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Essays on Meso-institutions: Evidences from the dairy sector

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To my family

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RESUMO

Oliveira, G. M. (2019). *Essays on Meso-institutions: Evidences from the dairy sector*. 2019. 102p. (Tese de doutorado). Faculdade de Economia, Administração e Contabilidade, Universidade de São Paulo, São Paulo.

A presente dissertação avalia um recente desenvolvimento teórico da Nova Economia Institucional que apresenta a divisão de três camadas institucionais - macro, meso e micro. O estudo traz uma análise considerando a conexão sistemática entre essas camadas e também uma investigação específica no nível meso. Utilizando dados secundários históricos sobre regulamentações de leite no Brasil e na Itália, e um conjunto de dados relacionados à análise laboratorial diária da qualidade do leite de vacas de 25 dos 27 estados brasileiros durante um período de dezenove anos (1999-2017), este estudo investiga questões nas literaturas de economia institucional, gestão estratégica e política alimentar. Esta dissertação contém três capítulos individuais no formato de artigos acadêmicos, além de uma introdução geral e conclusão. O Capítulo 2 concentra-se no campo da economia institucional, abordando a lacuna na literatura em fornecer uma abordagem sistemática detalhando as relações entre as camadas institucionais macro, meso e micro e sua análise como um sistema. Esta parte apresenta três conceitos - interconectividade institucional, complementaridade institucional, alinhamento institucional - para enriquecer este novo debate. É adotada uma perspectiva histórica e regulatória para avaliar esses conceitos na indústria do leite no Brasil e na Itália. São apresentadas proposições relacionadas ao funcionamento de camadas institucionais em termos de custos de transação. Com base nos vazios institucionais regulatórios, o Capítulo 3 apresenta uma investigação do impacto dos efeitos de tradução das meso-instituições sobre o desempenho, bem como a dependência dessa influência dos recursos no nível da empresa. Os resultados apontam que a criação de uma meso-instituição auxília na resolução desses vazios institucionais e aumenta o desempenho das empresas, devido aos mecanismos de provisão de informações que simplificam regras complexas e induzem as firmas a uma melhor adequação em seus ambientes externos e internos em termos de recursos alocação. Ainda, os resultados evidenciam uma relevância particular dos efeitos de tradução das meso-instituições para firmas pequenas. São apresentadas contribuições para a literatura de estratégia baseada em instituições. O Capítulo 4 apresenta a investigação de meso-instituições eficientes afetando a eficácia da implementação da política de alimentos. Os resultados ilustram que a função de tradução de uma meso-instituição aumenta a efetividade da política e destaca uma lógica sequencial de implementação de políticas a iniciar com efeitos institucionais (de primeira ordem) a efeitos de tecnologia e tamanho (segunda

ordem). Este capítulo também tem implicações políticas, evidenciando que qualquer regulamentação deve ser inicialmente traduzida e então monitorada para ser efetiva.

Palavras-chave: níveis institucionais, meso-instituição, vazios institucionais regulatórios, desempenho, efetividade de política alimentar.

ABSTRACT

Oliveira, G. M. (2019). *Essays on Meso-institutions: Evidences from the dairy sector.* 2019. 102p. (Doctoral dissertation). Faculdade de Economia, Administração e Contabilidade, Universidade de São Paulo, São Paulo.

This dissertation investigates a recent development in New Institutional Economics that draws attention to the division of three institutional layers - macro, meso and micro. I present an analysis considering the systematic connection between these layers and also a particular investigation of the meso-level. Using historical secondary data on milk regulations in Brazil and Italy, and a fine-grained dataset related to daily laboratory analysis of cow milk quality from 25 of the 27 Brazilian states during a nineteen-year period (1999-2017), I address some research questions in the fields of institutional economics, strategic management and food policy. This dissertation includes three individual chapters in the format of academic articles, besides a general introduction and conclusion. Chapter 2 focuses on the field of institutional economics by addressing the gap in the literature in providing a systematic approach detailing the relationships between macro, meso and micro institutional layers and their analysis as a system. This part presents three concepts - institutional interconnectivity, institutional complementarity, institutional alignment - to enrich this new debate. I adopt a historical and regulatory perspective to employ these concepts in the dairy industry in Brazil and Italy. I present some propositions related to the functioning of institutional layers and their basis in terms of transaction costs. Drawing on regulatory institutional voids, Chapter 3 investigates the impact of meso-institution's translation effects on performance, as well as the dependence of this influence on firm-level resources. As expected, I observe the creation of a meso-institution overcoming these institutional voids and increasing firms' performance, due to the information provision mechanisms that simplify complex rules and induce firms to achieve a better fit between their external and internal environments in terms of resource allocation. I also demonstrate the particular relevance of meso-institutions' translation effects for small firms. Some contributions to the institutions-based strategy literature are presented. Chapter 4 brings the analysis of efficient meso-institutions affecting the effectiveness of food policy implementation. I find that the translation function of a meso-institution increases the policy's effectiveness and highlight a sequential logic of policy implementation from institutional (first-order) to technology and size (second-order) effects.

This chapter also has policy implications, advocating that any regulation must be initially translated, and then enforced and monitored, to succeed.

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SUMMARY

1 General Introduction

This project aims to explore the new research agenda on New Institutional Economics, the division of institutional environments in the macro, meso and micro-layers (Ménard, 2018). On the one hand, the traditional New Institutional Economics has devoted much effort in understanding institutions' effects (Davis and North, 1970a, North, 1990a, Acemoglu and Robinson, 2012). On the other hand, this approach considering macro, meso and micro-institutions has been little explored (Ménard and Shirley, 2019). Recently, Ménard (2014) started to draw attention to this framework by showing the relevance of institutional differences in a given environment as a function of how rules are created (macro), implemented (meso) and operationalized (micro). In fact, this author claims that whereas both macro and micro levels have been well explored in the literature (Williamson, 1985, 1996, North, 1990a), the meso-institutional layer has been largely neglected (Ménard and Shirley, 2019).

Aiming to contribute to the literature, this dissertation explores these new theoretical enhancements in three different ways. First, I present a systematic conceptual framework exploring these three institutional layers and how they are connected. Three concepts are used to enrich this new debate and provide more ground for further empirical contributions - institutional interconnectivity, institutional complementarity, and institutional alignment. Second, I focus on the meso-institution background as the main theoretical basis aiming at investigating its effects from strategic management and food policy standpoints. This second part appears in two distinct chapters, with their own methodology and conceptual framework.

Both literatures have become increasingly interested in the intermediate layer of institutions, but nothing has been done through the meso-institution approach (Ménard, 2014). In the strategic management perspective, this meso-level has been gaining attention through the analysis of institutional intermediaries (Armanios et al., 2017, Mair et al., 2012) or sub-national institutions (Chan et al., 2010, Meyer and Nguyen, 2005). In the background of food policy, these institutional layers have been receiving attention through the influence of the political structure by way of national and regional arrangements on policy implementation (Hedley, 2017).

I divide this dissertation into five chapters, including this general introduction and an additional conclusion (Chapter 5). This study makes five main contributions. First, this is the first attempt to illustrate how macro, meso and micro-layers function as a system, i.e., their nodes and how they form an institutional environment (Chapter 2). Second, this is the first quantitative analysis that applies the meso-institutions approach. Third, I perform my analyses in a novel dataset that has not been used before in the literature and I also investigate the effects of public policies that are still unexplored. Fourth, I am the first to apply the framework of meso-institutions

from the perspective of institutional voids, which is the objective of Chapter 3, thereby uncovering relevant implications for the strategic management field. Fifth, this is the first application using the meso-institutions approach that evaluates a food policy (Chapter 4).

In Chapter 2, I analyze the recently-recognized division of institutional environments in macro, meso and micro-layers. A systematic approach detailing the relationships between these layers and their analysis as a system is still lacking. This study presents three concepts - institutional interconnectivity, institutional complementarity, institutional alignment - to enrich this new debate and provide more ground for further empirical contributions.

By *Institutional interconnectivity* I refer to the vertical relationship between the three layers, which highlights the information and communication in each of the steps of creation (macro), implementation (meso) and operationalization (micro) of rules. *Institutional complementarity* refers to the horizontal relationship within the three layers, which is related to the economies of scale and scope and transaction costs that constrain the entities in each level, i.e., the level of specialization that rules require. Entities from the same level can complement themselves according to the need for creating separate but connected rules (macro), implement distinct parts of the same rules through different entities (meso), or operationalize the same rules through different ways according to the variations occurring due to agents' preferences within the same market (micro). *Institutional alignment* refers to the relationship between each layer and the technological constraints regarding the rules at stake. These boundaries constrain the three processes of creation, implementation and operationalization of rules.

The theoretical framework of Chapter 2 is presented in Section 2.2. It also presents some propositions related to the functioning of institutional environments and their basis in terms of transaction costs (Section 2.2.1). Adopting a historical and regulatory perspective, this part describes these conceptual enhancements through an illustration of the dairy industry in Brazil and Italy (Section 2.3 and 2.4).

In Chapter 3, I investigate the effects of the creation of a meso-institution, contributing to the strategic management literature. According to the institutional perspective of strategy, the firms' success is guided by the ability to manage the benefits in the variations of formal and informal institutions (Marquis and Raynard, 2015). The institution-based approach has assumed homogeneous institutional effects to analyze the impact of regulatory institutions on strategy (Meyer et al., 2009, Peng et al., 2009). Some authors have also extended this institutional approach to investigate the lack of institutions inside the same environment, in terms of financial, labor, infrastructure, distribution channels, among other institutions that provide support to the market operation. These studies commonly use the business group perspective to study this lack

of institutions, the so-called institutional voids (Khanna and Rivkin, 2001, Khanna and Palepu, 2006, Khanna and Yafeh, 2007).

I use in turn an unexplored perspective in the literature of strategy, the meso-institutions. This background explores how the institutional environment can vary according to intermediary structures (Ménard, 2017). Some studies have adopted a similar analysis to explain the heterogeneity of firms' performance inside the same institutional environment, the institutional intermediaries. However, these studies have used the same logic as the institutional voids approach, which analyzes the institutions' support of market operation through resources- or market-based explanations (Armanios et al., 2017, Mair et al., 2012). In contrast, I maintain the institutional and regulatory point of view to study the institutions variation on the meso-level. In doing so, I use the meso-institution approach to study regulatory institutional voids and, therefore, study the effects of institutional heterogeneity on competitive advantage and performance in a given environment focusing on institutions rather than the usual explanations of resources and market access. The contributions are detailed at the end of Section 2.1.

In this part, I explore two main hypotheses based on the theoretical foundation presented in Section 3.2. The first is whether meso-institutions support firms to overcome regulatory institutional voids and increase their performance. The second tests whether translation effects of meso-institutions depend on firm-level resources. To test both hypotheses, I use the Brazilian cow milk industry where some institutional singularities stress the meso-institutions' role (Section 3.3). Combining difference-in-differences and matching, in a fine-grained dataset with firm-level data on cow milk quality in 25 of the 27 Brazilian states over a nineteen-year period (1999-2017)[1] (Section 3.4), I find support for both hypotheses. The results and placebo tests are detailed in Section 3.5. I summarize the main findings of this study in Section 3.6. Finally, I demonstrate some theoretical and managerial implications in Sections 3.7 and 3.8, respectively.

While Chapter 2 presents the effects of meso-institution creation, Chapter 3 examines the impact of meso-institutions on food policies by focusing on how regulation is implemented and what are the institutional mechanisms at stake in this, i.e., I analyze the influence of meso-institutions on the effectiveness of a food policy. I adopt the food policy literature as my main theoretical background and highlight the importance of these meso-layer institutions (Section 4.2). I test whether the presence of meso-

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[1]I use the same dataset for Chapters 3 and 4. However, each of them has distinct identification strategies and different theoretical meanings of variables. In Chapter 3, I study the creation of a meso-institution, the Conseleite, and its impact on the performance of cow milk producers. Thus, I use cow milk data to observe performance indicators. In Chapter 4, I investigate the effects of the presence of the same meso-institutions on the effectiveness of a food policy implementation. In other words, I measure the effectiveness of a policy related to cow milk quality using quality data. Both chapters are two different tests of the short- and long-term effects of a meso-institution.

institution boosts the food policy effectiveness due to the complementary translation device. This analysis highlights a sequential logic of policy implementation from institutional (first-order) to technology and size (second-order) effects. The mechanisms analyzed in this chapter are based on the concepts of market signaling, uncertainty, and information costs (Section 4.3).

Using the same empirical setting, the same cow milk quality micro-data and a similar modeling strategy (Section 4.4), I find support for my hypothesis and demonstrate some contributions to the food policy literature. I detail the results, robustness check and placebo tests in Section 4.5. I summarize the main findings in Section 4.6. Finally, I present the implications for theory and practice in Sections 4.7 and 4.8, respectively.

2   Chapter Two

Institutional layers: does this division matter?

Abstract

The division of institutional layers into macro, meso and micro-levels has been recently recognized. However, a systematic approach detailing the relationships between these layers and their analysis as a system is still lacking. This study presents three concepts - institutional interconnectivity, institutional complementarity, institutional alignment - to enrich this new debate and provide more ground for further empirical contributions. Adopting a historical and regulatory perspective, this paper describes these conceptual enhancements through an illustration of the dairy industry in Brazil and Italy. It also presents some propositions related to the functioning of institutional environments and their basis in terms of transaction costs.

2.1   Introduction

The analysis of institutions as a structured system formed by layers is now a significant part of the research frontier in New Institutional Economics (Ménard, 2018). This recent improvement has been increasingly evolving around the link between the traditional perspectives of institutions and firms (Ménard, 2014, 2016, 2017, Rouviere and Royer, 2017). These studies have called attention to the fact that there is an intermediary level that is responsible for the connection between the institutional environment (macro-institutions hereafter) and the organizational arrangements (micro-institutions hereafter) (North, 1990a, Williamson, 1985, 1996).[2]

The link between macro-institutions and micro-institutions occurs through meso-institutions. Meso-institutions *"designate the set of devices (entities) and mechanisms (procedures) through which the general rules are translated, adapted and made operational, providing guidelines to operators and users and feedbacks to decision-makers"* (Ménard et al., 2018, p. 15). Assuming the existence of these three institutional layers opens room to explore how they are connected, their failures and solutions.

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[2]The literature has evolved and new developments have called attention to the analysis of organizations as institutions. See Hodgson (2006), Ménard (2014) for further details.

This perspective goes further on the assumption of institutions as taken for granted (Williamson, 1985, 1996).

This paper assumes that all macro, meso and micro-institutions are formed by institutional and organizational aspects. The first is related to the creation, implementation and operationalization of rules through administrative processes or protocols. In other words, they are the rules by themselves, which are usually treated as procedures in the literature. The organizational characteristic in turn refers to the entity in charge of the creation, implementation or operationalization of those rules. Although this labeling can lead to some confusion, it is relevant to maintain this perspective since each macro, meso and micro-institution has its own internal rules of functioning that are surrounded by this organizational standpoint. Hereafter, the institutional feature will be interpreted as rules and the organizational aspect will be called entities.

The attention to this division of institutional layers derives from the new theoretical developments related to meso-institutions (Ménard et al., 2018). While the relationship between macro- and micro-institutions is well grounded in the literature (North, 1990a, Williamson, 1985, 1996), recent studies about meso-institutions have underlined the importance of investigating these three layers, something which has been scarcely done. Starting with Ménard (2014), who conceived the meso-institution theoretical model, other studies have applied this approach to the water and food sectors through descriptive studies(Ménard, 2014, 2016, 2017, Rouviere and Royer, 2017). Moreover, although *"...the mismatches among institutional layers... (and the potential gaps in their mutual adjustment) can be the source of major disruptions in economic activities, up to the point of challenging societal cohesion..."* (Ménard, 2018, p. 7), a systematic conceptual framework exploring these three institutional layers is still lacking.

Some scholars have explored the intermediate (meso) layer, but leaving room for how it bridges the macro and micro-levels. For instance, Ménard (2017) explores the meso-institutions in the water sector in France, England and the Netherlands showing how the allocation of property and decision rights related to water service provision leads to different types of intermediary entities. Similarly, Ménard et al. (2018) pay attention to the way how macro- and meso-institutions are connected and how the latter interferes in policy implementation, either in the processes of policy-formulation or policy-operationalization. Rouviere and Royer (2017) use the meso-institution approach to explore the issue of food safety in cattle traceability in Quebec and pesticide residues in France. They compare the characteristics of public-private-partnerships, as meso-institutions, in terms of incentives alignment, information and enforcement exercised inside this meso-level institutional entity.

Based on this evidence highlighting the relevance of considering the division of institutional layers, I propose a conceptual framework to explore how they are related

through three concepts: institutional interconnectivity, institutional complementarity, and institutional alignment. These concepts rely on an efficiency perspective regarding transaction costs for allocating resources in the creation, implementation and operationalization of rules, such as the management of specialized knowledge from human capital, information and communication technologies, technologies of monitoring considering geographical aspects, and internal accountability handling potential opportunism of elites and influential groups. The level of specialization of these assets, their potential of producing economies of scale and scope are also relevant in impacting the transaction costs involved.

Specifically, the conceptual framework proposed here provides some insight into the efficiency of the institutional layers and the legitimacy of rules based on the model by North (1990a), i.e., efficient institutions decrease the transaction costs in the relationships of a given economic system. Also, I assume that that the development of rules occurs through a coordinated allocation of resources (e.g., information and knowledge creation) in each of the tasks of creation, implementation and operationalization. The allocation occurs in each of the layers according to their operations and constraints, i.e., it is not a static frame which emerges from the first step in the development of a given rule. Therefore, rules can be seen as the outputs from a process of coordination of inputs related to information and knowledge.

Institutional interconnectivity refers to the vertical relationship between the three layers, which highlights information and communication as being dependent on specialized resources (e.g., TIC, human capital and knowledge, etc.) in each of the steps of creation (macro), implementation (meso) and operationalization (micro) of the rules.

Institutional complementarity refers to the horizontal relationship within the three layers, which is related to the economies of scale and scope and transaction costs that constrain the entities in each level. That is, distinct entities in the same layer have to be created due to the limitation of size in terms of specialized activities. They can complement themselves according to the need of creating separate but connected rules (macro), implement distinct parts of the same rules through different entities (meso), or operationalize the same rules through different ways according to the variations due to agents' preferences within the same market (micro).

Institutional alignment refers to the relationship between and within each layer and the technological constraints regarding the rules at stake. I submit that this aspect moderates the effects of institutional interconnectivity and institutional complementarity on the functioning of the three institutional layers.[3] These boundaries are relevant

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[3]Institutional alignment is similar but still brings some novelty to the criticality concept from Ménard (2014). Whereas criticality focuses on the technological constraints to make a transaction possible, institutional alignment refers to the connection between and within each layer and their technological environment affecting their efficiency in the activities of creation, implementation and operationalization of rules, thereby affecting the interconnectivity and complementarity, which is not

not only in the creation of rules, but also in implementation and operationalization. For instance, one regulation should consider the technologies available when defining technical parameters of quality, as well as whether meso-institutions are constrained by technologies when analyzing and monitoring if rules are being followed. The same holds for micro-institutions, since agents operationalize the rules according to the possibility to apply a certain technological framework.[4]

In order to contribute to this new and promising field, I aim *to provide a systematic framework to investigate how the relationship between macro, meso and micro-institutional layers occurs and to bring more details exploring why it matters.* This consideration of distinct institutional layers is still recent and, consequently, there is no established conceptual framework exploring it. Therefore, I propose the three concepts of institutional interconnectivity, alignment and complementarity as the basis of my theoretical discussion, and apply it to the dairy industry in Brazil and Italy as my two case studies. Focusing on the relationship between and within the three institutional layers, and investigating factors associated with their efficiency, I study the three proposed concepts comparing both countries and bringing complementary insights and underlining the possibility of extending the propositions stated in this general analysis to other contexts.

2.2 Theoretical Framework

New Institutional Economics has been considered as a promising field (Ménard, 2018, Ménard and Shirley, 2019). According to this author, further contributions and developments to this solid literature would consist of the investigation of the relationship between macro and micro-institutions going beyond in assuming the macro institutional environment as given (Williamson, 1985). Ménard (2018) highlights the research frontiers in this field as focusing on the way macro-institutions are implemented, their devices and mechanisms (meso-institutions), and the way by which these meso-level entities are operationalized by the micro-institutions.

Meso-institutions are entities by which rules are interpreted and rights are implemented (Ménard, 2017). Meso-institutions can involve both formal and informal institutions (North, 1991). The formal institution is the explicit legislation and norms, that is, it is a form to present a general comprehension of the limits of economic behavior surrounded by laws, legal sanctions and others standardized parameters. Similarly, the informal institutions are associated with intrinsic aspects of a society, group or other collective arrangement surrounding economic activities according to traditions,

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explored in the model of Ménard (2014).

[4]The two firsts concepts draw attention to the need of variety of institutional entities. This proposal highlights the impossibility in having one single entity coordinating all required activities - creating, implementing and operationalizing rules. In other words, the critique that "one size *does not* fit all" also applies here (Coase, 1937).

culture, or collective norms (North, 1990a). This division shed some light on both contexts: (i) a rule is created directly by the government (formal) or (ii) a rule emerging from private agents who recognize its legitimacy and start to follow it, which sometimes is *ex-post* established as a formal rule by formal institutions.

