



# A Study on The Coordination Delay in Chinese Product National Standard Setting Committee

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**Abstract.** To better understand the influential factors of coordination delay in standard setting process, we borrow the theoretical lens of institutional entrepreneurship. The data processing and calculating is conducted by SPSSRO data analysis software, including VIF test and OLS regressions. By using the data of Chinese National Product Standard setting plan, our empirical results show that the coordination delay in the committee is negatively related to degree of standardization. Moreover, we also find that the financial slack in the industry will weaken this effect by reducing firm's motivation, while the involvement of impartial parties will strengthen this effect by raising the difficulty of regulatory capture.

**Keywords:** Standard setting process, knowledge competition, institutional entrepreneurship, analysis based on SPSSPRO

## 1 Introduction

Standard setting committee is mainly composed by elite firms in the industry, thus there exist a competition-cooperation relationship among participants in standard setting committees<sup>[1]</sup>, which is in line with alliance studies. . As part of the institution, standard setting is not only influential to future development of the industry, but also influenced by the existing institutional environment. However, most studies on the standard committee treat standard setting process in a relatively independent way<sup>[2]</sup>, ignoring the fact that the influence of the new standard is to some extent decided by existing institution.

In this paper, we look into how the degree of standardization influences the coordination delay in standard setting committee. A higher level of standardization, measured by the number of accumulated effective standards, indicates the low institutional void, which is declared to provide opportunities for institutional entrepreneurship in lots of article. We particularly investigate committee-based standard setting process through institutional economy view, which strengthen the importance of self-interest as a key driver for individuals to participate in collective institutional entrepreneurship.

## 2 Theory and Hypotheses

By gathering knowledge and resources from members, standard setting committees frame the normative rules that regulate the features of the product in the market and the behavior of firms during their production<sup>[3]</sup>. Existing research have fully discussed public benefit of establishing standards from the regulation functions and social improvements, the key mechanisms includes uncertainty reduction, network externalities<sup>[4]</sup>, economy of scale<sup>[5]</sup>.

Prior studies find that the motivation of realizing private interest, including decreasing technological and market risks, knowledge acquisition, access to markets and conformity, can drive firm's to involve in standardization. Existing literature have fully discussed this argurement by combining with the emerging of dominant design. Standard can be seen as an institutionalized dominant design that enjoys formal legitimacy endowed by the authority<sup>[6]</sup> which conveys direct competitive advantage to the owner or controller of the technology that produce those attributes. Thus, influencing the content of standard is also ackwonledged as a comptition strategy.

### 2.1 Regulatory Void and the Degree of Standardization

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The motivation of involving self content in the standard setting is more intense at the the initial stage of standardization, when the dominant design is unclear and there are multiple technology paths contesting each other. In this period, the winner will possess greater benefits. To be more specific, standards have a "lock in effect", such that the initial standards in certain area will greatly influence the technology path through self-reinforcing mechanism, influencing content of sequential standard in this area. Thus, firms are more motivated to argue during standard setting so that the standards suit their interests in the initial stage of an emerging regulation to pave the way for the future position in technological trajectory.

In conclusion, we propose that it takes longer time and more effort to reach a consensus with is acceptable for all participate's self-interest needs when the degree of standardization is low, since both the motivation of regulatory capture and difficulty of achieving it is high.

**Hypothesis 1:** The degree of standardization is negatively related to the coordination delay inside the committee.

### 2.2 Motivation of Barging in Stantardazation Process

As staeted before, regulatory capture behavior is driven by the motivation of obtaining specific benefit from crafting new regulation. This movitation is deminsishing along with the sophistication of standard regulation. On one hand, slack financial slack can quickly adjust their portfolio<sup>[7]</sup>. On the other hand, firms with slack fianical resource

are less risk averse, since their endowments allow them to experiment with new methods or strategy and reduce the effect of failure on firm's operation. Under this circumstance, firms generally care less about the loss caused by losing advantage in standard setting, since their slack resource allows them to quickly recover from the transition, as well as respond to the new rules. The opposite side of losing the advantage and transitioning to new standard is successful capture. However, when firms in the industry generally have more exploitable financial resource, focal firm's embedding self-interest in the standard is less likely to cause great shock towards those who need to make adjustment. On the contrary, when slack financial resource in the industry is low, whether participants can shape the standard in line with their existing operation is of vital importance. Financially constrained firms are generally more vulnerable to the changing environment, compromise in standard setting may lead to unaffordable transition cost.

