 1997 Asian

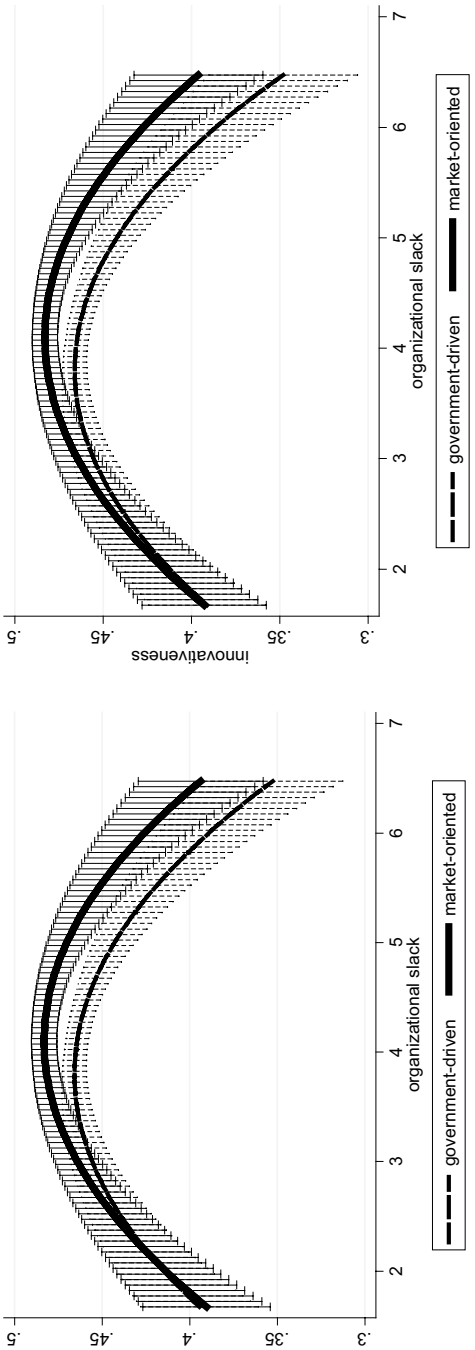

Fig. 2 Interaction effect of organizational slack and market-oriented institutional environment on innovativeness. **a** Interaction effect of organizational slack and market-oriented institutional environment on innovativeness. Vertical bars represent 95% confidence intervals. **b** Interaction effect of squared term of organizational slack and market-oriented institutional environment on innovativeness. Vertical bars represent 95% confidence intervals

Table 5 Results of subgroup analyses of organizational slack on innovativeness

Variables	Before the crisis		After the crisis	
	Model 1	Model 2	Model 3	Model 4
Prior R&D intensity	0.444***	0.443***	0.644***	0.643***
	(0.0172)	(0.0172)	(0.00602)	(0.00602)
Industry average R&D	0.146*	0.151*	0.195***	0.202***
	(0.0602)	(0.0602)	(0.0187)	(0.0188)
Growth	0.0403**	0.0388**	0.0264**	0.0239**
	(0.0144)	(0.0144)	(0.00864)	(0.00868)
Size	−0.00377	−0.00461	−0.0266***	−0.0270***
	(0.00499)	(0.00498)	(0.00241)	(0.00242)
AD intensity	0.00675*	0.00697**	0.00176	0.00215
	(0.00267)	(0.00266)	(0.00200)	(0.00199)
Age	−0.00160***	−0.00158***	−0.00223***	−0.00216***
	(0.000474)	(0.000473)	(0.000230)	(0.000229)
Liability	−0.00385	−0.00395	−0.0423***	−0.0408***
	(0.0105)	(0.0107)	(0.00855)	(0.00867)
Current ratio	0.0201*	0.0261*	0.00849+	0.0189**
	(0.00939)	(0.0112)	(0.00443)	(0.00596)
Industry	0.134***	0.132***	0.0565***	0.0545***
	(0.0175)	(0.0174)	(0.00881)	(0.00880)
Organizational slack		0.101		0.127***
		(0.0598)		(0.0221)
Organizational slack squared		−0.0140+		−0.0161***
		(0.00762)		(0.00267)
Constant	−0.0837	−0.263	0.822***	0.542***
	(0.182)	(0.224)	(0.106)	(0.115)
Observations	12,810	12,810	49,202	49,202
Number of id	3128	3128	7734	7734