Both macro-institutions define the rules of the game. Economic behavior is constrained by these rules, i.e., the transactions only take place considering the possibility of arbitration in potential conflicts. Micro-institutions are the operationalization of the rules in organizing economic activities by the agents (i.e., organizational arrangements), with a dependency on how the macro-institution is translated to a specific sector or location language, represented by the meso-institutions' functions (Ménard, 2014). The lack of interconnection between the institutional levels (micro, meso and macro) might generate communication noise or asymmetric information on the relationship between the rules and players. In other words, due to a misunderstanding in any of the processes of rule creation, translation or implementation, certain rules can fail. Therefore, the linkage between the different institutional layers is particularly relevant (Ménard, 2014, 2016, 2018).

Hodgson (2006) posits the central issue of this linking: "how do people understand the rules and choose to follow them?". He argues that institutions are encoded recognizing that the institutions' interpretation is vital, but he is not aware of the translation and implementation mechanisms, the meso-institutions. Furthermore, Saleth and Dinar (2008) submit the existence of different institutional layers, not only the macro-institutions. They emphasize a decomposition approach to institutional studies in order to consider the institutional implementation as a whole, that is, they investigate the institution's articulation stressing the intermediary institutional level, and, simultaneously, they ignore the naive and the monolithic relationship between institutions and firms.

Accordingly, the implementation of rules depends directly on their articulation mechanisms (de facto institutions) (Voigt, 2013), because they could be misunderstood. This incomprehension might be a consequence of the agent's behavior or due to the institution itself (Dequech, 2013). Then, moving forward in New Institutional Economics literature, institutional analysis must consider three different institutional layers: macro-institutions, meso-institutions and micro-institutions. Although the common focus of studies in New Institutional Economics considers a direct interaction between macro-institutions and micro-institutions (Williamson, 1985, 1996), the premise of my investigation, in turn, is that micro-institutions are also influenced by the interconnection between meso- and macro-institutions. In other words, the link between rules and economic agents depends not only on the way that regulations are created (macro), but also on the way they are implemented (meso).

The misalignment of these layers can result in the failure of a regulation and

"...part of the problem comes from a misunderstanding of the nature and role of in-stitutions involved in the definition, implementation and operationalization of these policies..." (Ménard et al., 2018, p. 14). This failure gives rise to policy gaps according to the institutional flaws and the dynamics of actors operating within mismatched rules and norms. Ménard et al. (2018) is the only study which explores the policy-implementation gaps according to the institutional flaws from the three layers. However, their analysis treats each macro, meso and micro-layer individually. There is no investigation of how they interconnect.

According to Spranz et al. (2012), the institutional settings are built on complex connections based on the concept of social embeddedness put forward by Granovetter (1985) and within a cultural context, which is constantly evolving over time, thereby demanding constant adjustments in the three macro, meso and micro- institutional layers. Additionally, Von Jacobi (2018) underlines that institutions are strictly connected with distinct social structures. He draws attention to the relevance of investigating institutions from a multidimensional point of view and claims that this still remains as a conceptual and empirical challenge. Specifically, *"...systemic interactions between a specific policy and the overall institutional framework, such an attempt is typically abandoned when it comes to empirics: evidence, to date, tends to remain scattered in attempts to study specific relations between two institutions or structural factors. ...* (Von Jacobi, 2018, p. 857).

Based on the recent developments of New Institutional Economics (Ménard, 2014, 2018, Ménard and Shirley, 2019), I submit that there exist three institutional layers - macro, meso and micro, and that their efficiency depends on the transaction costs involved in the allocation of resources for creating, implementing and operationalizing rules. I posit that these transaction costs can be analyzed under a systematic framework through the concepts of institutional interconnectivity, institutional complementarity and institutional alignment.

2.2.1 New cornerstones

While many scholars have strongly addressed institutions' impacts on economic systems (Davis and North, 1970b, Acemoglu and Johnson, 2005a, Ménard and Shirley, 2005, Acemoglu and Robinson, 2013, North, 1990a), the division of institutional environments into macro, meso and micro-layers has only very recently been recognized and very little is known about them so far (Ménard et al., 2018, Ménard, 2018, Ménard and Shirley, 2019). Expanding on the model started by Ménard (2014), I explore some novel issues originated from this separation of levels. I propose some concepts to enrich the connotation of these layers. Assuming an institutional point of view, I offer some explanations about the existence of distinct institutional layers and the co-existence of different entities within the same layer. Nonetheless, I provide some insights into

possible determinants of efficiency regarding the three institutional layers.

The implementation of any regulation involves costs, such as expenses regarding administrative and bureaucratic activities, the acquisition of technologies to create, enforce or even operationalize the rules, individuals' wages, negotiation costs between distinct influential groups, among others. I state that these costs are part of the operations of an entity performing its function, which varies according to its position in a layer and in an environment. Macro-creation, meso-implementation, micro-operationalization are activities performed by each layer to manage incentives between distinct individuals, to coordinate the correct information between and within institutional layers and to enforce the established rules and procedures between and within institutional layers.

In order to achieve an efficient management of incentives, information and enforcement, the operations require a certain level of specialization, which limits their potential of scalability, as well as highlights the existence of transaction costs. For instance, (i) the creation of a regulation involves the negotiation within interested political groups and also between them and the market, and the allocation of knowledge from specialized human capital about technicalities of a sector or the political environment; (ii) the implementation depends on the use of specific monitoring technologies and also specialized knowledge to enforce it; (iii) the operationalization is a function of the management of incentives within the market according to the negotiation between agents considering their interests in terms of quality, price and technology usage, given the consumers' preferences.

Assuming the impossibility of having only one big entity organizing and implementing rules (Coase, 1937), and regarding this coordination of incentives, the control of opportunism, and the relationship with technology, I propose three possible determinants pushing towards the effectiveness of the three institutional layers: (i) institutional interconnectivity in the vertical relationships of macro, meso and micro-institutions in terms of transmission of adequate information and translation of a rule; (ii) institutional complementarities derived from the horizontal relationships within institutional levels in order to not only achieve an efficient allocation of resources between and within entities and layers in the specialized processes of creation, implementation and operationalization of rules, but also control opportunism through enforcement; (iii) institutional alignment between and within each layer and their technological environment, thereby creating rules which contain feasible attributes of a good according to the availability of technologies that make this possible or the use of implementation tools according to proper monitoring technologies, i.e., design boundaries through rules that affect the coordination of incentives, quality and price in the economic activities.

Therefore, while institutional interconnectivity is associated with the relationships between the three layers, institutional complementarity refers to the relationships

within each layer, and institutional alignment is the means by which these relation-ships occur, i.e., how they occur and are constrained in terms of technology availability. Figure 2.1 illustrates this background.
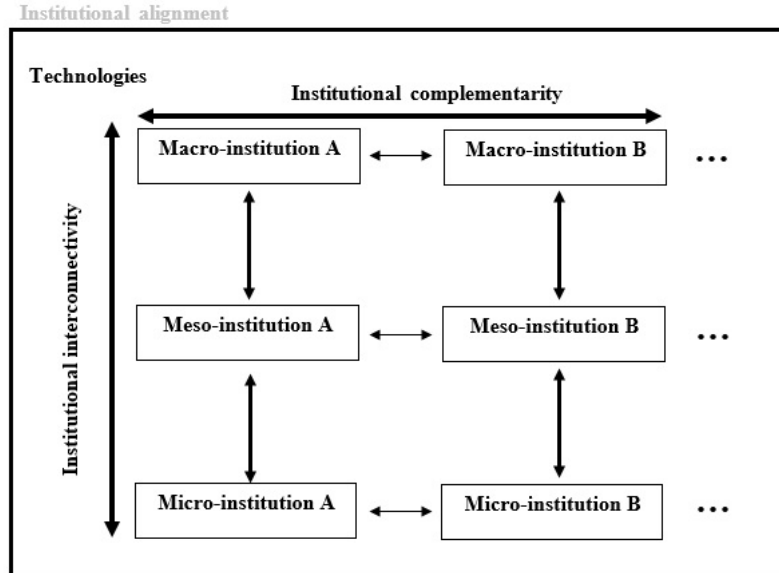
Figure 2.1: Conceptual model.

2.2.1.1 Institutional interconnectivity

While this new literature states the relevance regarding the individual coherence between the three levels (Ménard et al., 2018), I argue that macro, meso and micro-institutions are interconnected in a way that complements each of their functions - create, implement and operationalize rules, respectively. Specifically, I submit that they are part of a system that depends on their interconnection to be more or less efficient. By institutional interconnection I refer to the specialization function of the entities on each of these levels and their dependence, i.e., resources being applied to the specific activities of creation, implementation and operationalization of rules. For instance, while the specialization level at the macro-layer is related to a more broader perspective by which the allocation of resources must consider a general view of the environment as well as overlap with other macro-institutions (e.g., taking into account the entire regulatory environment of a country), the meso-institutions concentrate their efforts to a specific kind of macro-institution (e.g., implementing just one or few rules). Furthermore, while macro-institutions constrain a broader set of agents and trans-actions, meso-institutions define boundaries to a specific group of transactions and agents from a determined industry or location, and micro-institutions set up rules to an even smaller group, e.g., the coordination of a given supply chain establishing rules to manage similar transactions of supply, processing and channeling.

The efficiency of the three institutional layers depends on how well vertically interconnected they are, i.e., if the information is well communicated through each level, if there are adequate activities to perform their specialized roles, if the three levels are being constantly adjusted to keep their interconnectivity according to institutional changes. For instance, macro-institutions can be efficient in terms of rule creation, but they can fail without an adequate mechanism to implement those rules (meso). Also, a rule can be efficiently created and implemented, but if there is a lack of incentives in its operationalization at the micro-layer, it can fail as well. Therefore, institutional interconnectivity is a key concept since *"...laws, directives, or social norms organizing economic activities almost always remain abstract and/or ambiguous. They require 'interpretation' devolved to devices that 'translate' general rules into specific guidelines and to mechanisms that shape their implementation..."* (Ménard, 2017, p. 7).

Institutional interconnectivity also underlines the feedback perspective. This characteristic exposes the relevance of top-down and bottom-up connection in the coordination of the information, from the creation of rules, the alignment of interests between and within the layers, through their enforcement. All these aspects are based on the economizing logics of transaction costs. Macro-institutions should articulate themselves to negotiate and exchange information in order to create an adequate rule. Meso-institutions need to obtain general information and translate it into specific purposes and generate specific tools to monitor it, considering the particularities of location or group of agents when necessary. Micro-institutions should generate specific rules that operationalize the requests from the layers above according to the agents' interests and market functioning.

Accordingly, this interconnectivity illustrates the match between responsibilities and resources on each of the levels, thereby drawing attention to the specialized role in each macro, meso and micro-institution in creating, implementing and operationalizing rules. As each of these activities require distinct levels of specialization, they demand a division of labor as well as the allocation of discretionary power between entities. All these aspects affect the effectiveness of the three institutional layers. In other words, entities in charge of creating a rule are responsible for communicating adequate information and incentives to entities in charge of implementing it, which are therefore responsible for the transmission of a translation to the lower level where operationalizing entities are located.

Proposition 1: The interconnectivity between macro, meso and micro-institutions affects the transaction costs of a given environment.

One case that highlights the relevance of this concept and one reason why rules can fail is when there is an establishment of indicators to be followed, but there is no en-

tity enforcing the achievement of these parameters, i.e., an inefficient interconnection between meso and micro-levels. Even creating adequate rules at the macro-layer, if there is any enforcement in the implementation activity (meso), the economic activities possibly would not be constrained by operationalized rules considering this aspect. As the interconnectivity is vertically hierarchical, if there is any flaw in the first relationship (macro and meso), the meso and micro would also face noise. However, policy gaps evidenced by this last case can generate opportunities to rent appropriation from agents operationalizing rules at the micro-level. So, a given rule tends to be inefficient if a macro-institution does not enable an adequate implementation and monitoring at the meso-layer to constrain the operationalized rules at the micro-level.

2.2.1.2   Institutional complementarity

Institutional complementarity refers to the horizontal support within each layer, i.e., different types of macro-, meso- or micro-institutions helping each other within their respective levels because of economies of scale and degree of specialization related to each entity according to the required activities.[5] For instance, two distinct meso-institutions implementing the same rule, but one in charge of monitoring one specific part and the other responsible for the rest, or two distinct macro-institutions creating complementary regulations. Due to the boundaries according to the level of specificity of the demanded resources of a certain rule, and its coordination inside one entity, the creation of distinct entities within the same level is needed. The complexity behind a rule plays the main role in explaining how each entity in each layer can complement themselves as well as their optimal number. That is, simpler rules would not demand so many entities with distinct activities requiring a high level of specialization to be effective.

Additionally, institutional complementarity also draws attention to the coexistence of institutions within each layer in order to maintain self-control between the entities. As the activities of creation, implementation and operationalization of rules usually rise under a high level of complexity in terms of analysis of their efficiency, this leaves room to the emergence of opportunistic behavior. Influence and political groups can always try to expropriate rents and collect opportunistic benefits on their own according to the fragility of the institutional layers. Drawing on North (1990b), I submit that this horizontal perspective of institutional complementarity has two main implications.

First, institutional complementarity stands for the specialization within each layer

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[5]This concept aims to extend the ongoing analysis from Schnaider et al. (2019). While these authors study this complementary point of view at the meso-layer, I try to bring an extension for all the three levels, advocating that any, macro, meso or micro-institution can require a higher number of entities according to the specialization level required by a rule.

and the need of distinct entities complementing each other's activities. This characteristic is related to the specialized knowledge and information required for the three processes of developing a certain rule - creation, implementation and operationalization. Second, it also refers to the role of political markets and ideology shaping political choices from a top-down role. Policy-makers from the macro-layer try to push their preferences using politics as a tool of trading, mainly because of pressures from parties, other politicians, local authorities, and even the society (Ménard and Ghertman, 2009). Therefore, this aspect is also a function of transaction costs involved in all steps of creation, implementation and operationalization of rules.

Proposition 2: The institutional complementarity within macro, meso and micro-institutions affects the transaction costs of a given environment.

This case is exemplified in two ways. First, regarding specifically the specialized activities, one can think about a rule which demands strict monitoring according to distinct regions, i.e., the location of agents can be a predominant factor and, therefore, it can require the creation of complementarity entities to create, implement or operationalize rules according to the constraints related to each context (e.g., weather, demand and supply of a local market, income concentration, etc.), since the costs of centralize these activities could be higher than create several entities in different locations. Second, one can observe examples of monitoring authorities (e.g., police, public audit offices, etc.) controlling misbehavior inside of other entities in charge of creating and implementing rules.

2.2.1.3 Institutional alignment

Finally, by institutional alignment I refer to the focus performed by each of the three layers considering the same technological environment and technical content that the rules are surrounded with in each level. This characteristic draws attention to the relevance in considering the available technologies in a regulation perspective. When creating rules to a certain market, macro-institutions must take into account the technological availability when establishing parameters to be followed by economic agents. In other words, one macro-institution cannot define parameters that are unfeasible with the technologies available in the market.

Furthermore, the connection with meso-institutions and micro-institutions also holds. Regarding meso-institutions, the entities must consider the technological constraint regarding the activity of monitoring the activities. There is no reason to establish some rules if there are no technologies available to monitor and control their implementation (e.g., equipment that measures food safety indicators). In the case of micro-institutions, the entities must operationalize the rules considering the incentives

from the use of technologies and the quality level achieved due to it. This characteristic relates to the match between resources and responsibilities allocated to each institutional layer according to technology availability. Therefore, the role of institutional interconnectivity and institutional complementarity affecting transaction costs is contingent upon institutional alignment, since the technologies would influence the way that rules are translated, information is communicated and knowledge is created.

Proposition 3: The institutional alignment moderates the effects of institutional interconnectivity and institutional complementarity on the transaction costs of a given environment.

2.2.2 Remarks

To sum up, this conceptual enhancement hypothesizes the existence of three institutional layers, and their efficiency depends on their institutional interconnectivity, complementarity and alignment. My framework suggests that these characteristics are key factors in effectively creating, implementing and operationalizing rules. Table 2.1 summarizes the aforementioned arguments.

Table 2.1: Main concepts

Characteristics	Institutional Interconnectivity	Institutional Complementarity	Institutional Alignment
Orientation	Vertical	Horizontal	Vertical and Horizontal
Main influence	Information	Enforcement	Incentives
Link to the activity of	Translation	Enforcement	Coordination

Each of these concepts carries some implications. Institutional interconnectivity mainly highlights the need for translation of rules, i.e., the communication of adequate information from the creation of the rules and how they are enforced and monitored to the way they are transformed into production decisions. Institutional complementarity underlines the enforcement within layers due to potential opportunistic value expropriation, as well as the role of transaction costs resulted from the division of specialized activities between entities but within the same layer and activities of creating, implementing and operationalizing rules. Institutional alignments stands for the coordination of the activities according to the technological constraints in the market functioning as well as in the institutional layers operations. Specifically, this attribute mainly affects the coordination of transactions by establishing boundaries in production decisions thereby affecting directly the economic systems in terms of incentives, price and quality around the relationships.

2.3 Case studies

The empirical strategy exposes two case studies covering the dairy industry in Brazil and Italy. I study this conceptual framework using a regulatory perspective untangling macro, meso and micro institutional layers, and their connection with the concepts of institutional interconnectivity, complementarity and alignment. First, I present the cow milk regulations in each country. Next, I perform the analysis following my theoretical enhancements.

2.3.1 Brazilian cow milk regulations

The Brazilian cow milk industry has suffered from an issue of quality over the last years. For more than 40 years, several Brazilian markets, dairy included, faced strong interventionist regulations. From 1945 to 1990, the cow milk sector has its prices fixed by the Inter-Ministry Commission of Price (CPI). This public entity was responsible for imposing prices to transactions that dealt in cow milk supply. This affected the investments in technology by farmers and as a result many producers went bankrupt.

In 1990, a new regulation eliminated this establishment of prices (Decree n. 43/1990 - National Superintendency of Supply). The market then started to modify its organization; new international processors would enter the Brazilian cow milk market, bringing new incentive systems, technologies and forms of payment. In order to control these changes, the Ministry of Agriculture established a new legislation, Decree 7889/1990, transferring the responsibility for controlling milk production to the states and municipalities.[6] However, the complexity behind milk quality would remain unregulated.

It was only in the 2000s that public policies focused on the definition of quality indicators and basic parameters of food safety were created. The first such public policy was Normative Instruction number 51 (IN 51) from 2002 aiming for the modernization of the sanitary legislation of milk production. The second policy was Normative Instruction number 62 (IN 62) regulating the quality in production, collection and transportation of type A milk, raw chilled milk and pasteurized milk.

Given these technical parameters of milk quality, both farmers and processors could have access to these quality levels. Focusing on food security control and services for the quality management programs of private processors, the quality of cow milk production was controlled by specialized services from private laboratories of the Brazilian Network of Laboratories of Milk Quality Control, consisting of 10 private and independent laboratories, involved in the Monitoring System of Brazilian milk quality, a partnership with the Brazilian Agricultural Research Corporation (EMBRAPA) and

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[6]The Brazilian geopolitical structure is hierarchically formed by the federal, state and municipal levels. The actions of states and municipalities are conditioned by the umbrella of the former.

the Ministry of Agriculture, Livestock, and Food Supply (MAPA). The labs are located in the following states: Paraná (1), Minas Gerais (2), Rio Grande do Sul (4), Santa Catarina (1), São Paulo (1), Goiás (1), Pernambuco (1).

The control in the limits imposed by the regulation fell upon the labs themselves, which were now required to report any irregularities to the Ministry. This lab analysis was usually requested by the processor, which paid for the service but deducted these costs from the payment offered to farmers. However since the system focused on the quality management of private strategies, some issues still remained. There was a history of conflicts between milk farmers and processors, which the low trust environment in Brazil only served to highlight. Then, in order to evaluate the fairness behind the prices set by processors, the farmers needed to collect information from other farmers who produced similar quality level of milk and analyze these farmers' prices to compare with their own. However, this proved a costly activity. Cow milk farmers are widely dispersed and distant from each other. Moreover, the quality level could vary from farmer to farmer, making the costs to collect information from a similar quality level even higher. As such, the farmers could not gather a clear picture of the market functioning, which led to behavioral uncertainty related to a possible opportunistic action by buyers defining low prices, thereby undermining investments in in-farm milk production.

Hence, some farmers and processors decided to create an entity in order to solve this issue in their regions, the Conselho Paritário entre Produtores e Indústrias de Laticínios (Conseleite). This action was based on the success of another entity, the Conselho de Produtores de Cana-de-Açúcar, Açúcar e Etanol (Consecana) on the Brazilian sugar cane chain (Canziani and Guimarães, 2003, Silva et al., 2012). Conseleite is formed by milk producers and dairy processing firms, each one with five representatives. Its goals is to bring more reliance on the price definition, with a specific environment to deal with conflicts of interest between the two sides of the transaction in the milk sector in Brazil, setting prices according to the quality indicators as based on the regulation, and on the quality levels even for those above of that established by the regulation. This structure turned the farmer-buyer exchange more transparent and provided incentives for the farmer to achieve and maintain a high-quality production because of the better bargaining process using Conseleite's information about price references (Canziani and Guimarães, 2003).