Since participants' gain if successfully capture, as well as the threat if they fail are both impaired, participants' effort of claim self interest in standard setting process is diminished. We propose that industry's overall slack financial resource will weaken the negative effect of the degree of standardization on the coordination delay.

**Hypothesis 2:** Financial slack will weaken the negative effect of the degree of standardization on the coordination delay inside the committee.

### 3 Research Design

The next subsections provide instructions on how to insert figures, tables, and equations in your document. Data from the official website of National Public Service Platform for Standards Information. This website records key information of national standard setting process from 1999 until now, including the issue date of the standard setting plan, drafting committee members, and the date of first vote on the draft. However, since the information disclosure is not fully established until 2015 and the records before 2015 barely contain the information that we need to proxy the coordination delay, we only include standard setting plan issued between 2019-2022. Besides, because our main concern is the regulatory capture behavior of firms, we further exclude plans that do not invite firms or only invite 1 firm. In the end, 956 records are left in our sample. We obtain the information of the industry by using the data from the China Stock Market and Accounting Research (CSMAR) database.

In this research, we use Scientific Platform Serving for Statistics Professional (SPSSPRO), a professional data coding and analyzing software to conduct OLS analysis, which has been applied in many technology innovation research. Based on the core capabilities of data processing and analysis algorithms, SPSSPRO provides data analysis services which can be widely used in scientific research, business, data mining, questionnaire surveys and other fields.

**Dependent variable.** In this article, we investigate the coordination delay in each standard setting committee by looking into the duration of drafting. To be more specific, we calculate the days each committee takes to compose a unanimous version, which is counted by the days spent from the standard setting plan issuing date and the date of first vote on the draft.

**Independent variables.** Each standard setting plan is coded with a Chinese Classification for Standard (CCS) number. It is a 3-digit code that classify each standard into 24 categories 214 subcategories and 1606 detailed categories mainly according to the industry and the content of the standard. To measure the degree of standardization, we count the total number of prior standards that share the same 3-digit CSC code with the standard setting plan before the plan was issued. When there are more prior standards in the same subcategory, the degree of standardization in this subcategory is higher.

**Financial slack** reflects the characteristic of the industry, which influence the participating firms' urgent of arguing self-interest. CSC classification mainly draws from the industry and the content of the standard, making it possible for us to much CSC code with the 2-digit Standard Industry Code (SIC). For example, CCS code "B23" indicates standards on beans, potato crops and products, which matches the SIC code "A13" ("A" indicates agriculture and forestry industry). We calculate the financial slack by the average level of liquid ratio in the industry.

**Control variables.** Since most of the participants in our sample are not listed firms, we could not obtain the detailed data on each firm's characteristics. As the analyzing unit in our research is each standard setting plan (or each standard setting committee), we mainly include the features of each standard setting plan and the features of the corresponding industry as the control variables.

We firstly contains the features of the committees' composition, which might influence the coordination delay. *Total firms* in committee is controlled, as the more participants are involved, the time for organizing and commutating is inevitably increased. It is calculated by the number of all firms and impartial institutions that listed in the committee. To specify the prolong of drafting process under the lack of prior relevant standards is induced by the regulatory capture behavior of firms, rather than lack of experience of standard setting, we also control the *average experience* of the participants, which is measured by the average standard settings that the members has participated.

We then control the features of the standard setting plan. Some of the standards setting plan adopt existing standards issued by the international standard setting organizations like International Standardization Organization (ISO), International Electrotechnical Commission (IEC). The reference of existing standard might reduce the time needed to draft the standard. *International standard adoption* is coded as "1" if the drafting adopts international standard; "0" if there is not. Similarly, some standard setting plans are actually the revision of prior standards. Compared with standard setting plans that start from a scratch, the revision process may be more efficient. Thus, we code *formulation* as "1" if the standard setting plan is to set a brand-new standard that fills the void in its 2-digit code; "0" if the standard setting plan is to set an updated and revised version to substitute the specific prior out-of-date standard. Another dummy variable, *compulsory standard* is code as "1" if the plan is to set compulsory national standard, and "0" if recommendatory national standard. This is because compulsory national standards have more enforcement power on firm's behavior, which may stimulate firms' motivation to shape the draft in a way that favors themselves most.