Robust standard errors clustered at the firm-level in brackets

***$p<0.001$, **$p<0.01$, *$p<0.05$, +$p<0.10$

financial crisis. Our results showed that organizational slack benefits a firm's innovativeness; however, the effect of organizational slack on innovativeness decreases after a certain level, most likely as a result of organizational complacency and inertia (Baker and Nelson 2005; George 2005; Jensen 1986; Kim et al. 2008). Therefore, the results indicated an inverted U-shaped relationship between organizational slack and innovativeness. Additionally, this research extends our understanding of the contingency perspective, which is necessary when investigating the effect of an institutional change from a government-driven institutional environment to a market-oriented institutional environment on the relationship between organizational slack and innovativeness. Our results showed that the positive relationship between organizational slack and innovativeness is stronger in a market-oriented institutional

environment than in a government-driven institutional environment, suggesting that firms are more likely to benefit from the market-oriented institutional environment by utilizing of their organizational slack for innovativeness. We also found that a market-oriented institutional environment was able to mitigate the negative effects of organizational slack on innovativeness because the organizational slack is easily redeployed according to managerial discretion (Sharfman et al. 1988; Singh 1986).

Theoretical implications

The results of the present study provide a foundation for integrating an institution-based view into the study of the relationship between organizational slack and innovativeness. Previous studies of organizational slack focused on the relationship between organizational slack and innovativeness, and their hypotheses were based on the positive or negative effects of organizational slack on firms' innovative activities. However, several studies focused on the effect of organizational slack on innovativeness in an institutional vacuum. Given the discretionary nature of technological resources, organizational slack, as an example of excess resources, must be transformed into innovativeness through managerial discretion that is influenced by the national legal system (Crossland and Hambrick 2011; Mudambi and Swift 2011); however, the primary findings in the literature have not explained the institutional conditions under which some firms are more likely to encourage or discourage innovativeness when they have available organizational slack.

By reconciling an institution-based view with the effects of organizational slack on innovativeness, we have clarified in this paper the conditions in which the potential of organizational slack as a determinant of innovativeness can be realized. This result brings greater clarity to the suggestion of previous research that organizational slack is a double-edged sword regarding innovativeness, simultaneously fueling and hindering it by accounting for the contingency effects of different regulatory institutions. By including two distinct institutional environments, government driven and market oriented, we go beyond the static view of the potential effect of institutions on the relationship between organizational slack and innovativeness. We have shown the need to consider institutional environmental transitions to understand how and when an organization uses its excess resources for innovativeness. Future research may benefit from these insights into the institution-based view because institutional transition affects managerial discretion in utilizing organizational slack, which eventually influences its positive and/or negative effects on innovativeness.

Managerial implications

Our findings offer practical guidance for policymakers who are implementing market-oriented institutional environments and firm managers who are interested in implementing innovative activities through organizational slack. For transitions from government-driven to market-oriented institutions to be successful, policymakers as "institutional entrepreneurs" should focus on such as designing appropriate formal institutions (Kim et al. 2010). We also suggest that firm managers carefully consider

the characteristics of institutional environments in their decision-making regarding how and when organizational slack should be allocated. Our study examines how managerial attentions are directed toward institutional change, especially when the organization has too much or too little slack. Our results indicate that firm managers should consider not only the positive effects of organizational slack on innovativeness but also the negative effects on innovative activities resulting from too much organizational slack. Additionally, it is important for managers to recognize that, depending on whether market-supporting institutions are developed, organizational slack could have an unexpected impact on risk-taking or uncertain activities, such as investing in innovativeness.

Limitations and directions for future research

The findings of this study can be extended in several ways to address some of its limitations.

First, although other researchers have suggested that different types of institutions should be studied across emerging economies (Kim et al. 2010; Newman 2000), this study focused on just one country. In addition, the motivation for institutional change came from the IMF. Thus, the institutional change model suggested in this study could not be used in countries, such as India and Chile, where internal spontaneous institutional changes prevail (Kim et al. 2010; Peng 2003). Therefore, even though our sample of South Korean firms provides an idea basis for examining the relationship between organizational slack and innovativeness during institutional changes, future studies should be conducted in other empirical settings to test our findings' generalizability.

Second, we measured innovativeness as R&D intensity—the ratio of R&D expenditures to assets. According to Hagedoorn and Cloodt (2003) and Phelps (2010), however, there are numerous indicators for measuring for innovativeness, including patent counts, patent citations, and new product development. Some technologies are legally protected by copyright, and firms sometimes protect their innovativeness with alternative methods such as industrial secrecy. Researchers indicate that the degree to which firms invest R&D activities for their innovativeness varies significantly across industries. While we control for industry effects and limit the study to the manufacturing industry to address those issues, future researchers may also analyze more comprehensive measures of innovativeness.

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