2.3.2 Italian cow milk regulations

The milk policy in Italy was laid down in Regio Decreto n. 99, dated May 9, 1929, with the definition of bovine drinking milk. However, the relevant interconnection between regulation and market started to become more relevant with the emergence of the European Union's (EU) policy, the Common Agricultural Policy (CAP), in the

beginning of the 1960s, with the objective of providing stable market conditions for farmers and processors. After CAP, the European markets, including the Italian milk industry, started to suffer from market control in supply, with a system that encouraged higher prices. As a protectionist policy, the government imposed the payment of prices above the average negotiated in the international market. These incentives led to a problem of overproduction.

Aiming to handle this overproduction, another intervention system persisted from 1984 to 2015, the EU milk quota system. It imposed quotas of milk production to each EU member during this period, controlling the annual production by farmer, as well as applying fines to producers who violated the rules. Similar to the implementation of the fixed price in the years before, a public agency was put in charge of the implementation of the monitoring system, the Agenzia per le Erogazioni in Agricoltura (AGEA), connected to the Ministry of Agriculture in Italy. Thus, this agency was the meso-institution in charge of: first, implementing the fixed prices of milk in the 1960s under another name; and second, implementing and enforcing the milk quota system across Italy.

However, while the governmental concern was focused on price and then quantity, new problems regarding quality started to appear. Starting 1990, and aiming to handle food safety issues, new regulations on quality schemes were introduced. The national law 88/1988 channeled the design and implementation at the national-level of milk quality payment schemes; EC 852/2004 presented some procedures about hygiene of foodstuffs; EC 854/2004 exposed specific rules for a myriad of animal products for human consumption, raw milk included; EC 853/2004 specified health requirements for raw milk production, such as bacteria contamination, somatic cell count, residues of antibiotics, as well as concerns of milking, collection and transport procedures; EC 2073/2005 outlined the microbiological criteria for foodstuffs; EC 37/2010 imposed limits regarding pharmacologically active substances; EC 1881/2006 and 165/2010 established the maximum levels for certain contaminants in foodstuffs, like aflatoxins and other micro toxins.

Unlike the past case in which the same meso-institution was maintained in the change from the regulation of fixed prices to production quota, this new complex milk quality regulation required the creation of another implementation body. In charge of this distinct regulation were the Italian Ministries of Health and Agriculture, at the national-level, but controlling and enforcing it on the regional-level were public meso-institutions, the Regional Health Governments and Regional Zooprophylactic Institutes. The laboratories are top-down meso-institutions, nationally legitimized and created by the Legislative Decree n. 270/1993 to operate as a technical scientific instrument, providing veterinary services, activities and collaboration regarding animal health, breeding hygiene and quality control for foods of animal origin.

In total, there are 10 institutes spread in the following Italian cities: Brescia, Foggia, Padua, Palermo, Perugia, Portici (NA), Rome, Sassari, Teramo and Turin. Each institute is responsible for the technical analysis of the milk quality in its region. The analysis uses in a milk sample sent by either farmers or processors, depending on the arrangement organized as well as the quality management program implemented by each relationship. These entities are responsible for the control of the quality standards. All these institutes perform similar analyses, that is, there is no specialization between them. However, the Lombardy and Emilia Romagna Experimental Zootechnic Institute (IZSLER), in the city of Brescia, is considered the national center of cow milk analysis in Italy. Therefore, whenever one of the laboratories finds an issue, it contacts this center for help.

The implementation of the milk quality regulations was mainly left to these institutes. However, there are also some private laboratories performing the same kind of service – organized either by farmer associations or inside some dairy processors. These private laboratories are formally institutionalized by receiving a public certification enabling them to provide these services. Usually, they are used to reduce costs and also for other services, such as the transportation from the bulk tanks to the technical facilities of the laboratories. Therefore, the institutes and private laboratories are responsible for the analysis of the milk samples in order to certify if the agents are obeying and following the milk quality regulation.

In cases where the agent does not comply with the rules, veterinary services from the Regional Health Governments at the regional-level and by the Unità Sanitaria Locale (USL) at the local-level carry out inspection and control procedures. In other words, these entities complement the institutes' functioning in the implementation of the milk quality regulations in Italy. The public Regional Zooprophylactic Institute and some private laboratories are responsible for monitoring and providing information at the regional or local-level. The Regional Health Government and Azienda Unità Sanitaria Locale (AUSL) are responsible for enforcing the regulation, applying sanctions and penalties when needed.

Furthermore, beyond price, quantity and quality, another issue started to receive attention in Europe and Italy, the coordination of the milk supply. As noted by Falkowski et al. (2017), the European supply chains commonly face coordination issues like unfair trading practices. In the cow milk sector, the European Commission introduced the Milk Package in 2012 in order to handle these issues. The new regulation established guidelines about coordination, such as the use of contracts with specific elements of price, volume and quality aspects, as well as stressing the relevance of collective actions in the sector through producer organizations to use collective contracts, even out the bargaining power of buyers and suppliers, and increase market transparency.

Dealing with a totally different issue, the responsibility for implementing the new regulation was also distinct, mainly based on the Common Organisation of the Markets in agricultural products (EC Regulation n. 1308/2013). Specifically in the case of milk, the main meso-institutions in charge of implementing and enforcing the Milk Package were private entities called Producer Organisations, legal entities made up of groups of farmers which aim to help the distribution and commercialization of products, and encourage the development of high-quality products based on sustainable production practices. Other arrangements were relevant to the implementation of Milk Package, but always based on producer organisations: association of producer organisation, inter-branch organisations, and consortium between organisations.

An interesting point set forth by the EC Regulation n. 1308/2013 is that in a case where the farmers achieve a concentration of 2/3 of all production of the sector through these organizational arrangements, they are allowed to create and extend their own rules, which would constrain all producers, even those that do not participate in this concentration. In other words, these private meso-institutions would not only implement the Milk Package, but also started to function as a macro-institution by creating sector-specific rules for all agents. Then, the primary production, which is usually considered the weaker link in supply chains, would be transformed into the main agent to coordinate the transactions by the creation of the rules that considered their interests.

2.4 Different, but comparable cases

Although the Brazilian and Italian dairy sectors are quite distinct, the comparison between both provides ground to the conceptual enhancements proposed here. The idea to illustrate both cases together aims to highlight an analysis regarding distinct issues in terms of milk regulations guided by modifications by the macro, meso and micro-institutions. This approach supports the analysis of institutional interconnectivity, complementarity and alignment as key factors in the efficiency of the institutional layers.

2.4.1 Brazil

In the Brazilian case, I observe three periods (Table 2.2).[7]

First, a heavily regulated period from 1945 to 1990, when the milk market was constrained by the government regulation establishing prices through its Inter-Ministry Commission of Price (CPI). At the macro-layer, the Brazilian State had an interventionist approach, creating rules to strongly control the market functioning. In this first

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[7]This analysis only considers the main entity in both Brazilian and Italian cases. Other meso-institutions can be also related in the two countries, but I have included only the structure with the most influence in each period, given the concern about the macro-level.

Table 2.2: Main focus of the Brazilian cow milk regulations

Characteristics	1945-1990	1990-2000	2000-present
Concern at the macro-level	Production increase and inflation/price control	Quality	Quality
Main meso-institution	Inter-Ministry Commission of Price (CPI)	Regional and municipalities' offices	Laboratories and Conseleite
Strategies at the micro-level	Focus on quantity: lack of incentives enhancing quality	Initiating micro-institutions concerned with quality	Improving micro-institutions' tools regarding quality in the cow milk supply

period, the concern about price and quantity was implemented through a centralized approach from one public meso-institution, the CPI. The agents' strategies were focused on controlling the amount of supply and volume of production since price was fixed. At the micro-layer, these economic agents were restricted to acting according to these limits, which made room for disinvestments since premium prices and payment by quality parameters were not at stake. Then, quality payment schemes were absent, leaving the prices to be coordinated exclusively based on a traditional supply-demand approach, lacking any complex strategy paying attention to value-added dairy products.

In this first case, I observe more relevance regarding the institutional interconnectivity and institutional alignment. Institutional interconnectivity appears by the information flow in the vertical relationships. The macro-institutions, mainly represented by the four ministries of agriculture, economy, trade and planning, were responsible for providing a systematic view of the different sectors in terms of main raw inputs, activities and production operations (e.g., processing, logistics, trade, etc.). Based on this background, the meso-institutions (CPI) were in charge of maintaining a system of monitoring the evolution of prices and costs according to the information provided by the firms (e.g., sales, volume of production, etc.), and therefore establishing the fixed prices according to the domestic market. The micro-institutions were responsible for the provision of the information mentioned above (i.e., their operations). In case of a misunderstanding in any stage of the information provision, all institutional layers would face efficiency issues, since the main objective of price establishment would be disconnected from the real business activities and market demand.

The institutional alignment is also a relevant factor in this period due to strong technological constraint from the fixed prices. While the technologies regarding the functioning of each layer are relevant due to the huge amount of information, the concept of criticality defined by Ménard (2014) is more present in this case. The establishment of prices by the State led to guidance contrary to the value-added and quality strategies. Since premium prices could not be adopted as rewards, private players did not invest in technologies in the different stages of the production - raw material, logistics, package, among others. Therefore, the quality level of drinking milk and dairy products was negatively affected, but one can still consider the policy

as efficient, since its main goal was not related to quality but to price and inflation control. The institutional complementarity appears mainly as the different ministries functioned jointly, providing a specific background with respect to their specialized focus (e.g., economy, agriculture, etc.) at the macro-layer.

In the second period (1990-2000), this sector experienced a change regarding its coordination to a more market-oriented approach. This change during the second period illustrates a shift in focus, from quantity to quality, which led to a strong modification at the meso and micro-levels. At the macro-level, the Brazilian government eliminated the establishment of prices and started to open the market for foreign investments and multinational companies. At the meso-level, the old meso-institution was extinguished and the responsibility regarding several aspects of milk products were transferred over to each Brazilian state and in some cases to municipalities. The monitoring and implementation of milk-related policies were the responsibility of these local-specific meso-institutions, thereby showing that the implementation structure was decentralized through regional offices, but still public.

At the micro-level, the milk producers and buyers obtained more freedom to negotiate individual strategies of milk supply, level of quality, incentive systems, and also the purchase of technologies from developed countries to increase quality and efficiency since incentives started to be at stake. They started to create specific systems to remunerate and provide incentives guided by quality levels, which influenced the specific investments in farms and also the processing of value-added products and price of the final product, before being sold as standardized drinking milk. However, many farmers did not enjoy this wave due to their lack of reference of quality. As commonly seen in any market, the indicators of payment based on quality parameters were imposed by the processors, but the farmers did not have a reference in the form of a regulation based on which they could clearly understand these parameters as well as their value.

In this second period, institutional complementarity gained more relevance. The decentralization of the monitoring of meso-institutions from CPI to regional offices resulted in specialized control that took into account the local aspects of the negotiation environment. While in the first case the systematic view was based on sectors, other factors like local conflicts between firms, market structure, weather conditions, among others, started to be considered and, therefore, the meso-institutions needed to adopt implementation mechanisms that were more specialized according to their locations. Although this scenario illustrates the larger presence of physical assets and structures, the transaction costs in understanding the local markets decreased.

Still started in this second period, but more present in the third period (2000-present), the quality issue received the central attention. At the macro-level, many regulations emerged with two purposes: establishing a reference of quality, aiming to

define minimum parameters of food security; and creating a structure to support it. Two main policies emerged to provide reference of quality parameters: IN 51/2002 and IN 62/2011. Both regulations were created with the same objective: to establish references of minimum quality levels. Although they were also adopted by the farmers to obtain a reference of quality indicators, which they then could use to negotiate with the previously imposed payments schemes of the processors, the change from one to another was surrounded by small adjustments in some indicators. The second objective regarding the creation of the structure was achieved by the creation of certification bodies in the government, which provided guidelines and accredited private laboratories to provide specialized services of cow milk quality analysis, i.e., implementation mechanisms from the meso-layer needed to be specialized to be able to monitor and control these technical indicators, which allowed the creation of the laboratories.

With the provision of this specialized implementation mechanism, not only the monitoring and control become more efficient, but also the micro-institutions started to be legitimized and perceived as fair by the agents. These laboratories started to become key agents by providing information for both farmers and processors to form the basis of the quality payments schemes in the milk supply. Using these services, both farmers and buyers could access the correct level of quality in milk production, which also affected the investments in the production and the incentives provision in the supply chains. However, although the farmers started to obtain quality references from the regulation, another problem persisted: they did not know what the fair value of their quality levels was, in terms of payment.

To solve this problem, the farmers needed to understand how the market was pricing the quality, which was difficult since the milk market in Brazil was strongly dispersed, with various and quite different farmers. In other words, the meso-institutions managed to address the food safety problem, but the issue of quality and pricing still persisted. As the connection between price and quality was not a concern of the regulation, which just imposed quality levels considering food safety, a distinct institutional bottom-up movement emerged: the agents started to organize themselves to create a meso-institution, the Conseleite, to handle this duality between price and quality in some Brazilian states.

While both public and private laboratories were in charge of implementing the regulation, Conseleite was responsible for legitimizing the micro-institutions. The Conseleite provided information regarding the relationship of price-quality taking into account the market functioning, i.e., it supplied information to farmers regarding the market functioning based on the remuneration and incentives of quality in other transactions of milk supply exchanged in the market. By doing so, the micro-institutions (i.e., incentives program on quality) went through an adaptation process to adjust the fairness of the remuneration, since the farmers started to obtain reference information

to compare and negotiate. New forms of quality enhancing emerged: processors' providing technical assistance to milk farmers, awards recognizing high-quality farmers, access to financial resources, among others. After this institutional rearrangement, at the micro-level, new quality payment schemes started to be created due to the incentives which enabled the legitimacy of the rules, because of the perception that the investments were being rewarded. Specifically, many micro-institutions were legitimized by this meso-institution.

This case explores the controversial point regarding the way people choose to follow rules (Hodgson, 2006). That is, how the three institutional layers are perceived as legitimate structures. As noted by Ménard (2014), the legitimacy of meso-institutions is established by the macro-layer, but the author does not explore how this legitimacy occurs in the connection between the meso and micro-levels. Even though several studies have highlighted the role of the alignment between institutions and governance mechanisms and transaction attributes Williamson (1985, 1996), none has studied the agents' perception of institutional legitimacy behind it.

As pointed out in the Brazilian case, it is possible to notice that legitimacy is also important for micro-institutions. Due to a lack of meso-institutions providing legitimacy to micro-institutions, some transactions were suffering from inefficiencies. As a result, agents at the micro-level coordinated an action to create a structure in the meso-level in order to provide this legitimacy, but not directly participating in the value creation and capture from the economic exchanges.

Specifically, the third period sheds light on the importance of the three concepts of institutional interconnectivity, complementarity and alignment. Firstly, institutional interconnectivity appears through the relevance of the translation of the technical indicators at the macro-layer as well as the provision of information about the market functioning at the meso-layer. Considering the lack of both types of translation, the micro-institutions would face serious problems to be efficiently implemented, and the likelihood of facing issues regarding food safety would be also high. In other words, the efficiency of the environment would be harmed.

Secondly, institutional complementarity appears through the joint functioning of Conseleite and the labs. It illustrates the specialized activities of both entities by focusing on either technical lab analysis considering the macro-institutions' indicators or technical market analysis considering the micro-institutions' characteristics. This scenario evidences the relevance of their specialized assets and the transaction costs involved in it. Finally, institutional alignment mainly appears linked to the labs' activities. Based on the complex technicality of their operations, these entities needed to be equipped with specialized technologies of cow milk quality analysis to be able to provide the adequate information.

In conclusion, the Brazilian case illustrates that the effectiveness of a regulation

not only depends on the way that it is created in the macro-level, but also how it is implemented and monitored at the meso-level. My results show that a change in the macro-layer leads to a change in the meso- and micro-levels according to the need for specific content carried by the change. If a regulation alters the requirements of institutional interconnectivity, complementarity or alignment, all macro, meso and micro-institutions would be modified according to the costs for achieving the required level of specialization when creating, implementing, monitoring and operationalizing the new rules.

2.4.2   Italy

Similarly to Brazil, the Italian dairy industry also experienced three relevant periods of milk regulations, but with some differences in the interplay between quantity-quality concerns (Table 2.3).

Table 2.3: Main focus of the Italian cow milk regulation

Characteristics	1960-1984	1984-2015	2012-present
Concern at the macro-level	Government price subsidies	Quantity control (quotas) and Quality concern	Coordination issues (Quantity, quality and price control through contracts
Main meso-institution	Agenzia per le Erogazioni in Agricoltura (AGEA)	Regional Zooprophylactic Institutes	Producer Organisations
Strategies at the micro-level	Increase quantity and absorb the incentives	Creating mechanisms to control volume of production and initiating micro-institutions concerned with quality	Designing micro-institutions' tools regarding coordination

The first period (1960-1984) marks the beginning of an interventionist wave during which macro-institutions were created to induce an increase of milk production through payment of prices that were above the international averages. Through its political structure, the Italian government established the AGEA in charge of the implementation, monitoring and control of this complex subsidy system at the meso-level. The agency was responsible for monitoring the price in each farmer-processor transaction, receiving information on volume and proving the subsidies according to the establishment of incentives of prices from the macro-institutions. At the micro-level, milk farmers and processors took advantage of this price increasing approach and created micro-institutions aiming to increase the volume of production as much as the demand would support to receive drinking milk or dairy products, enabling the creation of several supply systems constrained by specific rules on quantity and time of delivery.

This first period in Italy highlights mainly the concepts of institutional interconnectivity and institutional complementarity. The former is relevant due to the dependence of the institutional layers on the bottom-up information flow. Micro-institutions

providing the adequate details regarding volume of production are key factors in this scenario. Institutional complementarity raises from the joint activities of distinct macro and meso-institutions providing information about the domestic market from distinct countries over the world to make the analysis of the international market. Since each market presents a totally different reality and functioning, specialized macro and meso-institutions are necessary to provide the adequate details about each location.

The first period resulted in an overproduction and a change in the macro-institution. The modification altered the concern about higher prices to a control of volume of production, leading to the creation of quotas. At the macro-level, a quota of production system was created to control the level of production by each farmer. In other words, another interventionist period (1984 - 2015), but now controlling the amount of production, instead of inducing it through high prices. At the meso-level, the same meso-institution, AGEA, was kept responsible for the implementation of the new macro-institution. As the agency would maintain a similar function as its old activity - to monitor each farmer-processor transaction - there was no reason to replace it, even though the concern was modified from providing incentives of price to the control of quotas of production. Then, the activities would remain similar and the adjustment costs in AGEA's internal structure would be lower than if the agency was replaced.

This agency would keep its control over farmers' activity, but instead of analyzing prices, it would observe yearly reports around the level of production. Thus, the structure would suffer from small changes to be able to implement the new approach. Conversely, at the micro-level, micro-institutions were strongly impacted. Many supply systems became extinct, since the production started to be limited by a certain level, according to the quota, and then many farmers and processors bankrupted. Furthermore, as quality was not at stake, and the milk storage was absurdly high, the price drastically decreased. This situation highlights the interesting argument that a change at the macro-level will not necessarily modify its implements mechanisms completely, even though the layers are interconnected, the impacts originated by the institutional changes can bring a stronger influence in one level than in another.

This first concern of the second period underlines the institutional interconnectivity concept. Although a change occurred from quantity to quality control, the meso-institution in charge of implementing the rules was maintained. This characteristic evidences that the specialized activities of monitoring of AGEA would not face a strong change, but smooth adjustments. Therefore, the top-down and bottom-up information flow would be similar in terms of coordination, resulting in the maintenance of the past structure. This illustrates that the activities of creation, implementation and operationalization of rules are interconnected, but the entities related to them are not always replaced when facing institutional changes.

Still in the second period, another relevant point emerges: the quality concern

similar to the Brazilian case. From the 1990s to the 2010s, new macro-institutions emerged aiming to regulate food safety issues on milk production to the healthy consumption of milk drinking and dairy products, like in Brazil. A bundle of regulations establishing levels of milk quality parameters as well as limits for the use of chemical substances. As in the Brazilian case, the emergence of new macro-institutions concerning milk quality brought the need of creation of new meso-institutions. However, as noted by Ménard (2014), Rouviere and Royer (2017), distinct meso-institution can emerge from one country to another even having similar objectives. In Brazil, while the intermediary mechanisms in charge of implementation and monitoring of quality concerns were private laboratories certified by the Brazilian government, the Italian meso-institutions were public laboratories, the Regional Zooprophylactic Institutes (RZI). Together with the private certified labs, these institutes were responsible to inform the authorities if milk producers were following or not the limits and minimum level of food security.