Finally, we use two variables to control for complexity of the standard, as complexity may involve more technical details or implementation details to discuss during the standard setting process. The first variable is *industry level R&D investment ratio*,

which mainly reflects the technical complexity. The second variable is the *preparation interval* between the day the new standard is officially issued, and the day the new standard officially starts implement. This interval is counted by month and settled in advance when the standard setting plan is issued. The more time the industry needs to adjust to the new standard indicates that the implementation process is more complex.

The descriptive statistics and correlations of variables for our analyses is presented in Table 1. Also, the VIF test show that there doesn't exist multicollinearity among the explanatory variables (VIF=8.33).

Since our sample is cross-section data, we conduct the OLS regressions to test our hypotheses. The analyses are performed at committee-level. As the standard setting plan may be affected by the macro factors like industry policy in certain years. We particularly control for the year effect and the CSC category effect (at the 2-digit CSC level).

**Table 1.** Variables correlation

Variables	Mean	Std.Dev	(1)	(2)	(3)	(4)	(5)
(1) Negotiation Delay	697.59	295.09	1				
(2) Degree of standardization	64.34	93.65	-0.14	1			
(3) Financial slack	2.62	0.83	-0.07	-0.07	1		
(4) Total firms in committee	8.86	7.77	0.11	-0.09	-0.06	1	
(5) Average experience	13.36	24.55	-0.08	0.45	-0.09	-0.25	1
(6) International standard adoption	0.18	0.39	-0.15	0.25	0.07	-0.01	0.1
(7) Formulation	0.58	0.49	0.09	-0.17	-0.04	-0.04	-0.02
(8) Compulsory standard	0.02	0.12	0.00	-0.05	0.01	-0.09	-0.06
(9) R&D investment ratio	4.18	1.72	0.02	-0.07	0.49	-0.02	-0.09
(10) Preparation interval	697.59	295.09	0.01	-0.02	-0.23	-0.02	0.09

**Continues Table 1.**

Variables	Mean	Std.Dev	(6)	(7)	(8)	(9)	(10)
(5) Average experience	13.36	24.55					
(6) International standard adoption	0.18	0.39	1				
(7) Formulation	0.58	0.49	-0.13	1			
(8) Compulsory standard	0.02	0.12	0.115	-	1		
(9) R&D investment ratio	4.18	1.72	0.11	0.11	0.07	1	
(10) Preparation interval	697.59	295.09	-0.00	-	0.36	-	1
				0.07		0.21	

## 4 Results

Table 2 shows the OLS regression result on the coordination delay in the standard setting process. Model 1 is the base model that only contains control variables. The results suggest that with more firms that join in the committee, the coordination process is prolonged. Also, when the standard setting plan is aimed at setting a completely new standard rather than revise the last version, the more time the coordination process needs. However, with more preparation interval before the new standard is officially conducted, the coordination delay is shortened. This finding is contradictory to what we have supposed before. We think this might because that the longer preparation interval lessens firm's tension on the possibility of unfavorable standard.

Mode2 to Model 3 test our Hypotheses. The F-value for the models are all significant. Model 2 tests the main effect of the degree of standardization, which is negative and significant (-0.410,  $p=0.002$ ), suggesting that with higher level of standardization, the coordination delay in drafting stage is significantly reduced. Hypothesis 1 is supported. Also, compared with the base model, the value of adjusted R-squared is increased (from 0.4887 to 0.4902), suggesting that the presence of the main effect improve the fittingness of the model. Hypothesis 2 argues that the main effect in Hypothesis 1 will be weakened when the industry financial slack is high. In Model 3 we add the interaction between the degree of standardization and financial slack. The coefficient estimate of the interaction is positive and significant (0.96,  $p=0.015$ ), supporting Hypothesis 2. The results are shown in Table 1 and the moderating effect of financial slack is shown in Figure 1.