As a response to the rearrangement in macro and meso-levels, new micro-institutions were created, naturally induced by the market, to control the downwards in price through payment schemes systems based on quality parameters. Processors designed strategies to encourage farmers to invest in high-quality milk production. New supply systems oriented by quality replaced the quantity concern. Different from the Brazilian case, the Italian transactions did not demand the creation of another meso-institution to manage the duality between the fair price and quality indicators, whereas this was required in Brazil. One possible explanation is the economic organization of this market in Italy. The presence of more collective actions, less costly ways to collect information in the market, the more homogeneous profile of farmers and their distance can be a reasonable explanation.

This other part of the second period presents a basis related to the institutional alignment concept. Likewise the Brazilian case, the new concern on quality by the Italian government demanded by the acquisition of new technologies by meso-institutions (RZI, in this case) to implement and monitor the quality levels. The institutes needed to acquire specialized equipment for cow milk analysis. Moreover, the emergence of the quality debate opened room to the increasing of investments of production technologies by farmers according to the rules defined by the micro-institutions, i.e., the amount of investments in the production processes and quality enhancements occurred according to the rewards provided by the rules.

The third period in Italy (2012 - present) refers to a regulation regarding coordination issues, which Brazil still did not experience and maybe is not going to pass through since the Italian markets are more regulated. The modifications in the macro-layer resulted in a strong change at the meso- and micro-layer. At the macro-level, the Common Organisation of Markets emerged aiming to legitimize the use of specific con-

tractual tools and their enforcement at the meso-level by collective actions, which was demanded by the new macro-institution called Milk Package and its requirements of coordination through contracts in the farmer-processor transactions. Instead of internalizing the implementation responsibility, a regulation was created to legitimize these private devices to handle the collective negotiations. Thus, at the meso-level, the meso-institutions in charge of implementing these new rules were producers organisations and other kind of collective actions. These entities enabled the collective negotiation of contracts, minimizing the unbalancing of bargaining power between farmers and buyers, and minimizing the emergence of unfair trading practices in some cases. The activity of aggregating the adequate actors in a given collective framework to then negotiate would generate to much adjustment-related costs to the State. For this reason, the duty on this issue was transferred to the market, but monitored by the macro-institutions.

An interesting point in this period was that the macro-institutions provided a distinct incentives in this coordination perspective: they would enable the producer organisations and the others kind as an entity with legitimacy to create sector-specific rules. At the micro-level, both macro- and meso-institutions were strongly impacted by the new way by which the agents act. Farmers and buyers became aware of coordination problems and, therefore, they started to manage transaction costs regarding their relationships. Rather than focus on quality, the new central point was how to develop supply strategies given the collective approach imposed by the macro- and meso-institutions. Instead of individual negotiations on quality and premium prices, the new micro-institutions were focused on how economies of scale from the amount of milk supply and from the collective economic organization of the farmers could handle the coordination problems.

This last period in Italy mainly underlines the role of the institutional complementarity at the meso-layer. The coordination concern and the decentralization approach to implementation of rules stresses the specificity across the Producers Organisations. Since coordination issues can cover a broad range of distinct aspects, each of these collective arrangements are adapted according to their reality and their main problems in order to manage coordination frictions and follow the rules from the macro-institutions. In other words, the implementation of the coordination rules occurs through different but complementarity meso-institutions.

Therefore, likewise the Brazilian case, the dairy industry in Italy also draws attention to the relevance of the concepts of institutional interconnectivity, institutional complementarity and institutional alignment. Specifically, the two cases exposes that institutional interconnectivity is a key feature of any institutional environment, since any kind of rule is subject to translation, which was already raised by Ménard (2014, 2017), Ménard et al. (2018). Both cases illustrated the strong connection between institutional complementarity and entities from the macro- and meso-layer. The need

for a systematic perspective in both levels illustrates the transaction costs role when specialized activities have to be performed. Furthermore, the evidences shed some light on the connection between the different levels - meso and micro - and the technological environment. This role appears through the institutional alignment. While Ménard (2014) highlights the technological connection and macro-institutions, I also summarize some relations between the need of technologies and the activities of meso- and micro-institutions to make them more efficient. This argument is based on the need of specialized monitoring equipments in order to implement and control the rules at the meso-layer, as well as the use of adequate technologies in the production processes according to the rules defined by the micro-institutions in which each agent is involved.

2.5   Conclusion

Based on a regulatory perspective, I provide some evidence highlighting the key concepts of institutional interconnectivity, institutional complementarity and institutional alignment and show how they drive the agents' strategies. I provide an understanding of how policies are created (macro), implemented (meso) and operationalized (micro) according to their translation and information flow (interconnectivity), specialized monitoring and enforcement (complementarity) and their technological basis (alignment). This article highlights the relevance of considering three institutional layers - macro, meso and micro -, how they interconnect and the key features in their relationships. I posit that this institutional interconnection and evolving are conditioned by transaction costs and an efficiency perspective. I underline that different inefficiencies can emerge from one layer to another, which result in distinct reactions and also problems, but there is either a top-down or bottom-up institutional legitimacy to support or facilitate these changes.

This study uses the cow milk regulations cases in Brazil and Italy from a historical standpoint to illustrate these ideas. I present the different periods of regulations in each country, describing the changes and adjustments in the macro, meso and micro-level according to the passages from one period to another. I show that changes in macro-institutions cannot always lead to strong modifications in the other levels, sometimes small adjustments being enough. The cases expose that not only meso-institutions are legitimized by macro-institutions, but meso-institutions also legitimize micro-institutions. Some micro-institutions were shown to be inefficient when there was no legitimacy from the levels above (macro or meso).

Although this article is focused on cow milk regulations, the propositions discussed are general, which can enable further applications in other sectors and countries, as the comparison between Brazil and Italy presented here. Despite being only a tentative description of the issue of regulations creation, implementation and oper-

ationalization, I suggest that rules can fail for different reasons. Far from suggesting that my concepts and framework fully fill the extant gaps in the literature of institutions and their impact on economic systems, I provide some theoretical enhancements to explore this new research agenda and provide some concepts capable of illustrating the three institutional layers, which are not only systematically related, but also independently relevant, and whose efficiency is dependent on at least three distinct characteristics - (1) institutional interconnectivity, (2) institutional complementarity and (3) institutional alignment - with different focuses and influences - (1) translation, information and vertical relationships; (2) enforcement and monitoring, incentives and horizontal relationships; (3) coordination, incentives and functioning as a background in all relationships.

In conclusion, this study makes theoretical contributions by providing more details concerning this dimensionalizing institutional perspective from a regulation point of view. Furthermore, this can support policy-makers in constructing more effective policies with general goals and implementation structures. That is, I stress the importance of the three different institutional layers, and how they are interconnected, how they are complementary and technologically aligned. Finally, I present some developments and more details regarding transaction costs and how they can be useful to explain the efficiency of institutional layers, or a regulation, as illustrated in my cases.

3   Chapter Three

Meso-institutions: the link between regulatory institutional voids and performance

Abstract

This study analyzes the impact of meso-institutions on performance, as well as the dependence of this influence on firm-level resources. Using a fine-grained dataset of cow milk quality data in Brazil, I combine difference-in-differences and matching to investigate it. I evidence firms with access to meso-institutions overcoming regulatory institutional voids and increasing performance. These effects are based on the translation and information provision mechanisms that simplify complex rules and induce the firms to achieve a better fit between their external environment and internal resource allocation. My results also underline the particular relevance of meso-institutions for small firms which commonly face the scarcity of heterogeneous organizational resources to overcome institutional voids on their own. I contribute to the institutions-based strategy literature by studying institutional voids and meso-institutions under a point of view of competitive advantage and performance.

3.1   Introduction

According to the institutions-based strategy literature, firms' success depends on the ability to handle formal and informal institutions' variations (Marquis and Raynard, 2015). Some authors explore circumstances in which the enforcement and monitoring are the major institutional issues, like the emergence of networks (Mesquita and Lazzarini, 2008), relational governance (Dyer and Singh, 1998, Granovetter, 1985, Poppo and Zenger, 2002) and other informal institutional mechanisms (Peng et al., 2009, Marquis and Raynard, 2015) in response of formal institutions' failures. Usually, these arrangements appear under the self-enforcement perspective of contract theory and the mechanisms of trust and social norms (Gil and Marion, 2012, Uzzi, 1997), basing on the shadow of the future or the shadow of the past (Gibbons and Henderson, 2012), as well as narrowly focusing in the assumption of opportunism (Klein et al., 1978, Williamson, 1991).

Assuming another perspective, other scholars have explored how the institutional environment in the country level affects the firms' strategic decisions (Meyer et al., 2009,

Peng et al., 2009), but treating institutions strictly at the macro level, assuming them under a condition of homogeneous effects (Meyer et al., 2009, Peng et al., 2009). This literature has increasingly gained attention in investigating the lack of institutions in terms of financial, labor, infrastructure, distribution channels, among other institutions that provide support to the market operation the so-called institutional voids (Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Khanna and Palepu, 2006, Khanna and Yafeh, 2007).

More recently, a critique in treating institutions formed by only the macro-layer has emerged (Armanios et al., 2017, Chan et al., 2010, Mair et al., 2012, Meyer and Nguyen, 2005). Neither guiding the attention to the opportunism and enforcement issues, nor assumes a unique macro-level to the institutions, the institutional intermediaries approach has been showing the relevance in consider the other levels of institutions to investigate firms' performance. However, all these three institutional perspectives in strategy are still limited.

The literature has followed three paths: institutional analysis focused on opportunism-based issues, the uniqueness of the macro-level institutions and their homogeneous effects, or the narrow attention in resources or market- based conclusions. There is no attempt exploring an institutional problem that takes into account other levels beyond the macro and focuses on institutional explanations. Contributing on that, I assume the existence of a meso-level of institutions derived from the extent to which institutions are translated to lower levels and explore it using institutional arguments (Ménard, 2014, 2017, 2018).

In this paper, I use the concept of meso-institutions to show that institutional voids can also be originated from translation problems of institutions (e.g. regulations and policies) (Ménard, 2014, 2018), which I call regulatory institutional voids. Based on the relevance of institutional intermediaries' information provision (Sleptsov et al., 2013), I advocate that the meso-institutions' translation function carries relevant effects on the micro-level in which firms make strategic decisions. For instance, a better translation of macro-institutions can allow a more efficient resource allocation and decision-making process (North, 2006), attenuate the costs to make the right decision (Hayek, 1945), reduce the information collection costs to operate efficiently (Grossman and Stiglitz, 1976), and minimize the uncertainty involved in the exchange process (North, 1990a). That is, assuming that meso-institutions are *"in charge of translating them into rules specific to a sector, a region, a type of activities"* (Ménard, 2016), some firms can obtain competitive advantages by achieving an adequate fit between the external environment and internal resource allocation due to the support of these translation devices (Donaldson, 2001).

This study explores two points. The first is whether meso-institutions can support firms to overcome regulatory institutional voids. My expectation is that firms with

access to these meso-institutions' translation mechanisms achieve higher performance. By meso-institutions I refer to an institutional intermediary that supports firms to overcoming these voids by translating the rules' complexity and providing adequate information. By translation effects or mechanisms I refer to the capacity of adapting a general and broad content to a specific context. In my case, this is seem through the adaptation of the complex indicators of quality from a milk regulation into simpler parameters of price. The translation effect studied here is about the reduction of costs to understanding a regulation and adjust firms' internal strategies (e.g., get a clear picture of the price mechanism of a market). That is, understanding how transactions are being exchanged as well as the value imposed by the market to the quality attribute of a product. Specifically, these translation effects regard the information and negotiation costs around a transaction.

By regulatory institutional voids I refer to the complex macro-institutions (e.g. policy and regulations) that generate firms' misinterpretation problems because of the higher costs to understand the functioning of a market constrained by the policy. This lack of information is relevant because the misunderstanding of a regulation can mislead firms to make inefficient decisions in terms of their internal resource allocation, thereby influencing performance negatively. In other words, a regulation can influence the economic agents' value perception of the quality level of certain goods, then observe an adequate portrait of the market functioning and its coordination of price-quality value is crucial. Therefore, meso-institutions present a strong impact in performance because of their effect on institutional voids.

The second point is that I assume translation effects of meso-institutions as being dependent of firm-level resources, especially the presence of heterogeneous organizational resources that enable the use of other firms' internal alternative solutions to overcome institutional voids. By heterogeneous organizational resources I refer to distinct organizational resources that can support firms to adopt an alternative solution using internal inputs to fill the voids. I use size as a mechanism to capture the dependence of firm-level resources. For instance, large companies do not need an external structure to manage problems from regulation, they can use their internal resources, either financial resources to pay for specialized services or internal structure of regulatory analysis. In contrast, a small firm does not have the same ease access, either because of its limitations in terms of payment for services or the lack of internal specialized knowledge. In operationalization terms, I measure the overcoming of regulatory institutional voids and the increasing of performance using quality parameters of a complex regulation that generated voids. Also, I evaluate the meso-institutions' translation effects using an identification strategy of a difference-in-differences that captures the creation impact of this structure.

This study contributes in several limitations found at the extant literature. First,

some studies have explored the enforcement and opportunism-based issues of institutions, while I study translation problems. Second, it has devoted much attention to a unique level of institutions, the macro-dimension, while I adopt a meso-level institutional approach. Third, the recent debate about institutional intermediaries have only focused in resources- and market-based arguments, not in institutional explanations as I do. Fourth, I am the first to apply the framework of meso-institutions under the perspective of institutional voids. Fifth, this is the first attempt that analyzes the meso-institution in a quantitative basis. Also, I perform my analyses in a novel data still not used in the literature, as well as bring relevant implications to practice by being the first to quantitatively investigate the effects of my subject.

Accordingly, this study attempts to contribute to the institutions-based strategy literature. I unveil a new approach of regulatory institutional voids, and explore a meso-level of institutions. I stress that the next generation of institution-based strategy studies needs to place more emphasis on the institutions' levels, institutional translation and the major role of information in regulatory institutions voids. The application of signaling theory on management studies can support this development (Connelly et al., 2011).

3.2 Theoretical Foundation

Institutions have been largely studied since Davis and North (1970a). Institutions and public policies have been assumed as sources of (un)development in terms of economic growth (North, 1990a, Acemoglu and Johnson, 2005b, Acemoglu and Robinson, 2012) and social disorder (e.g. corruption, violence, etc.) (North et al., 2009, de Mariz et al., 2014). However, due to the major focus on the macro country-level (Ménard and Shirley, 2005), few precise conclusions have been directly made on *why institutions fail* in the same environment (Chan et al., 2010, Meyer and Nguyen, 2005).

Some studies advance on this issue but based on market imperfection in terms of resources access (Armanios et al., 2017, Lamin, 2013, Mair et al., 2012) or strategizing by the government (Doh et al., 2012, Khanna and Rivkin, 2001, Khanna and Yafeh, 2007, Lazzarini, 2015). In contrast, I maintain the new institutional economics focus on institutions to explain this relevant phenomenon (Ménard, 2014, 2018). Some statements in the past literature have already indicated an opportunity to advance in the institutional theory. For instance, in Demsetz (1969) when he says " *I believe to be the basic problem facing public and private policy: the design of institutional arrangements that provide incentives to encourage experimentation (including the development of new products,... new ways of organizing activities)*" or Loeb and Magat (1979) in "*We believe that the only way to escape the disagreeable choice between regulation and franchise control is to design new social institutions*".

According to Ménard (2016), the dimensionalizing perspective of institutions can

be a path. While macro and micro levels are widely discussed, the meso-institutions have far received less attention. A vast part of the literature assumes the institutional context as internally homogeneous (Marquis and Raynard, 2015, Meyer et al., 2009, Peng et al., 2009). I, in contrast, explicit meso-institutional forces carrying heterogeneity in a given institutional environment that result in distinct firms' performance (Ménard, 2014). These forces are originated from meso-institutions that *"provide the essential link between the general rules and norms established at the macro-level of the social, political, or judiciary systems, rules and norms in which are embedded policies that often cover several sectors or sub-sectors simultaneously"* (Ménard, 2017).

This link relies on the provision of appropriate information and translation of the rules complexity. That is, meso-institutions are critical institutional layers when issues related to rules translation appear. According to the extant literature, there are few examples that apply the meso-institution approach. Ménard (2017) illustrates European cases where the macro-institutions are seen as European Union policies while the meso-institutions vary according to the decentralization of decision rights in the institutional environment of each EU country member. He exemplifies meso-institutions as regulatory agencies and other institutional structures that obtain and coordinate property rights in water provision according to the macro-level of regulation. Alike, Rouviere and Royer (2017) illustrate the food safety context following the macro-institution as a national regulation but varying the meso-institutions in terms of responsibilities and rights due to its nature as different public private partnerships. Broadly speaking, the institutional architecture defines the duality in duties and rights, i.e., who has to do what, who has the right to capture the created value and who has to monitor who. Therefore, meso-institutions appear as key devices in those relationships in terms of the general rules translation.

Indeed, I assume that the interplay between institutions and firms does not occur directly, there are meso-institutions in between. While the strategy literature just explores it through the resource- or market-based support of institutional intermediaries to entrepreneurship or foreign investment decisions (Armanios et al., 2017, Chan et al., 2010, Meyer and Nguyen, 2005), I investigate the institutional influence of meso-institutions through translation and information provision on regulatory institutional voids. Some studies have emphasized the information relevance in strategy contexts (Lamin, 2013, Sleptsov et al., 2013). They provide support in adopting the meso-institutions' translation function as a relevant theoretical channel. Therefore, I assume that the meso-institutions translate general rules to certain context and then influence firms' performance (Ménard, 2014).

In this light, a meso-institution that arranges a structure to communicate relevant information may attenuate the costs on the required knowledge to take the right decision (Hayek, 1945), as well as may reduce the costs in achieving information needed

to operate efficiently in that market (Grossman and Stiglitz, 1976). This information provision allows a better plan in production and decision-making. By interpreting the macro-institutions correctly, the firms make better choices in terms of investments and resources allocation (North, 2006), obtain better information and reduce the uncertainty in the exchange process (North, 1990a). These arguments imply that the resource allocation become more efficient in the micro-level, thereby leading to:

*Hypothesis 1: When faced with complex macro-institutions that generate **regulatory institutional voids**, the **meso-institutions** increase firms' **performance** because of their **translation effects**.*

Apart from the direct impact of meso-institutions on performance, it also depends on firm-level resources. The relationship between meso-institutions and performance is moderated by the firms' heterogeneous organizational resources. Drawing on institutional voids studies (Gao et al., 2017, Khanna and Rivkin, 2001), I assume size as the main characteristic that identifies these heterogeneous organizational resources in firms.

Institutional voids are usually originated from the lack of resources and market inefficiency (Khanna and Rivkin, 2001, Khanna and Yafeh, 2007). The usual solution of this market failure emerges from large firms that take advantage of their established structure. In many cases, these firms adopt their own strategies to handle institutional failures rather than using an external intermediary. When needed, they may create their own supply channels, specialized talent labor market, reputation diversification strategies (Khanna and Palepu, 1997, 2006, Gao et al., 2017), or they also strategize by the government (Doh et al., 2012, Khanna and Rivkin, 2001, Khanna and Yafeh, 2007, Lazzarini, 2015) or explore market entry strategies in different institutional contexts (Peng et al., 2009, Meyer et al., 2009). Therefore, larger firms have already possessed solutions to increase their performance in cases of institutional voids.

Larger firms own more heterogeneous organizational resources and can achieve more competitive advantages due to resources complementarities (Gibbons and Roberts, 2012), resources specificities (Barney, 1991, Peteraf, 1993) or access to strategic factor market (Barney, 1986). These kind of firms usually can make heavy investment in R&D, create specialized factor markets of inputs, make good connections with government, contract specialized services to handle institutional failures of misinterpretation of the law, among others (Khanna and Rivkin, 2001, Khanna and Palepu, 2006, Khanna and Yafeh, 2007, Marquis and Raynard, 2015). They can access structures that support them in case of regulatory institutional voids, making them more independent of meso-institutions. Being so, I assume that meso-institutions are institutional intermediaries particularly relevant to small firms which commonly face the scarcity of these hetero-

geneous organizational resources to overcome institutional voids on their own (Mair et al., 2012, Meyer and Nguyen, 2005).

In other words, meso-institutions carry an inclusive function for firms that cannot handle market failures by themselves. Some firms cannot afford own sufficient organizational resources that generate other alternatives to overcome institutional voids beyond the use of an institutional intermediary to provide translation with clear information (Lamin, 2013, Sleptsov et al., 2013). In doing so, I stake that the translation function of meso-institution carries an important inclusive growth effect in firms which do not own those wide variety of heterogeneous organizational resources.

For instance, a large firm does not need an external help to handle institutional voids. It normally has its own internal variety of resources to manage the voids, such as large amount of financial support, interorganizational relationships with partners, easier access to technologies, knowledge and human capital accumulation, and so on. However, on the other side, small firms do not own a supportive structure like that. This other type of firm usually needs external influence to manage institutional voids. Government subsidies, lower taxes, cheaper financial credits to access technologies are only few examples of this external support for small firms.

Specifically, I assume that scarcity of heterogeneous organizational resource plays a positive moderating role on meso-institutions' translation effects for small firms, since these type of firms cannot access other alternatives to circumvent the institutional voids using their own variety of resources.

*Hypothesis 2: When faced with complex macro-institutions that generate **regulatory institutional voids**, the **translation effects** of **meso-institutions** are more relevant to **small** than to large **firms** to overcome the voids and increase their **performance**.*

Figure 3.1 synthesizes my conceptual framework.

3.3   Empirical setting: Brazilian cow milk industry

Cow milk industry is a relevant sector in Brazilian economy. In 2016, the Brazilian industry emerged as one of the leaders in worldwide milk production. The country had the second largest cattle herd in the world with more than 19 million cows. It occupied the leader position in South America with 59% of the cow herd for milk production in the continent, and it was also the fourth largest global milk producer with more than 33 billion of liters, representing approximately 56% of all cow milk production in South America (FAO, 2016).

The Brazilian cow milk industry is a complex production system. There are
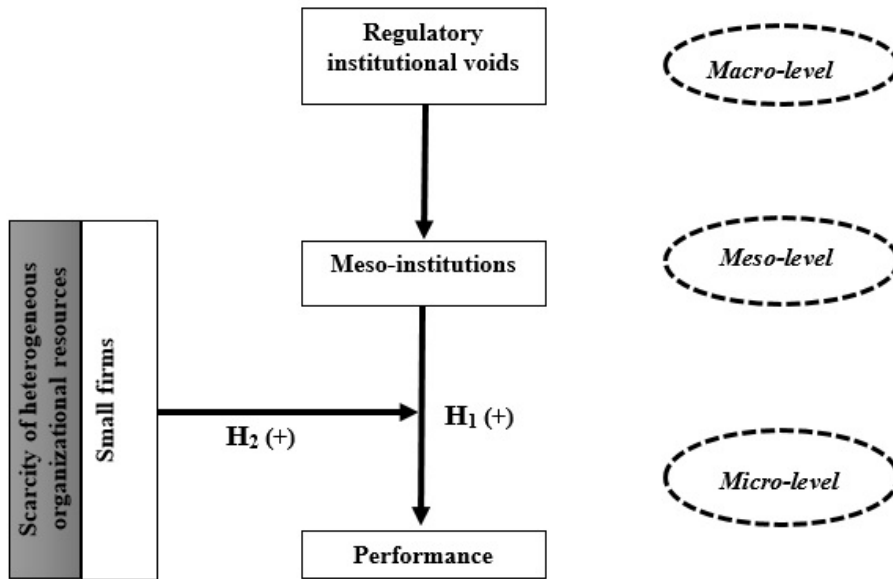
Figure 3.1: The conceptual model

worldwide leaders of dairy processing firms operating in Brazil such as Nestlé, brand branches from BRF and J&F groups, among others. This sector contains more than 1.3 million heterogeneous milk producers located over the vast territory of 8.5 million of square kilometers (Embrapa, 2016). This heterogeneity in producers' profile leads to variations in quality level in milk production which requires regulation mechanisms to be controlled.

Historically, many sectors in Brazil have suffered from strong regulation and governmental intervention. Starting from the 1930s in *Getúlio Vargas* government until the 1990s, the regulatory interventionism prevailed in Brazilian economy. Many sectors had managed quotas limiting production and defining price, especially agri-food chains. The intervention mechanisms led to a decreasing of quality and investments in technology by producers. In order to minimize the negative externalities of the interventionism, during the *Fernando Henrique Cardoso* government in the 1990s, a deregulation process emerged to deal with the disinvestments. However, some sectors did not react according to the expected, as the milk industry that continued facing its quality and disinvestments issues.

In the 2000s, after this deregulation process, milk producers were not able to understand market signalization and, consequently, some food safety problems emerged. As an alternative, the government made an interference once again. The intervention was a regulation about quality indicators and basic parameters of food safety in milk production, the Normative Instruction number 51 created in 2002 (IN 51/2002) (MAPA, 2002).

According to the new legislation, there were five main indicators of quality in milk production to be respected: somatic cell level (SCL), total bacteria level (TBL),

percentage of protein (PP), percentage of lactose (PL) and total solids (TS). The first two can be interpreted as an index of low-quality. They represent information about the control of bacterial contamination of the raw milk. In contrast, the others appear as an index of high-quality. They are a relevant part of the raw product that carries the value to the processing of dairy goods.

I study these all five quality indicators as two distinct indexes. Dairy firms usually adopt two main strategies in their production. One strategy is related to products that depends of a certain level of bacterial contamination to achieve a good level of fermentation and quality (e.g., cheese and yogurt production). Another strategy relies on the higher presence of attributes of protein, lactose and total solids to produce value-added products (e.g., powdered milk and high-quality drinking milk). Therefore, the analysis of cow milk quality can be influenced by this strategy variation, thereby considering two different indexes is needed due to the reality of businesses' strategies of dairy sector.

Even with this new regulation and quality indicators, some issues on disinvestments and quality still prevailed in the milk cow sector in Brazil. The five indicators were considered too complex and technical. They required specialized knowledge to be interpreted, a knowledge that was not available to all milk producers in Brazil. Thus, many producers continued to produce low-quality milk, mainly because they could not properly understand the rule, i.e., a lack of understanding due to informational constraints about the regulation, which characterizes the regulatory institutional voids. In other words, the farmers were not able to understand the value in their quality level to properly negotiate prices with buyer, thereby leading them to manage transaction costs and signaling information problems (Connelly et al., 2011).

The failure in the implementation of the IN 51/2002 demanded a change in the sector economic organization to manage these informational barriers from the complexity of the regulation, the creation of the *Conselho Paritário entre Produtores e Indústrias de Laticínios* (Conseleite) (Joint Council of Farmers and Dairy Processors) (Canziani and Guimarães, 2003, Silva et al., 2012). The Conseleite was created after the IN 51/2002 and formed by milk producers and processing firms. As a state-level structure, only five Conseleite units were created in the Brazilian states of Paraná (2002), Rio Grande do Sul (2004), Santa Catarina (2007), Mato Grosso do Sul (2011) and Rondônia (2014). The foundation of Conseleite only occurred in five states due to the difficulty in coordinating the collective interests of farmers and processors, as well as in finding leaders to represent these both sides. In other words, the creation of this structure depends on the economic organization and collective representativeness of the agents.

Conseleite approximates milk farmers and processors to an external third part formed by specialized technicians in dairy market. The third part (technicians) receives

information of quality parameters from the regulation and regional production costs directly from the involved agents (milk farmers and processors) or public information in market. They use a specific and transparent methodology of price formation based in an agreement of both parties, presenting the outputs in monthly meetings with formal documents signed by five representative agents from each parties, the farm and processing sides. For this reason, acting regionally and individually, each Conseleite brings transparency to the milk supply transaction based on the provision of information and price references that translate the complex regulation.

Conseleite also presents a particular characteristic that stresses the reliability of my identification strategy. The creation of this structure does not follow the efficiency of the milk production in terms of quality. Indeed, there are two distinct situations. The establishment of this arrangement occurred in Brazilian states known as efficient milk producer, as well as in locations considered inefficient.

Specifically, Conseleite is a meso-institutional device (Ménard, 2014). Following the institutional intermediary literature (Armanios et al., 2017, Mair et al., 2012), this is an intermediary level between regulation and firms which acts as an institutionalized structure and manages the information constraints resulted from the complexity of quality indicators. This is a structure that supports firms to overcome regulatory institutional voids and complements formal institutional environment supporting the translation of complex macro-institutions (Ménard, 2017).

By providing price references based on technical indicators of regulation and production costs in its region of establishment, that is, creating meso-institutional mechanisms, Conseleite manages institutional failures originated from complex rules misunderstanding, thereby handling regulatory institutional voids. In doing so, this structure generates an essential link in the relationship between macro-institutions and firms (Ménard, 2017). Also, I classify this structure as being a meso-institution, not an organization, because even providing support to the transaction, it does not absorb the value created, acting as an external part to the transaction of farmers and buyers.

I test my hypothesis 1 analyzing whether Conseleite can enable the firms to make the allocation of resources more efficient due to the translation of the milk quality complex parameters. Broadly speaking, my expectation is that Conseleite can manage institutional failures of translation and influence milk producers' performance using an information provision structure which attenuates the lack of understanding of the rules. The channel of influence in performance of milk producers are the outputs of Conseleites meetings that guide the negotiations of price and quality in the micro-environment - transactions between milk producers and processors. In doing so, Conseleite generates a mechanism that can encourage quality enhancing and can create transparency in the relationship between producers and processors. Drawing on the management application of signaling theory (Connelly et al., 2011), I expect that Conseleite can support a

more efficient resource allocation because producers might obtain more adequate benefits of their investments in production, as well as reduce uncertainty and transaction costs of these involved agents. Specifically, Conseleite provides information about the value of quality levels according to the price established in the exchanges made in the market.

This intermediate arrangement also has the same isolating mechanism of the theoretical meso-institution: each structure adopts local production costs to elaborate its price definition, limiting the imitation by producers who are not located in the same region. Producers adhere to this institutional structure in order to explore the reduction of informational barriers. Notwithstanding, the Conseleite's influence does not occur equally to all milk producers. The effect of this structure depends on characteristics of each producer having in view the possessing of heterogeneous organizational resources. I assume that Conseleite's translation function is particular relevant to milk producers who cannot count on other alternatives to overcome the institutional voids. While large milk producers can also adopt other mechanisms using internal inputs to handle this obstacle, the small agents cannot do that due to their restriction on resource access.

For hypothesis 2, I identify size focusing on individual milk farmers. Compared to the other profiles of my study - collective milk farmers or processors firms - this type of producer has a restrict internal structure and less resources to allocate and manage the institutional voids. Therefore, the empirical identification strategy relies on the fact that it is usual to observe milk producers with resources restriction. Indeed, some Brazilian milk producers are family farmers and settlers (Vilpoux, 2014) or even too small and facing difficulties to acquire relevant resources (Schebeleski, 2013).

3.4   Data and method

Empirically, I test whether the creation of Conseleite increases the milk quality of Brazilian producers. My mechanism is that the Conseleite translates the complex regulation (IN 51/2002) into price references which reduces the uncertainty and transaction costs and turns the producers' decision-making more efficient. That is, Conseleite boosts incentives based on the information provision that encourages a better resource allocation, thereby increasing performance because of this market signaling. Additionally, I test the dependence at the firm-level according to the possession of heterogeneous organizational resources. I study whether small firms present positive effects of meso-institutions in performance due to the inclusive aspect of this translation mechanism.

I use a unique dataset with daily laboratory analysis of milk from 25 of the 27 Brazilian states (Alagoas, Amazonas, Bahia, Ceará, Distrito Federal, Espírito Santo, Goiás, Maranhão, Minas Gerais, Mato Grosso do Sul, Mato Grosso, Paraná, Pará,

Paraíba, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Rondônia, Roraima, Sergipe, Santa Catarina, São Paulo, Tocantins) over a nineteen-year period (1999-2017), at the individual level, totaling more than 14 million data points. It is a private dataset from a Brazilian laboratory that participates of the Brazilian Network of Laboratories of Milk Quality Control and also takes part in the recent launching of the Monitoring System of Brazilian milk quality, a partnership with the Brazilian Agricultural Research Corporation (EMBRAPA) and Ministry of Agriculture, Livestock, and Food Supply (MAPA) in Brazil. It corresponds to an unbalanced panel since there is no data for all days. Moreover, I transformed the data to daily means when the individuals have more than one observation in the same day.

The dataset is comprised of milk quality information. I constructed two indexes about milk quality. First, a low-quality index that has a negative correlation with milk quality (the sum of total bacteria level and somatic cell level). Second, a high-quality index that has a positive correlation with milk quality (the sum of percentage of lactose, percentage of protein and total solids, in which the percentages are multiplied by 100). All variables are in the IN 51/2002 as well as represent the performance of the milk producer. They enable us to capture whether the creation of Conseleite provides translation devices of the complex rules and then brings positive effects in the producers' quality and performance. In addition, the dataset describes the Brazilian state of each observation, and exposes some control variables such as the technology adopted in the milk storage (direct from the animal, milk storage tank, storage tank inside a truck, milk storage silo and others) and the scale economy capacity, i.e., the agent's size (individual milk producer, dairy processing firm, group of milk producer and others).

This unique field setting allows us to test my conceptual framework performing a difference-in-differences approach. I adopt the states with Conseleite as my treatment group. Specifically, I only use the state of Mato Grosso do Sul because I do not have data before and after the Conseleite creation in the other states (Paraná, Rio Grande do Sul, Santa Catarina and Rondônia). Therefore, I excluded these four states' data. As my control group I adopted the other states in my sample. As the treatment exogenous shock, I assumed the creation of the Conseleite in Mato Grosso do Sul in February 11, 2011.

Stressing my identification strategy and trying to avoid selection and omitted variable biases and endogeneity, I performed distinct and complementary procedures: i) addition of time- and individual-fixed effects to deal with the non-observable heterogeneity; ii) insertion of state-specific time trends to complement my test of the parallel trends hypothesis (Besley and Burgess, 2004); iii) adoption of a placebo test; and iv) clustering of error term in order to attend to serial correlation and heteroskedasticity issues (Bertrand et al., 2004, Cameron et al., 2011).

My cluster procedure follows Bertrand et al. (2004). I ignored all the time series information by turning my dataset into a panel of length 2 (before and after) since the cluster standard error in a level above (state) of my unit of analysis (individual) can solve this problem. I also maintained the information about time (day, month and year) in each observation to use a time-fixed effect. I kept the information as closer as possible to the shock at stake. I decided to do that because the panel is unbalanced, then the observations come from different periods, forcing us to control this unbalance using this approach.

Other procedure to stress my identification strategy is the use of the coarsened exact matching technique. To circumvent the bias of the imbalance between the treatment and control groups (Blackwell et al., 2009, Iacus et al., 2012), I coarsened seven variables: technology of storage, economies of scale capacity (size), total bacteria level, somatic cell level, percentage of lactose, percentage of protein and total solids. The first two are naturally categorical and remain in their five and four categories, respectively. The others are continuous, and, being so, I transform them into well–defined categories.

I coarsened both the bacteria total level and the somatic cell level in seven categories, percentage of lactose in five categories, percentage of protein in six categories, total solids in five categories. Attenuating the imbalance as much as possible, I defined each category containing at least 10% to 20% of all observations of that variable. Following Blackwell et al. (2009), Iacus et al. (2012), Beatty and Tuttle (2014), I performed this specific matching because of its better performance compared to other matching methods. I also maintain all observations weighting my estimates based on the matching outputs.

Finally, I perform my estimates in the sample corrected for serial correlation based on the following equation:

$$Y_{ist} = \alpha_s + \delta_t + \phi_{st} + \lambda_{ist} + \Lambda I_{st} + \epsilon_{ist} \tag{1}$$

Where Y_{ist} represents the outcome of interest (low-quality or high-quality indexes) for individual i in group s (state) by time t. α_s and δ_t are state- and time-fixed effects, respectively. ϕ_{st} is a specific-time trend variable which includes an interaction between all months and states that captures the monthly seasonality of milk production. λ_{ist} are individual controls, specifically the aspects related to the technology in milk storage and size. ΛI_{st} represents the treatment effect by state s at time t. ϵ_{ist} is the error term.

3.5   Results

My identification strategy is a difference-in-differences that adopts the creation of a meso-institution as the treatment effect and evaluates whether this structure manages

regulatory institutional voids providing adequate information to increase performance. The validation of this strategy relies on the fact that after Conseleite creation the regions where it is located have an additional translation device boosting incentives and increasing the performance through information and translation provision. In Figure 3.2, I plot the medians of both quality indexes to test this identification strategy based on the parallel trends hypothesis.
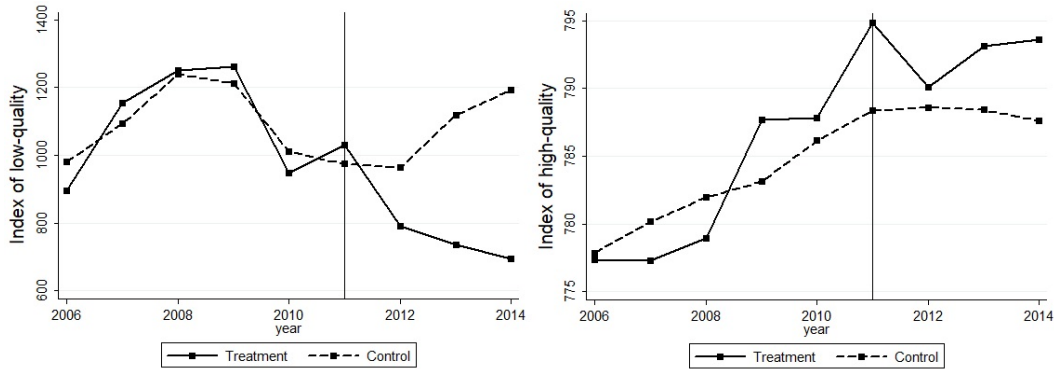
Figure 3.2: Parallel trends

Figure 3.2 supports the parallel trends hypothesis. It displays that the treatment and control groups have similar behavior until the treatment effect on February 11, 2011. As expected, the treatment group has a change after the effect. It presents an increasing in performance demonstrated by the growing in the high-quality index and the decreasing in the low-quality index.

In addition to Figure 3.2, I also evaluate the mean values of both indexes. Table 3.1 reports the descriptive statistics for the outcomes of interest for both the treatment and control groups in the pre-period of the treatment effect.

Table 3.1: Descriptive statistics in pre-period of treatment effect

VARIABLE	Treatment Group	Control Group	Total Sample
Index of low-quality	1,482.51	1,534.18	1,532.72
	(1,327.54)	(1,478.72)	(1,474.68)
	[2,941]	[101,185]	[104,126]
Index of high-quality	780,89	783.82	783.76
	(38.49)	(45.72)	(45.59)
	[3,372]	[162,700]	[166,072]

Notes: (a) Overall means. (b) Standard errors are reported in parentheses. (c) Number of observations is reported in brackets.

Columns 2 and 3 present the descriptive statistics about the indexes of milk quality for both the treatment and control group, respectively. Column 4 displays the results for total sample before the effect of Conseleite creation. All results, either the medians or mean values, provide support for my identification strategy.

Table 3.2 reports my main estimates that follow Equation 1. They are performed in the sample adjusted for serial-correlation using matching weights.[8] In the first part,

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[8] I also have performed all estimates from Tables 3.2, 3.3 and 3.4 excluding the matching weights. All results are

Models 1 to 4 assume the index of low-quality as the outcome of interest. In the other part, Models 5 to 8 focus in the index of high-quality.

Table 3.2: Effects of meso-institution creation

VARIABLE	(1) Index of low-quality	(2) Index of low-quality	(3) Index of low-quality	(4) Index of low-quality
DiD Coefficient (ΛI_{st})	-155.12**	-152.57**	-152.58**	-127.16*
	(63.96)	(64.43)	(64.44)	(72.02)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	No	Yes	Yes	Yes
Size controls	No	No	Yes	Yes
Time trends	No	No	No	Yes
Observations	64,268	64,268	64,266	64,266
Adjusted R-squared	0.4444	0.4460	0.4460	0.4477
VARIABLE	(5) Index of high-quality	(6) Index of high-quality	(7) Index of high-quality	(8) Index of high-quality
DiD Coefficient (ΛI_{st})	9.13*	9.10*	9.10*	3.82**
	(4.75)	(4.75)	(4.76)	(1.68)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	No	Yes	Yes	Yes
Size controls	No	No	Yes	Yes
Time trends	No	No	No	Yes
Observations	99,676	99,676	99,676	99,646
Adjusted R-squared	0.4155	0.4156	0.4156	0.4188

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001.

I expose the estimates already considering state- and time-fixed controls to capture the difference-in-difference effect (Bertrand et al., 2004). In sequence, I progressively insert some covariates. Third column corresponds to the results adding technology dummies. Fourth column is a model in which I add dummies of size effects. Finally, fifth column presents a model in which I include a set of dummies relate to state-specific time trends.

My results support hypothesis 1 showing that meso-institutions increase firms' performance. They evidence Conseleite as a relevant meso-institution that supports more efficient decisions by managing regulatory institutional voids originated from rules' complexity. They stress the information provision of Conseleite increasing the performance of milk producers in terms of quality. The outputs of this meso-institution address the problems of misfit between firms and institutional environment. This

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robust.

misfit emerges because the firms do not make the best decisions due to the incomplete interpretation of the rules.

In this light, the Conseleite has several effects by informing price references based on productions costs and parameters of quality from the rule. It enables firms to achieve a better fit between their internal structure and the external environment (Donaldson, 2001), and encourages a better resource allocation as a result of superior incentives that are generated by the translation and information provision used in the bargaining processes which, in fact, highlights the reduction of uncertainty and transaction costs in the relationship between milk producers and processors (Hayek, 1945, Grossman and Stiglitz, 1976, North, 1990a, 2006). Therefore, I illustrate meso-institutions as relevant arrangements to solve market signaling problems (Connelly et al., 2011).

This design emphasizes that institutional voids can also rely on translation problems and that meso-institution can appear as an alternative solution to the literature of institutional intermediaries (Armanios et al., 2017, Mair et al., 2012), sub-national institutions (Chan et al., 2010, Meyer and Nguyen, 2005), business groups (Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Khanna and Palepu, 2006) or network and relational contracts (Gibbons and Henderson, 2012, Gil and Marion, 2012, Uzzi, 1997).