**Table 2.** OLS Model Estimation on Coordination delay

	Model 1	Model 2	Model 3
Total firms in committee	4.561*** (-1.135)	4.592*** (-1.129)	4.305*** (-1.132)
Average experience	-0.545 (-0.509)	-0.028 (-0.532)	-0.165 (-0.534)
International standard adoption	-16.288 (-22.683)	-9.66 (-22.659)	-12.617 (-22.64)
Formulation	41.562** (-16.949)	35.567** (-16.965)	36.890** (-17.05)
Compulsory standard	105.525 (-103.192)	107.24 (-102.642)	93.865 (-102.686)
R&D investment ratio	21.037 (-42.573)	35.046 (-42.577)	41.575 (-43.366)
Preparation interval	-8.499** (-3.574)	-9.232*** (-3.562)	-8.953** (-3.563)
Degree of standardization		-0.410*** (-0.13)	-2.784*** (-0.987)
Degree of standardization * Financial slack			0.962** (-0.396)

Financial slack -85.613\*  
(-45.877)

Degree of standardization \* Involvement of impartial institutions

Involvement of impartial institutions

Constant	1520.277*** (-230.313)	1494.897*** (-229.223)	1781.569*** (-274.224)
Year FE	YES	YES	YES
CSC FE	YES	YES	YES
Observations	956	956	956
Log Likelihood	-6407.059	-6401.364	-6397.666
Adj R-squared	0.4887	0.4942	0.4969
F value	8.48***	8.59***	8.54***

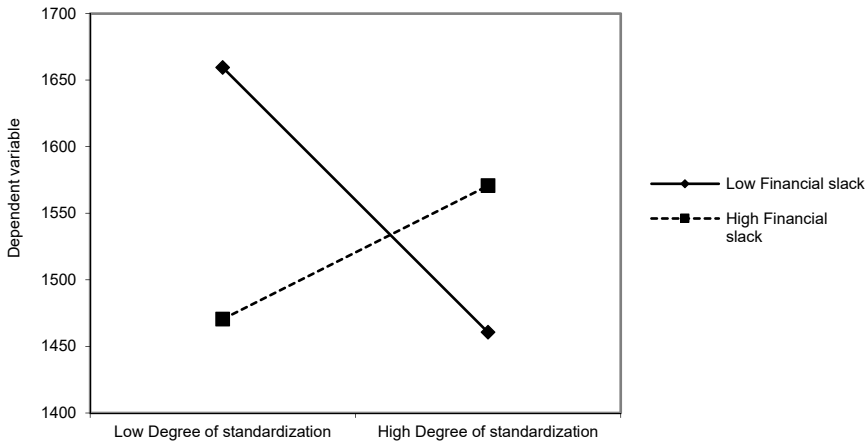


Fig. 1. Moderating effect of financial slack

## 5 Conclusion

Our research try to take a step further on the current standardization research. Although standard setting is an important topic, the study on its progress is relatively limited. By collecting 956 Chinese National Product Standard setting plans, we empirically test the influential factors that affect the days needed in the drafting stage, which directly reflects the difficulty of coordination and negotiation.

Also, we extend the current institutional entrepreneurship research by strengthening the effect of the existing institution. We argue that institutional entrepreneurship is not independent event, rather, its process and its influence is determined how much “void”

or opportunity is left in the current field. And when the foreseeable benefit from devoting into institutional entrepreneurship is low, the motivation of arguing self-interest is accordingly reduced.

This article also contains some flaws that need future studies. First of all, we can't directly measure the conflict among participants. As most of the committee members are unlisted company, the available information very limited. This article has an assumption that the standardization will reduce the diversity, and accordingly the conflict among firms. However, this assumption needs to be further verified. Secondly, we call on further studies that look into the differences in standard setting among all types of standards. Currently most of the literature on standard setting focus on the product standards, which directly convey competitive advantage to the standard setters. However, nonproduct standards, such as the measurement, test and environment standards, also play a key role in firms' competition.

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