My findings draw attention to the fact that the heterogeneity in performance can be a consequence of macro-institutions' misunderstanding. Indeed, the meso-institution perspective comes out as another source of competitive advantage. The intermediate-level institution translates the macro-institutional environment supporting better resource allocation decisions and incentives in the negotiations (Ménard, 2017). Therefore, the meso-institutions deserve attention in the strategic management analysis, especially in cases where the institutional environment plays a relevant and complex role, like in emerging economies where it can generate regulatory institutional voids.

Focused on the informational and knowledge relevance (Hayek, 1945), this new theorizing can complement institutions-based studies in strategy such as the institutional intermediary and sub-national institutions literatures that narrowly concentrate in resource or market-based solutions (Armanios et al., 2017, Chan et al., 2010, Mair et al., 2012, Meyer and Nguyen, 2005), the business groups studies that do not explore the regulatory institutional voids (Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Khanna and Palepu, 2006), the institution-based view that pays much attention to a unique institutional macro-level (country) (Meyer et al., 2009, Peng et al., 2009), and the relational governance and network arrangements (Dyer and Singh, 1998, Mesquita and Lazzarini, 2008, Poppo and Zenger, 2002) that emphasize institutional problems exclusively based on enforcement and opportunism (Klein et al., 1978).

This perspective points to the fact that translation and informational constraints

also play a relevant role to performance considering within institutional variation in a country (Chan et al., 2010, Lamin, 2013). It also presents that the same institutional environment is not homogeneous, as international management literature usually assumes. Thus, the institutional analysis of firms' strategy decisions should take into account the distinct layers of institutions (Ménard, 2014, 2017).

The results also evidence an asymmetric effect of meso-institutions on performance. This finding brings the insightful argument about performance multidimensionality from Hsieh et al. (2010) to the discussion. Alike these authors, I find different effects on performance attributes. In my case, I notice a larger impact of Conseleite's effect on low-quality index than high-quality index. Thus, meso-institution's effects impact more the food safety and security background of bacterial contamination (i.e., low-quality index) than the value added strategies in dairy production (i.e., high-quality index). This perspective draws attention to the complexity behind the concepts of performance and quality.

3.5.1 Placebo test

In the previous section, my estimates introduced the relevance of meso-institutions in the strategic management field and their role in performance. However, I also perform some placebo tests aiming to support the robustness of my results and identification strategy. This test changes the period of the original treatment effect from February 11, 2011 to another period. First, I exclude the contaminated data of the state of Mato Grosso do Sul after the Conseleite creation. Next, I change the treatment effect to the year of 2008. This year represents a relevant period to the Brazilian cow milk industry. In 2008, the global economic crisis influenced the milk sector in Brazil due to the dependence of imports and exports, but they do not have different effects in the treatment and control groups. Therefore, I expect to find no differences between the treatment and control groups.

Table 3.3 reports estimates that support my main results. It evidences that the treatment and control groups do not present differences in performance - either in high- or low-quality index. These findings support my identification strategy that both groups are similar until the real treatment effect, which shed light in the robustness of my main results, stressing the main findings of Hypothesis 1 about the effects of meso-institution creation. I evidence a data-driven argument that the meso-institution approach is relevant to the strategic management field. Moreover, I present a new application of this new framework that is just stressed through descriptive cases studies in the literature (Ménard, 2017, Rouviere and Royer, 2017).

Table 3.3: Placebo test: distinct shock periods

VARIABLE	(1) 2008 Index of low-quality	(2) 2008 Index of high-quality
DiD Coefficient (ΛI_{st})	-119.08	7.52
	(156.60)	(6.17)
State Fixed Effects	Yes	Yes
Time fixed Effects	Yes	Yes
Technology controls	Yes	Yes
Size controls	Yes	Yes
Time trends	Yes	Yes
Observations	62,618	97,678
Adjusted R-squared	0.4503	0.4202

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001.

3.5.2 Heterogeneous organizational resources effects

Additionally, I study whether the meso-institution effects are influenced by a positive moderating role of the scarcity of heterogeneous organizational resources for small firms. I test the inclusive aspect of this institutional intermediary in performance. The mechanism is based on the fact that a new contingency leads to adjustments to achieve the adequate fit between the internal and external environments. This adaptation has a large impact for small firms that cannot access alternatives using their heterogeneous organizational resources to handle regulatory institutional voids. In this light, these firms are more dependent on meso-institutions and, thereby, I expect that the scarcity of heterogeneous organizational resources has positive moderating effects in the relationship between meso-institutions and performance.

Table 3.4 displays the estimates following the same specification of Equation 1 with some new covariates. In this case, I do not have available data to test the both indexes of quality. I only assess the effects of the high-quality index for the individual milk producer case. I test the hypothesis about the scarcity of heterogeneous organizational resources by adding an interaction variable of the difference-in-differences coefficient and the dummy of individual milk farmer, and respecting other interactions between treatment group and after shock dummies with this variable. This dummy identifies the small firm context in my sample and evidences the effect of the firms'

possessing of fewer resources that could be used to manage the regulatory institutional void on their own.

Table 3.4: Heterogeneous organizational resources effects

VARIABLE	(1) Index of high-quality	(2) Index of high-quality	(3) Index of high-quality	(4) Index of high-quality
DiD Coefficient (ΛI_{st})	1.71	1.66	1.66	0.66
	(1.12)	(1.10)	(1.10)	(1.18)
DiD Coefficient * Small firms	40.17****	40.29****	40.29****	37.43****
	(9.49)	(9.49)	(9.49)	(10.10)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	No	Yes	Yes	Yes
Size controls	No	No	Yes	Yes
Time trends	No	No	No	Yes
Observations	99,676	99,676	99,676	99,646
Adjusted R-squared	0.4172	0.4173	0.4173	0.4195

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * $p<0.1$, ** $p<0.05$, *** $p<0.01$, **** $p<0.001$.

My results support hypothesis 2. They show that the scarcity of heterogeneous organizational resources plays a positive moderating role in the relationship between meso-institutions and performance. These findings stress the particular relevance of the meso-institutions' translation and information provision mechanisms for small firms. As these kind of firms cannot access other mechanisms to manage regulatory institutional voids, the meso-institution emerges as particularly relevant as an inclusive institutional intermediary.

I illustrate an alternative solution to overcome institutional voids using information provision and meso-institutions' translation effects for different firms. I bring another illustration about the primarily relevance of information in institutional voids (Lamin, 2013, Sleptsov et al., 2013). While the literature traditionally presents market- and resources strategies as shown by the business groups (Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Khanna and Yafeh, 2007), foreign market strategies (Chan et al., 2010, Meyer and Nguyen, 2005) and strategizing by the government studies (Doh et al., 2012, Lazzarini, 2015), I shed some light in this inclusive function for small firms. Following the institutional multidimensionality in entrepreneurship and international management literatures (Armanios et al., 2017, Chan et al., 2010, Meyer and Nguyen, 2005) and drawing on the New Institutional Economics (Ménard, 2018), I scrutinize the relevance of considering institutions as formed by distinct institutional layers impacting performance in different types of firms.

The findings evidence Conseleite's information provision as particular relevant

to support individual milk farmers. They show the Conseleite reducing the rules' complexity and causing a positive impact in performance, especially for firms that I assume as small. This meso-institution manages the problems of misfit between firms and institutional environment for agents who do not easily access other resource- or market-based alternatives (Donaldson, 2001). Therefore, the results stress the inclusive spillovers of this structure by encouraging economic efficiency through translation and information provision, reducing the uncertainty and transaction costs for small firms (Hayek, 1945, Grossman and Stiglitz, 1976, North, 1990a, 2006), and providing an efficient market signaling (Connelly et al., 2011).

3.6 Conclusion

In this article, I empirically examine the effects of meso-institutions on regulatory institutional voids and performance. My hypotheses underline the relevance in analyzing institutions with distinct layers and present other types of institutional voids, like the informational constraints related to rules' comprehension, which I call as a regulatory institutional void. I focus on the translation effects of meso-institutions as an institutional intermediary and their inclusive growth support for firms facing scarcity of heterogeneous organizational resources. I find support for both of my hypotheses. The results demonstrate that meso-institutions manage regulatory institutional voids based on their translation and information provision mechanisms. In addition, I demonstrate that these mechanisms are particularly important for small firms.

I extend the institutions-based strategy literature in several ways (Marquis and Raynard, 2015). First, I stress the relevance in considering the intermediary level in institutional analysis, as a recent debate has been claiming (Armanios et al., 2017, Chan et al., 2010, Meyer and Nguyen, 2005). Second, I explore institutional voids under an informational context directly related to regulation and its translation, that is, assuming other natures beyond the opportunism-, market- or resources-based perspectives (Khanna and Palepu, 1997). Finally, I also contribute to the meso-institutions literature (Ménard, 2014, 2017) by exploring the perspective of institutional voids (Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Khanna and Yafeh, 2007) and market signaling (Connelly et al., 2011).

I also present managerial contributions. I show that the creation of Conseleite brings causal positive effects on cow milk quality in the regions where they are located. I expose that the Conseleite can support milk producers by providing information that translate the Brazilian complex rules about milk quality. These translation effects reduce uncertainty and transactions costs around the relationships of the cow milk supply transaction.

3.7   Implications for theory

From a theoretical perspective, this study advances on the theory of meso-institution explaining the performance implications. While the extant studies about meso-institutions just adopt a descriptive approach (Ménard, 2014, 2017, Rouviere and Royer, 2017), I perform an empirical analysis. Based on a strategy standpoint, I posit that meso-institution creation can reduce regulatory institutional voids and increase performance, thereby stressing the relevance of this structure in connecting macro- and micro-level when complex rules require specialized knowledge. Thus, I unveil that the meso-institution background can support the contingency perspective about the adjustments in the strategic fit between the external and internal environments (Donaldson, 2001), present other solutions to the internal variation of institutional environment in a country beyond the business groups and institutional intermediaries approaches (Armanios et al., 2017, Chan et al., 2010, Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Meyer and Nguyen, 2005), and work as an efficient sender of market signaling (Connelly et al., 2011). Furthermore, I present some other theoretical spillovers to the transaction costs, inclusive growth and institutional translation literatures.

Like the Canadian marketing board arrangement (Royer, 2011), the meso-institution, the Conseleite, can minimize transaction costs in milk supply transaction through information provision. The specific information is an output of the translation devices about the complex rules that can lead to the reduction of negotiating, enforcing and monitoring costs. In general words, this intermediate structure supports the bargaining processes by managing the regulatory institutional voids surrounded by information constraints that affect the incentives in the transactions. Conseleite's price references inform the value of the connection between quality and price.

The proposed framework also evidences a specific intersection of inclusive growth and the relationship between the fields of strategic management and institutions. Following the worldwide concern about inclusive policy and governance (OECD, 2016), I illustrate a case where meso-institutions overcome institutional and informational barriers with translation mechanisms and minimize inequalities and induce inclusive growth for small firms. I evidence that the institutional issue of translation should receive as much attention as the other types of failures such as the opportunism-related enforcement and monitoring issues (Klein et al., 1978, Williamson, 1991).

Additionally, I highlight that the access to a clear knowledge can be a source of competitive advantage in complex institutional environments (Hayek, 1945). Thus, the institutional translation can be a promising research agenda in the strategic management literature. For instance, explore *"how do people understand the rules and choose to follow them"* (Hodgson, 2006) in the micro-level can generate opportunities to appropriate rents and bring performance implications either.

Overall, I bring several contributions to distinct literatures. I contribute to the relational governance and network literatures by highlighting other types of institutional failures (Dyer and Singh, 1998, Granovetter, 1985, Mesquita and Lazzarini, 2008, Poppo and Zenger, 2002). I also complement the institutions-based view since I expose the heterogeneity in the institutional arrangement of a country while it usually assumes an homogeneous institutional environment (Meyer et al., 2009, Peng et al., 2009). I also contribute to the institutional voids literature by showing a distinct regulatory void, related to informational constraints, that is not usually explored (Khanna and Palepu, 1997, Khanna and Rivkin, 2001, Khanna and Palepu, 2006). By illustrating an institutional standpoint, I bring contributions to the recent institutional intermediary literature that just focuses on resources- and market-based arguments to explore institutional heterogeneity (Armanios et al., 2017, Mair et al., 2012). Therefore, the findings suggest a new agenda wherein institution-based strategy scholars can investigate not only country characteristics affecting performance, but also institutional actions in the local-level.

3.8 Implications for practice

The article also has relevant implications for practice. While early studies about meso-institutions just focus on regulatory agencies or public-private-partnerships, I explore a private structure in a agri-food context. The results present a private meso-institution as a valuable mechanism of inclusive growth, and also show how small firms can obtain higher performance when they possess clear information and achieve a more transparent and fair environment.

Moreover, while the extant literature just shows theoretical expectations about Conseleite (Belik et al., 2012, Pereira et al., 2016, Silva et al., 2012), I present the first attempt that originally show the effects of this structure in Brazilian milk producers using micro-data. This study offers to policy-makers and managers the possibility of extending this kind of institutional structure for other economic systems. There are two distinguished examples that support this opportunity of generalization. One is the case of the Canadian Marketing Boards that were originated from producers' efforts to react to unstable prices and to manage institutional and market failures (Veeman, 1997, Tamilia and Charlebois, 2007, Royer, 2011). The other case is the United Soybean Board in the United States. As the meso-institution that I expose, this is also a market-originated entity which promotes collective economic development, but for soybean farmers and based on strategic actions in research, technology and demand promotion (Williams et al., 2014).

I hope that my study motivates other scholars to use the meso-institution approach in the strategic management field. This endeavor is especially relevant given

the key impact of institutions in firms' strategies and performance (Marquis and Raynard, 2015). Furthermore, there is much room to empirical work in this field in which only descriptive studies have been done (Ménard, 2017, Rouviere and Royer, 2017).

This study has several limitations which should be considered as a research agenda for further studies to be made by institution-based strategy scholars. First, I just study a private and market-originated meso-institution, but one could raise what are the differences between public and private meso-institutions and how to explore the advantages of each one. Second, I explore the meso-institutions' effects as homogeneous to the state-level, but these effects can also vary according to the location and their impact range. Having it in view, one could investigate to municipality-level and the range of impact of the meso-institutional effects as well as how this occurs.

4 Chapter Four

Food policy, meso-institutions and informational constraints: Evidence from dairy sector in Brazil

Abstract

This study analyzes the influence of meso-institutions on the effectiveness of food policy. Combining difference-in-differences and matching based on Brazilian data on cow milk quality, I investigate the translation effects of meso-institutions on the implementation of food policies. The results demonstrate that an efficient meso-institution increases food policy's effectiveness and highlight a sequential logic of policy implementation from institutional (first-order) to technology and size (second-order) effects. The paper also has policy implications, advocating that any regulation must be initially translated, and then enforced and monitored, to succeed.

4.1 Introduction

A meso-institution is a set of devices *"in charge of translating [...] rules specific to a sector, a region, a type of activity, through identifiable mechanisms of implementation and control"* (Ménard, 2016). They *"determine and enforce specific rules delineating the domain of possible transactions"* (Ménard, 2017) through mechanisms of policy translation, enforcement, and monitoring (Ménard, 2018). I examine the impact of meso-institutions on the effectiveness of food policies by focusing on how regulation is implemented and what are the institutional mechanisms at stake in this. The main goal is to test the hypothesis that an efficient meso-institution can increase the effectiveness of a new food policy due to its supportive mechanisms of information provision.

Although the literature on food policy is extensive (Erjavec and Lovec, 2017, Hedley, 2017, Reardon et al., 2017, Saint Ville et al., 2017), there is a gap in explaining the possibility of distinct policy outcomes and effectiveness depending on how the regulation is implemented. Drawing on Ménard (2014, 2017), I argue that the mechanisms by which the regulation is implemented, the meso-institutions, are undoubtedly relevant for this analysis. In the light of this new research frontier in New Institutional Economics (Ménard, 2018), this study analyzes the effects of meso-institutions on the effectiveness of a food policy. I define this influence as being the first-order effects by

which the agents achieve a better understanding of the regulation with lower costs due to the provision of information from this intermediate mechanism. It relies upon the perspective of market signaling (Spence, 1973), information and knowledge (Hayek, 1945), information costs and asymmetry (Akerloff, 1970, Grossman and Stiglitz, 1976).

The second step of the analysis focuses on how meso-institutions affects agents considering their different characteristics of technology and size, which I refer to "second-order effects". I aim to test whether large agents or agents with better access to technologies have advantages in implementing a regulation more effectively, given the same conditions for accessing the meso-institution and, consequently, the same conditions for a better understanding of the regulation with lower costs. I examine whether those specific agents, larger in size or with specialized technologies, have a better capacity for adjustment according to changes in regulation.

I bring some contributions by adopting this meso-institutional standpoint to highlight the relevance of the institutions and their effects on food policies: (a) I bring a systematic approach that can be extended to other institution-regulation analysis; (b) I evidence a causal effect, which has not yet been addressed in the meso-institution literature; (c) I am the first to quantitatively test the meso-institution approach; (d) I expose managerial contributions by showing an information signaling improving the effectiveness of a public policy in an emergent country, and, moreover, by presenting the first and novel evidence related to the effects of meso-institution on the studied Brazilian food policy (Belik et al., 2012, Silva et al., 2012).

Based on a literature review conducted to find the relevance of institutions on regulations (Section 4.2), I apply this approach to the Brazilian cow milk industry as detailed in Section 4.3. This sector has experienced deregulation processes over recent years, highlighting the meso-institutions' role. The meso-institution that I focus on here is the Conselho Paritário entre Produtores e Indústrias de Laticínios (Conseleite) (Milk Farmers and Processors Joint Council) (Canziani and Guimarães, 2003). This private arrangement emerged due to the difficulty experienced by public agents in implementing complex rules about cow milk quality. I focus on a relevant food policy in the Brazilian cow milk industry, the food policy Normative Instruction no. 62 of December 29, 2011 (IN 62/2011). This policy is still in force, and it regulates quality parameters for milk production, storage, and transportation in Brazil (MAPA, 2011).[9] The regulation imposes technical parameters regarding milk quality, such as total bacteria level, somatic cell level, percentage of lactose, percentage of protein, and total solids.[10]

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[9]This policy is issued by a global context in which several developed countries have addressed the relevance of create regulations to coordinate the food security indicators of dairy products, such as the Canadian and European cases (Schnaider et al., 2019). Therefore, examining a mechanism able to increase the effectiveness of this type of policy can contribute to this goal.

[10]The responsibility for following the milk quality requirements is attributed to processing firms, which create their own mechanisms of traceability to identify each raw milk origin in order to manage a quality scheme. Processing firms which present milk samples that do not achieve the minimum requirements are prohibited of selling dairy products until

My empirical design (Section 4.4) contains an identification strategy that tests whether Brazilian states in which Conseleite is present have better outcomes from the implementation of the IN 62/2011. This effects is based on the benefits of the Conseleite coordinating information and providing incentives to the farmers negotiate with their buyers. By effectiveness of the policy, I refer to the increasing of milk producers' performance, measured by the complex quality indicators shown in the regulation.[11] To measure this, I perform a difference-in-differences (DiD) approach with matching, in a unique dataset consisting of data on cow milk quality from Brazil. Section 4.5 presents the findings. Section 4.6 brings a summary of the main results and conclusions. Finally, I illustrate implications for theory and practice in Sections 4.7 and 4.8.

4.2 Theoretical Foundation

The food policy literature has evolved since Cochrane (1949). Food scholars have changed the main focus from his research agenda based on an *"analytical work concerned with tracing the consequences of pursuing a given policy"* to an approach with institutions affecting food regulations. Many studies have addressed the relevance of institutions and their impact on the effectiveness of food policies (Erjavec and Lovec, 2017, Hedley, 2017, Saint Ville et al., 2017). However, these scholars do not show a systematic approach that enables an understanding of how a food policy is implemented through institutional layers.

For instance, investigating an agricultural policy in Saint Lucia, Saint Ville et al. (2017) draw attention to the need to consider a systematic standpoint to increase the effectiveness of a food policy implementation. The authors present the existence of distinct levels of institutions that are responsible for food policy development. They state that an inadequate interconnection between these structures leads to the failure of a regulation. In this light, contrary to the common belief, the policy should not be only producer-, consumer- or technology-oriented, but also institutionally guided.

Jayne et al. (2018) present a review of input subsidy programs in sub-Saharan Africa and show that some households achieve a better understanding of regulations and, through this, explore some advantages. In my approach, these advantages are originated from the reduction of the uncertainty due to the lack of information about a given complex rule (North, 2006), which is one of the meso-institutions role (Ménard, 2014). Moreover, Jayne et al. (2018) also suggest that an adequate interpretation of local or regional aspects involved in a policy is crucial, even those implicit factors, such as social constraints or political influence. Indeed, making the rules of the game clearer allows individuals to achieve the needed knowledge to make the right decision

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the normalization of the food safety levels of the identified producer. The punishment from processing firms to their suppliers can vary according to each private strategy of each firm.

[11] As a limitation of this study, I only focus in the increasing of quality as the effectiveness of the policy related to quality indicators. However, one can also explore other types of effectiveness of this policy, such as the effects on informal market of milk exchanges and the influence on the prices of the final products.

(Hayek, 1945), making them more efficient because of this understanding of how the institutional market processes work (Grossman and Stiglitz, 1976, Hayek, 1945). The properly understanding of all institutions and their functions are central issues to the success of policies and firms (Ménard, 2017).

Focused on the Common Agricultural Policy of the European Union, Erjavec and Lovec (2017) suggest that a change from the traditional perspective of agricultural economics to an institutional approach is needed. They highlight the relevance of reallocating the attention from the analysis of a policy's welfare effects to an approach in which the (un)success factors in policy implementation emerge as the central issue, which I do by using the meso-institution approach (Ménard, 2017, Rouviere and Royer, 2017).

Hedley (2017) exemplifies policy effectiveness and governance in Canadian agri-food chains. He suggests that the success of agricultural and food policy depends on an integrated model of policy-making that considers the interdependencies between different institutional levels, namely federal (F), provincial (P) and territorial (T). In accordance with the Ménard (2016), this author indicates that the heterogeneity in the outcomes derives from *"creative institutional arrangements in agriculture [that] have emerged over many years to provide working relationships among F–P–T governments"*.

Following these suggestions, I adopt the meso-institution approach to analyze a food policy. According to Ménard (2018), this framework assumes that the interplay between policies (i.e. institutions) and organizations does not occur directly. An intermediate-level institution links both extremes with three main functions: to translate, implement and monitor the involved rules and rights (Ménard, 2017, Rouviere and Royer, 2017). In specific terms, meso-institutions are a set of devices that surround the effectiveness of a policy (Ménard, 2014). They are responsible for: i) monitoring and enforcing the rules; ii) implementing the incentives and sanctions; and iii) translating the general rules to certain local or regional contexts.

The relevance of meso-institutions relies on the fact that rules cannot be fully understood by economic agents in certain cases, thereby leading to inefficiencies. The proper understanding of the rules leads to a better resource allocation (North, 2006), lower uncertainty in exchange processes (North, 1990a), lower costs in achieving information (Grossman and Stiglitz, 1976) and a more efficient planning of production decisions (Hayek, 1945). Indeed, *"the macro-institutional level of the polity, the judiciary, general customs, etc. require specific enacting devices that can 'translate' and adapt them to specific circumstances..."* (Ménard, 2016).

In sum, one can ask: can meso-institutions can support a better implementation of the rules? Do these devices interpret the institutions' complexity, turning it into clear information and knowledge in a certain context? Then, can the clarified information lead to a better implementation of the policy due to some advantages in the exchange

processes? No empirical and quantitative-based study of meso-institutions has been made. Aiming to address this gap, I have drawn attention to the benefits of meso-institutions in the implementation of policies.

4.3 Brazilian Cow Milk Sector: A Brief Illustration

Brazilian cow milk production is relevant in the global context. In 2016, Brazil was the second largest milk producer with more than 19 million cows, with only India having more. The country was also the fourth largest producer, with more than 33 billion liters, with only the United States, India and China, respectively, producing more. In addition, the Brazilian cow milk sector represented the leadership position in terms of number of dairy cows and liters of milk in the South American context, with 59% and 56% of the continent's production, respectively (FAO, 2016).

The production is widespread over the vast territory of more than 8.5 million square kilometers. According to Embrapa (2016), the industry is comprised of more than 1.3 million of milk farmers, 2 thousand registered milk processors, 4 million direct and indirect workers, responsible for an average domestic consumption of 60 liters per person per year and the generation of 18.5 billion dollars.[12] Moreover, the sector includes many global leading firms in dairy processing, such as Nestlé, brand branches from BRF and J&F groups, and others.

Beyond the economy relevance, the industry presents some in-farm singularities that highlight the meso-institutions' role. The Brazilian milk producers are heterogeneous, with several profiles - with college or elementary education degree, large or small farms, high or low level of technology, and so on. Consequently, any milk policy related to the primary production faces a challenge; it must be both effective and easy to be implemented by a myriad of agents. Moreover, many sanitary conditions and animal health aspects of milk production are not so easy to understand. They are highly technical and require a very specialized type of knowledge (MAPA, 2011).

A Brazilian regulation regarding cow milk quality, the Normative Instruction 62/2011 of December 29, 2011 (IN 62/2011) (MAPA, 2011), was created to present specific parameters of animal health and sanitary conditions in production. It sets indicators that reveal characteristics of quality and provides incentives to produce high-quality milk. However, after it was created, the regulation led to some issues about the interconnection between quality and price. It only proposed a requirement for a minimum-quality level, lacking concern regarding the fact that distinct high levels of quality would lead to higher prices.

The regulation introduced a reference of how the quality should be measured and established a minimum level for food safety (Figure 4.1, situation (a)). Farmers have

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[12]Exchange rate of 1 dollar equals 3.5 *reais* (Brazil currency), approximately.
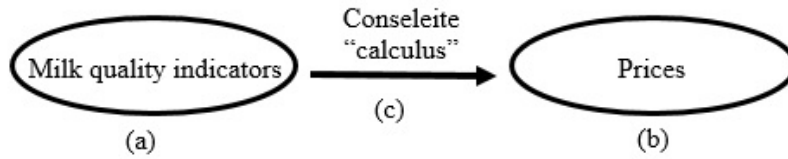
Figure 4.1: Lack of information of quality, price and quality-price.

to bear a cost k_1 to obtain information on the scores of the quality indexes of their own milk. This holds because "quality" entails multiple dimensions that are not easy to identify without a specific knowledge and not easy to observe without specialized devices. Accordingly, a farmer should bear k_1 with the purpose of acquiring the specific technological knowledge and the specific measures of the regulation's indicators: total bacteria level, somatic cell level, percentage of lactose, percentage of protein, and total solids. This cost is related to the payment for cow milk quality analysis by specialized laboratories from the Brazilian Network of Laboratories of Milk Quality Control, involved in the Monitoring System of Brazilian milk quality, a partnership with the Brazilian Agricultural Research Corporation (EMBRAPA) and Ministry of Agriculture, Livestock, and Food Supply (MAPA) in Brazil.

In addition, the Brazilian production system is made of geographically dispersed production units (i.e. farms) and this incurs a further cost, say k_2, on the farmer (or the processor) who would be interested to observe the exchanges carried out by other farmers and processors in the cow milk market in Brazil. Bearing this cost would allow agents to observe the prices and volume negotiated by other parties in the market, and then they could achieve a more clear picture and obtain references for negotiating the price of their own milk.

Furthermore, the farmer may also observe the supply of quality milk. Even in this case, however, the farmers may have difficulty in observing the level of quality of the milk exchanged in the market, and this would raise a third cost k_3, which reflects the necessity for the farmer to invest resources to know what is the level of quality that has been exchanged in the market. Thus, the lack of information on quantity, quality and prices increases the market uncertainty faced by the farmers who want to enter the market for quality milk. This uncertainty is also based on the fact that the farmers assume a possible/potential opportunistic action in the way that the buyer defines price, i.e., they, the farmers, wonder if they are receiving a fair price according to their quality level (Figure 4.1, situation (b)). This holds because many milk supply transactions in Brazil are governed by relational contracts, depending on verbal agreements about in-farm milk collection, thereby leading to barriers in accessing transparent information about the price and quality exchanged in the market.

Table 4.1 summarizes these costs.

Farmers who want to organize their quality milk supply need to obtain infor-

Table 4.1: Costs of market signaling

Costs	Definition
k_1	Costs to achieve information about the quality of own milk
k_2	Costs to obtain information about the prices and level of supply of quality milk exchanged in the current market
k_3	Costs to collect information about the quality level of the milk exchanged in the current market

mation about the variations of quality indexes and the prices paid in the market. However, if a cost to achieve this information exists ($k_2 + k_3$), one should expect that the incentives to acquire these information decrease if the price system works perfectly (Grossman and Stiglitz, 1976), which is not the case since market failures exist.

Aiming to provide a structure that connects the price system as an informational and knowledge device (Hayek, 1945), and handles these costs regarding quality-price variations ($k_2 + k_3$) by providing market signaling (Spence, 1973), a meso-institution emerged in the Brazilian cow milk industry, the Conseleite (Figure 4.1, situation (c)). This structure is a private state-level structure created in five of the twenty-seven Brazilian states: Paraná (2002); Rio Grande do Sul (2004); Santa Catarina (2007); Mato Grosso do Sul (2011) and Rondônia (2014). The Conseleite is an arrangement formed by two equal parts with five representatives from each - milk farmers and processors - and a third part with private technicians from the milk market. These representatives are collective actions, usually union or associations of processing firms and milk producers. Since there is no link with local authorities, Conseleite is financed through donations or by contributions from the members of these associations, which are jointly responsible to define a certain amount among their members.

Specifically, Conseleite works as follows. The technicians use information regarding quality parameters from the regulation and regional production costs to apply a specific and transparent pricing methodology based on the agreement of both parties, presenting suggestions of price according to the quality level in monthly meetings with formal documents signed by the five representative agents from each side; I call this a "translation function" (Canziani and Guimarães, 2003).[13] These price suggestions are not mandatory, but they tend to be very well accepted by both producers and processing firms. The agreement in use or not these suggestions also depend on the negotiation between both parties in each relationship.

By informing these suggestions of price references, the Conseleite makes each

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[13]One can observe these references by accessing https://conseleitepr.com.br/.

farmer-buyer exchange to achieve more transparency, minimizing the farmers' costs regarding market uncertainty $(k_2 + k_3)$, and plays a relevant role in the farmers' incentives to maintain high-quality production. In addition, the Conseleite also affects the processors' incentives by spreading information and market signaling (Spence, 1973), since this can lead to a higher level of quality of the raw cow milk and, therefore, add more value to the processed dairy goods, such as increasing their shelf life. Specifically, Conseleite just acts as an external support structure and does not directly participate in the transaction, since each agent is responsible to obtain their quality level and to negotiate their own terms.

To sum up, there are two situations. Situation (1): The Conseleite does not exist and the farmer achieves a profit π_1, which is equal to a given price, P, minus the costs of the quality analysis, k_1, the cost of obtaining information about the prices and level of supply of quality milk in the current market, k_2, and the cost of collecting information about the level of quality that has been exchanged in the current market, k_3; then I have $\pi_1 = P - k_1 - k_2 - k_3$. In this case, the market does not provide incentives to produce high-quality milk, which may discourage investments in milk quality or even make this value-added market extinct (Akerloff, 1970). Situation (2): The Conseleite exists and eliminates the costs k_2 and k_3, leading to a profit π_2, which is equal to a given price, P, minus the costs of the quality analysis, k_1, ; then I have $\pi_2 = P - k_1$. Then, $\pi_2 > \pi_1$ and $\pi_2 - \pi_1$, i.e., $(k_2 + k_3)$, which represents farmers' incentives to maintain high-quality production from the reduction of market uncertainty due to the provision of information by the Conseleite.

Figure 4.2 shows my empirical setting. A singularity of Conseleite is that it was not created in regions with high-quality production, but originated from the result of economic organization of milk farmers and processors to efficiently coordinate incentives. According to Silva et al. (2012), the Conseleites' informational outputs have been strongly adopted in transactions between milk farmers and dairy processing firms in the states where they operate. However, many Brazilian regions did not create such an arrangement because of the constant conflicts. Many milk producers from these regions continued to face problems because of the location-specific aspect of Conseleite: it adopts regional production costs in its translation devices and, therefore, the information is more specific for each region. So, based on the quality-price concern and the information-incentives provision, is the Conseleite (meso-institution) able to improve the effectiveness of the IN 62/2011 (food policy)?

4.4 Data and Methods

I explore the effects of a meso-institution - Conseleite - on the implementation of a new food policy (IN 62/2011) in the Brazilian cow milk industry. My dataset
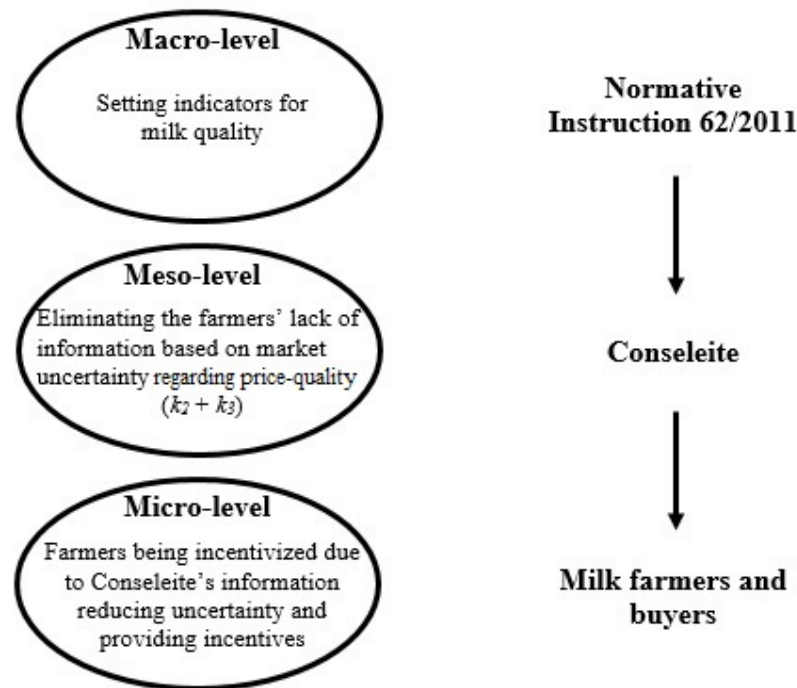
Figure 4.2: Empirical setting

includes laboratory analysis of milk from 25 of the 27 Brazilian states (Alagoas, Amazonas, Bahia, Ceará, Distrito Federal, Espírito Santo, Goiás, Maranhão, Minas Gerais, Mato Grosso do Sul, Mato Grosso, Paraná, Pará, Paraíba, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Rondônia, Roraima, Sergipe, Santa Catarina, São Paulo, Tocantins) over a 19-year period (1999–2017), at the individual farmer level, totaling 14 million data points. This is a private dataset from a Brazilian laboratory that participates in the Brazilian Network of Laboratories of Milk Quality Control. The dataset contains detailed information of approximately 490,000 agents. However, it corresponds to an unbalanced panel set with daily information because I do not have data corresponding to all days. I convert the data to daily means because some individuals have more than one observation in the same day.

The dataset consists of milk quality parameters. I constructed two indexes of milk quality following the indicators in the IN 62/2011.[14] One index measures negative correlation with milk quality (total bacteria level and somatic cell level). The other measures positive correlation with milk quality (percentage of lactose, percentage of protein, and total solids). All variables are relevant because they are included in the milk policy and capture the distinct effects of the policy's effectiveness in the presence or absence of Conseleite. The dataset includes states where the observations come from,

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[14]The choice in studying all five of these quality indicators as two distinct indexes is based on the reality of dairy businesses. Firms from this sector usually adopt two main strategies in their production. One is based on the fact that the production of certain products is dependent on an adequate level of bacterial contamination due to fermentation. Another strategy is dependent on the presence of a higher level of certain milk attributes, such as protein, lactose and total solids, to produce value-added products (e.g. better butter, powdered milk or drinking milk). Therefore, it is important to use two separate indexes of cow milk quality due to this variation.

as well as control variables that could influence the main factors, such as the technology adopted to store the milk (direct from the animal, milk storage tank, storage tank inside a truck, milk storage silo, or others), and the individual capacity of economies of scale (individual milk farmer, dairy processing firm, group of milk farmers, or others).

This unique field setting enables the application of the DiD approach. I have the treatment group (states with Conseleite), the control group (states without Conseleite), and the treatment exogenous intervention (public policy - IN 62/2011 in December 29, 2011). In order to evaluate the impact of the institutional change in the presence of the Conseleite, I exclude the state of Rondônia, where the Conseleite was only created in 2014.

Attempting to circumvent the selection and omitted variable biases and endogeneity, I performed the following complementary procedures: i) added time- and state-fixed effects to handle non-observable heterogeneity; ii) added state-specific time trends as a complementary mechanism of parallel trends hypothesis (Besley and Burgess, 2004); iii) tested the parallel trends hypothesis; iv) performed a placebo test; and v) managed serial correlation and heteroscedasticity issues through error term clustering (Bertrand et al., 2004).

Following Bertrand et al. (2004), I clustered standard error at the state-level due to the possibility of a serial correlation problem. However, due to the low number of states (fewer than 50), I followed the authors' suggestion and applied the adaptation of a panel of length 2 (before and after). According to them, this aggregation solves this serial correlation problem even for quite small groups. However, I kept and used the information about time when the sample was analyzed (day, month and year) as time-fixed effects. I maintained this time information as closer as possible to the intervention if the farmer sent more than one sample. I decided to do that because the panel is unbalanced, so the observations come from different periods, forcing us to control this unbalance using time fixed effects.

Additionally, strengthening my identification strategy, I performed coarsened exact matching (CEM) to avoid the bias from the imbalance between the treatment and control groups (Blackwell et al., 2009). I coarsened seven variables: technology; size; total bacteria level; somatic cell level, percentage of lactose, percentage of protein; and total solids. The first two are naturally categorical, so they remain as their five and four categories, respectively. The others are continuous, so I adapted them into well–defined categories.

I coarsened total bacteria level into seven categories; somatic cell level into five categories; percentage of lactose into five categories; percentage of protein into six categories; and total solids into five categories. Each category has at least 10% to 20% of all observations of that variable to attenuate the imbalance as much as possible. I chose the CEM approach because of its better performance compared to more popular

matching methods (Beatty and Tuttle, 2014, Blackwell et al., 2009, Iacus et al., 2012). I maintained all observations and weighted my estimates according to the CEM outputs.

Finally, after the serial correlation and the matching corrections, I performed my estimates based on the following equation:

$$Y_{ist} = \alpha_s + \delta_t + \phi_{st} + c\lambda_{ist} + \Lambda I_{st} + \epsilon_{ist} \tag{2}$$

where Y_{ist} is the outcome of interest based on two indexes of quality for individual i in group s (state) by time t: an index of low-quality (the sum of total bacteria level and somatic cell level); and an index of high-quality (the sum of percentage of lactose, percentage of protein and total solids, with the percentages multiplied by 100). α_s and δ_t are state- and time-fixed effects, respectively. ϕ_{st} is a specific-time trend variable, which includes an interaction dummy between all months per state in order to capture the monthly seasonality of milk production. $c\lambda_{ist}$ are individual controls, specifically the aspects related to technology and size (economies of scale). ΛI_{st} characterizes the treatment effect by state s at time t. ϵ_{ist} is the error term.

4.5 Results

The identification strategy is a DiD approach that adopts the new food policy (IN 62/2011) related to milk quality as the intervention, comparing the difference of its effectiveness in Brazilian states that contain or not a meso-institutional arrangement, the Conseleite. The validity of this strategy is the assumption that Brazilian states with Conseleite have an additional translation mechanism providing information and incentives.

I initially test this identification strategy using the parallel trends hypothesis in Figure 4.3. Following Aragón and Rud (2013), I plot the medians resulted from the conditional means of the low-quality and high-quality indexes, respectively. These values are conditional on the technology of milk storage, size, state-, time-, and specific time-trend fixed effects.
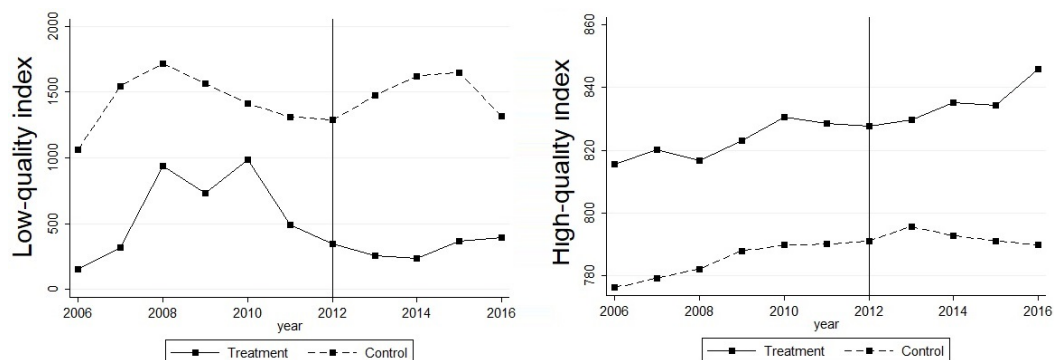

Figure 4.3: Parallel trends

Figure 4.3 suggests that both treatment and control groups support the parallel trends hypothesis. As expected, it shows that Brazilian states with Conseleite present a decrease in the low-quality index after the intervention. In addition, the high-quality index exposes an increase for the treatment group and a decrease for the control states, as expected. That is, both indexes evidence the increase in milk quality as well as policy effectiveness. In general terms, the identification strategy illustrates that the presence of a meso-institution improves the effectiveness of a new food policy due to its function of translating the rules.

I also complement Figure 4.3 by analyzing the mean values of both indexes. Table 4.2 reports the descriptive statistics for the variables of interest of both treatment and control groups in the pre-treatment period.

Table 4.2: Descriptive Statistics – Pre-Period of IN 62/2011

VARIABLE	Treatment Group	Control Group	Total Sample
Index of low-quality	1,624.66	1,514.08	1,524.95
	(1,488.50)	(1,482.07)	(1,483.06)
	[12,092]	[110,878]	[122,970]
Index of high-quality	777.55	784.78	784.23
	(33.45)	(41.86)	(41.33)
	[14,851]	[180,800]	[195,651]

Notes: (a) Overall means. (b) Standard errors are reported in parentheses. (c) Number of observations is reported in brackets.

In sequence, Table 4.3 displays the DiD estimates using the corrected sample for serial-correlation issues and matching weights in Equation 2.[15]

First, in order to capture the DiD effect, the second column already exposes the estimates considering state- and time-fixed controls (Bertrand et al., 2004). In sequence, I progressively add covariate controls. The third column corresponds to the results when considering the technology controls. The fourth column inserts dummies that capture the size effects. Finally, the fifth column includes a set of state-specific time trends.

The analyses are focused in Models 4 and 8, which bring all controls. However, some interesting points are worthy of mention regarding the other models. It is important to note the effects of time trends on the milk production related to the low-quality index (Model 4). The time trends illustrate how relevant is the monthly seasonality in this milk quality strategy. This underlines a type of cycle of increasing and decreasing milk quality over months and Brazilian states. This result signalizes a point of attention by policy-makers and managers from the cow milk sector.

Regarding my main hypothesis, my estimates suggest that the presence of a meso-institution increases the effectiveness of a new food policy. Moreover, the results highlight the heterogeneity of policy outcomes due to the presence or absence of an intermediate institutional structure responsible for implementation. Based on

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[15]I also have performed all estimates from Tables 4.3, 4.4, 4.5 and 4.6 excluding the matching weights. All results are robust.

Table 4.3: Effects of meso-institution on the new food policy

VARIABLE	(1) Index of low-quality	(2) Index of low-quality	(3) Index of low-quality	(4) Index of low-quality
DiD Coefficient (ΛI_{st})	-51.70	-50.87	-50.79	-97.95**
	(35.81)	(35.06)	(35.06)	(40.21)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	No	Yes	Yes	Yes
Size controls	No	No	Yes	Yes
Time trends	No	No	No	Yes
Observations	76,536	76,536	76,536	76,526
Adjusted R-squared	0.4782	0.4815	0.4815	0.4825
VARIABLE	(5) Index of high-quality	(6) Index of high-quality	(7) Index of high-quality	(8) Index of high-quality
DiD Coefficient (ΛI_{st})	1.56*	1.54*	1.54*	1.55*
	(0.87)	(0.87)	(0.87)	(0.88)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	No	Yes	Yes	Yes
Size controls	No	No	Yes	Yes
Time trends	No	No	No	Yes
Observations	123,416	123,416	123,416	123,374
Adjusted R-squared	0.3566	0.3574	0.3575	0.3584

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001.

Ménard (2014, 2017), these findings illustrate the relevance of an intermediate-level institution that translates general aspects to a specific context, serving as a bridge between institutions and organizations. Both extremes, the macro- and micro-levels, need support to connect themselves, and the meso-institution plays this role. In this study, I empirically observe that a new food policy addressing milk quality has a better implementation in locations where meso-institutions provide a translation structure.

In my case, the meso-institution simplifies a complex rule by providing information through price references. The results highlight that a new policy can bring different outcomes even inside the same institutional environment and considering similar organizations. I present a design that captures the influence of meso-institutions on increasing policy effectiveness in the locations where they operate. This finding stresses that the translation of institutions is quite relevant in some cases, especially in situations in which the regulations are complex.

In sum, I contribute to the literature in three distinct ways. I suggest that traditional discussions about farm characteristics (size and technology) are not sufficient to explain failures in food policy implementation (Van Tongeren, 2008). I illustrate the relevance of meso-institutions to address failures in policy implementation when the rules are complex (Hassanein, 2011, Saint Ville et al., 2017). I demonstrate that na-

tional food policy should consider the different levels of the institutional environment, such as federal, regional, and local (Hedley, 2017, Jayne et al., 2018), and, moreover, I show an empirical and causal evidence of how the institutions affect food regulations and their effectiveness.

4.5.1 Sensitivity Analysis

In the previous section, I underline the meso-institution's role in food policy. However, I also bring a sensitivity analysis to emphasize the robustness of the results. I perform three different approaches: the first containing the placebo test, the second performing robustness checks in alternative subsamples and a third in which I present complementary findings.

4.5.1.1 Placebo test

I perform a placebo test allocating the intervention (December 29, 2011) to another period. I chose the year of 2008 to apply this test. This period represents notable impacts on the Brazilian cow milk industry, but an equal influence in both treatment and control groups. It marks the global economic crisis that directly affected the milk economy in Brazil.[16] It is expected to not find the same results of my main specification.

Table 4.4 shows the estimates using the indexes of low-quality and high-quality.

Table 4.4 displays interesting findings. I find no difference in the placebo test. Therefore, this illustrates the robustness of my data-driven evidence about the new research frontier between the New Institutional Economics and public policy analysis, the meso-institution (Ménard, 2018). I stress the initial theoretical developments from Ménard (2014, 2016) and contribute to the dimensionalizing institutions movement. Additionally, I add a quantitative empirical analysis to the extant descriptive case studies of Ménard (2017) and Rouviere and Royer (2017).

4.5.1.2 Robustness checks

Drawing attention to the robustness of my results, I also test whether the institutional effects of meso-institutions persist in homogeneous groups in terms of technology and size. In doing so, I verify whether my results are sensitive to alternative sample definitions. I perform the same specification (Equation 2), but now in two distinct subsamples, one related to technology and another to size.

First, I study whether the results are maintained when the individuals have the same size. Through this, I analyze whether the presence of meso-institutions distinctly affects the food policy implementation among dairy processor firms. That is, the agents

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[16]The placebo design excludes the data in treatment states after the real intervention and the observations from Mato Grosso do Sul. This Brazilian state is excluded because the Conseleite was only created there in 2011.

Table 4.4: Placebo test: distinct shock period

VARIABLE	(1) 2008 Index of low-quality	(2) 2008 Index of high-quality
DiD Coefficient (ΛI_{st})	221.39	-1.69
	(157.88)	(2.31)
State Fixed Effects	Yes	Yes
Time fixed Effects	Yes	Yes
Technology controls	Yes	Yes
Size controls	Yes	Yes
Time trends	Yes	Yes
Observations	70,178	115,440
Adjusted R-squared	0.4896	0.3542

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * $p<0.1$, ** $p<0.05$, *** $p<0.01$, **** $p<0.001$.

should still present different policy outcomes due to the translation of the complex rules from the meso-institution, even in similar size conditions. Based on the theory, it is expected that they should present distinct results originated from the influences of the institutional context for organizations that access meso-institutions.

Second, I apply the same procedures, but focusing on the technological platform: when the observations present an equal specific milk storage technology, the tank. It is expected to observe a distinct food policy effectiveness due to the meso-institution's role for organizations that access it, even in similar conditions of technology.

Table 4.5 reports the estimates in these specific subsamples.

The results suggest that institutional differences still influence the food policy implementation, given similar size and technology conditions. I evidence that the presence of the meso-institution is relevant to policy progress, even in homogeneous groups of size and technology. Agents with the same size and technological structure are distinctly impacted by a food policy due to the intermediate-level institution's translation. This illustrates that the agents must initially understand the policy, and then make further size- or technology-related decisions. In sum, I indicate that the meso-institution is a key driver to the success of a food policy, being as relevant as technology and size managing food security and safety issues.

Table 4.5: Robustness checks in subsamples

VARIABLE	(1) [Only dairy firms - Size] Index of low-quality	(2) [Only dairy firms - Size] Index of high-quality	(3) [Tank storage - Technology] Index of low-quality	(4) [Tank storage - Technology] Index of high-quality
DiD Coefficient (ΛI_{st})	-104.83**	2.59***	-97.65**	2.44***
	(40.31)	(0.85)	(41.76)	(0.84)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	Yes	Yes	Yes	Yes
Size controls	Yes	Yes	Yes	Yes
Time trends	Yes	Yes	Yes	Yes
Observations	76,202	76,408	72,962	73,530
Adjusted R-squared	0.4869	0.5220	0.4841	0.5174

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001.

4.5.2 Complementary results

I also draw attention to the fact that second-order effects of size and technology are still relevant. I explore whether the agents make distinct adjustments to the translation according to their differences in size and technology, given the same meso-institution condition. I identify this mechanism using an interaction term between the DiD coefficient and size and technology variables, but respecting other interactions between treatment group and after intervention dummies with these variables. That is, I compare whether a specific group of agents with similar size differs from the rest of the sample, given the same meso-institution influence. I explore the same effect focusing on the technology. Like in the robustness checks case, I perform models with variables that evaluate the size effect using the identification of dairy processor firms, and the technology effect of using a specific type of milk storage tank.

Model 2 shows that dairy processing firms achieve second-order benefits of meso-institutional translation. This group of firms presents a more efficient adaptation to the food policy than the other agents. Possibly, these firms have an easy access to the resources that support cheaper adjustments. In addition, Model 4 illustrates an increase in the high-quality index by agents who use a specific type of technology. Therefore, these models evidence the second-order effects of size and technology.

Additionally, but unexpected, Models 5 and 6 bring intriguing findings about the joint effects of size and technology. They report positive effects of size demonstrated by the decrease in the low-quality index, but they also evidence unexpected results of the second-order technology effects. The results indicate that, given the same level of rules' translation (meso-institution presence), and in the presence of a condition of size that enables more uncertain investments, the decisions of technology can lead to a downward trend in quality. This suggests that agents may test new, but not always adequate, technologies more often than others and, in doing so, they harm their

Table 4.6: Second-order effects

VARIABLE	(1) [Size effects] Index of low-quality	(2) [Size effects] Index of high-quality	(3) [Technology effects] Index of low-quality	(4) [Technology effects] Index of high-quality
DiD Coefficient (ΛI_{st})	545.87	-5.82	-642.41	-5.50
	(1,448.21)	(4.04)	(1,014.63)	(4.06)
DiD Coefficient * Dairy firms	-649.43	8.62**		
	(1,451.53)	(4.31)		
DiD Coefficient * Milk storage tank			556.51	8.18*
			(1,020.76)	(4.32)
State Fixed Effects	Yes	Yes	Yes	Yes
Time fixed Effects	Yes	Yes	Yes	Yes
Technology controls	Yes	Yes	Yes	Yes
Size controls	Yes	Yes	Yes	Yes
Time trends	Yes	Yes	Yes	Yes
Observations	76,526	123,374	76,526	123,374
Adjusted R-squared	0.4831	0.3589	0.4833	0.3589

VARIABLE	(5) [Joint effects of size and technology] Index of low-quality	(6) [Joint effects of size and technology] Index of high-quality
DiD Coefficient (ΛI_{st})	545.28	-5.71
	(1,448.13)	(4.10)
DiD Coefficient * Dairy firms	-7,397.13****	10.68
	(1,459.06)	(8.72)
DiD Coefficient * Milk storage tank	6,765.21****	-2.27***
	(263.42)	(9.32)
State Fixed Effects	Yes	Yes
Time fixed Effects	Yes	Yes
Technology controls	Yes	Yes
Size controls	Yes	Yes
Time trends	Yes	Yes
Observations	76,526	123,374
Adjusted R-squared	0.4838	0.3589

Notes: (a) Standard errors are reported in parentheses and clustered by an interaction variable between states and months. (b) "State Fixed Effects" represents a set of dummies for each state. (c) "Time Fixed Effects" is a set of dummies for each day of a month (1,2,3,4,...), 12 months of each year, 19 years of sample period range (1999-2017). (d) "Technology controls" is a set of dummies related to the equipment used in milk storage before sample sending (cow, milk silo, milk storage tank, storage tank inside a truck, others). (e) "Size controls" corresponds to a set of dummies related to the category of the agent responsible for that sample (e.g. individual milk farmer, collective farmers, dairy processing firm, others). (f) "Time trends" represents a time trend variable for each state over all possible months. (g) Statistical significance: * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001.

performance, even with a proper understanding of complex regulations.

These estimates illustrate a relevant theoretical contribution. The results include the role of technology in the analysis based on New Institutional Economics and transaction costs. As noted by Ménard (2014), *"technological issues in a transaction cost framework should be reinstalled as a priority in our agenda"*. My findings bring initial, but promising, evidence about technology's impact in this context. I show that technology is relevant to impact performance based on the perspective of economizing transaction costs.

4.6 Conclusion

I support my hypothesis that an efficient meso-institution increases the effectiveness of a new food policy implementation. This occurs because the meso-institution reduces the lack of information by translating the rules of the game to organizations. I conclude that a new Brazilian food policy on milk quality was better implemented in locations where there was the presence of a Conseleite. These findings evidence that those regions have an additional translation mechanism that increases the regulation effectiveness by providing incentives based on the economic value of quality production. These locations presented better quality levels in the parameters related to the new regulation due to the Conseleite's informational support.

This intermediate-level ("meso") institution covers the gap between the rules (i.e. institutions, "macro") and milk farmers and processors (i.e. organizations, "micro"). It provides information through regional price references based on milk policy's content, which are adopted in transactions of milk supply. In addition, concerning the regulation, Conseleites introduce production costs in price formation, thereby they isolate their effects according to their specific locations.

The results reported in this study indicate that the presence of a Conseleite resulted in the decrease of a low-quality index and an increase of a high-quality index when IN 62/2011 emerged. The study identifies this earlier influence as first-order effects, and the impacts of size and technology as second-order effects. Thus, I advocate a sequential logic in food policy implementation, in which the institutions come first and then it comes the influence from technology and size. This portrait exposes that the organizations are differently impacted by policies due to the meso-institution's translation function, even when those firms which are similar in technology and size.

4.7   Theoretical Implications

The study contributes to the theory of meso-institutions introducing alternative mechanisms to manage implementation failures of food policies. I posit that the implementation of a new policy occurs in at least two distinct stages, which I call first- and second-order. By first-order effects I refer to the need for a translation function, which has to be accomplished before the implementation. The agents require a minimum knowledge and understanding of the regulation in order to adjust themselves (Hayek, 1945). That is, knowledge circulation and clear information makes the translation more effective and induce more efficient decisions in the second-order stage (Grossman and Stiglitz, 1976, North, 2006). By the second-order I refer to the idiosyncrasies of each individual, whereby size and technology choices appear. That is, following a clearly translated rule in the first-stage leads to more efficient decisions regarding the acquirement of new technologies or expansion, stagnation or reduction of production capacity (size).

I find that the success of a policy implementation depends on an initial translation, and then enforcement and monitoring. Policy-makers should initially provide a clear access to the policy's details before establishing sanctions for illegal behavior (North, 1990a). Thus, having understood the rules, the economic agents make strategic decisions about technology and size, subject to sanctions. Otherwise, in the case of misunderstanding the rules, the agents are not subjected to the competitors' strategies, but they are subjected to the institutions' punishments and to the bargaining losses in negotiations with buyers (North, 2006). In sum, I claim that institutions are formed by distinct layers (macro-, meso- and micro-) with a sequential logic of impact (first-

and second-order effects).

My theorizing advances the literature of meso-institution (Ménard, 2014, 2018). I complement the empirical evidences from the recent descriptive case studies (Ménard, 2017, Rouviere and Royer, 2017). I also illustrate that meso-institutions do not have only short-term impacts in food policy effectiveness, but also long-term consequences for further policies, even those implemented a long time after the creation of the meso-institution. I strongly advocate that policy implementation failures can originate from informational constraints due to the complexity of the rules.

Agents who do not absorb the policy's technical content, or do not know where they can look for informational support, do not implement the policy efficiently. These firms demand an adequate translation structure to then adapt their production system (Ménard, 2016). Otherwise, the informational barriers result in relevant issues regarding transaction costs and the improper definition of property rights (Barzel, 1997, Williamson, 1985, 1996).

The results underline the fact that food policy fails when it is not well translated and implemented. However, I illustrate that not only macro-, but also meso-institutions can fail. There is a relevant gap between the institutions and organizations that are crucial to policy success, which I cover here with the translation function of meso-institutions (Ménard, 2014, 2018). To sum up, all the three levels of the institutional arrangement matter (Hedley, 2017). Any regulation must consider the political architecture in its implementation environment (Reardon et al., 2017) - for instance, how national-, regional- or local-levels are relevant for policy translation, implementation and monitoring.

Overall, I expose a higher effectiveness of food policy implementation in regions where meso-institutions are located. I highlight the relevance of institutional translation mechanisms, claiming that any regulation must be initially translated, and then enforced and monitored, to succeed. The findings lead to a new research agenda about meso-institutions wherein scholars can study not only food policy challenges (Barrett, 2010, FAO et al., 2017, Godfray et al., 2010), but also other inequality-related policy problems, such as poverty and health.

4.8   Managerial and Policy Implications

I also bring relevant implications for practice and policy. Like specialized regulation in infrastructures services (e.g. water, electricity, etc.), food policies usually carry much complexity and technicality. This being so, alternative arrangements usually emerge to support food policy implementation at the intermediate-level. The nature and focus of the meso-institution depends on the food policy. The policy's content defines the priority according to the institutional barriers in the translation, enforcement

or monitoring functions. For instance, in the case of technical and complex content or constraints in accessing specialized services, the translation is crucial. In the case of extensive localization of agents in a large territory, enforcement and monitoring are the key supports.

Some cases from abroad illustrate that my contribution is not limited to the Brazilian geographical scope but is applicable in other contexts - for instance, in the Canadian Marketing Boards (Royer, 2011, Tamilia and Charlebois, 2007, Veeman, 1997) and European Milk Board cases. Both are responsible for providing price information based on quality parameters from the regulation in their location as well as production costs. They also detail market functioning, presenting information about dairy import and export balance, financial issues of large players, environmental and animal welfare problems. That is, they link the organizations and institutions, promoting transparency and fairness with institutionalized and efficient measures in the middle-level.

I also make a contribution specifically to the milk sector. The results evidence that the national milk quality program in Brazil is related to the issue of farmers' informational constraints and that translation structures manage this well. In contrast, the European Union faces a distinct issue but can also learn from this experience. The milk supply transaction in the European market faces a market dilemma. Milk farmers possess considerable access to technology and achieve a high level of quality, but suffer from declines in demand and prices. Thus, the European problem in the milk quality program is connected to the response from the coordination of the chain according to the market signalization. The European Milk Board is already looking at this issue through a broader perspective. However, like the Conseleite, this other meso-institution could better explore its branches by applying a focused strategy that provides better details of market demand and supply regionally, not broadly.

This illustration shows that a meso-institution must emerge with different functions depending of the issue from each type of rule. Locations with similar issues from Brazil could create Conseleite following some guidelines. They should initially approach both sides of the transaction of milk supply - the milk farmers and processors - and provide an external third part formed by technicians specialized in dairy market. The main difficulty is to convince representative agents of both sides to follow the Conseleite's suggestions. Thus, the creation of this meso-institution is related to a market organization movement. It is based on the agents' agreements to adopt a common structure (Conseleite) that is responsible to provide price references (information) and to guide incentives in terms of milk quality levels and production costs.

5   General Conclusion

This dissertation evaluates the new research agenda in New Institutional Economics which claims for the division of institutional environments into three layers - macro, meso and micro. Specifically, I provide a systematic view of this division and also investigate the relevance of the meso-level, which has been recently considered in the literature. Using secondary data about regulations in Brazil and Italy, and also employing a Brazilian dataset related to more than 14 million data points about daily laboratory analysis of milk quality from 25 of the 27 Brazilian states during a nineteen-year period (1999-2017), I address some research questions in the fields of institutional economics, strategic management and food policy. Limitations along with theoretical and policy implications are presented individually in each chapter.

In Chapter 2, I focus on the institutional economics field. I analyze the connection of the three institutional layers - macro, meso and micro - providing some theoretical enhancements based on the concepts of institutional interconnectivity, institutional complementarity, institutional alignment. This chapter describes the investigation of the relationship between and within each layer. The analysis is based on historical secondary data about cow milk regulations in the dairy industry in Brazil and Italy. I also present some propositions related to the functioning of institutional environments and their bases in terms of transaction costs.

In Chapter 3, I specifically focus in the meso-layer to address a research question in the strategic management field. This part analyzes the effects of meso-institutions on firms' performance, as well as the dependence of this in relationship on firm-level resources. Studying a regulatory institutional void regarding a Brazilian regulation about cow milk quality, IN 51/2002, and applying a difference-in-difference approach, I demonstrate that the information provision mechanisms of meso-institutions and their translation function have a positive impact on performance. Moreover, I find that this effect is still more relevant for small firms. Aspects like serial correlation and placebo testing are also addressed to highlight the robustness of these results.

In Chapter 4, I also pay attention to the meso-institutions but now focusing on the food policy literature. I evaluate the impact of the presence of meso-institutions on the effectiveness of a food policy implementation in Brazil, IN 62/2011. Based on a framework about rule understanding, information costs, uncertainty and market signaling, and using the same dataset but with a different identification strategy, I find that an efficient meso-institution increases food policy's effectiveness and highlight a sequential logic of policy implementation from institutional (first-order) to technology and size (second-order) effects. The robustness of these results is also tested through

a sensitivity analysis of a placebo test and sample specification.

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