Structural Change and Economic Dynamics 37 (2016) 43–51

Contents lists available at ScienceDirect

Structural Change and Economic Dynamics

journal homepage: www.elsevier.com/locate/sced

Finance-technology complementarities: An organizational equilibria approach

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ARTICLE INFO

Article history:
Received December 2013
Received in revised form July 2015
Accepted November 2015
Available online 17 December 2015

Keywords:
Transaction costs
Corporate governance and finance
Institutional complementarity
Organizational equilibria

ABSTRACT

Unlike many pre-crisis contributions, Oliver Williamson emphasized how different investment projects involve different forms of governance. According to him, their specificity contents define and separate the appropriate conditions for debt and equity governances. Our paper extends his contribution by arguing that, while the degree of specificity of the technology influences the choice of the governance, also the reverse is true: equity and debt governances involve different degrees of specificity. Thus, we have to deal with finance-technology complementarities, which can generate multiple organizational equilibria. Their possible inefficiency provides an argument for regulating the limits of each form of governance and for understanding the variety of arrangements existing in real life economies.

1. Introduction

Before the financial crisis and the great depression, according to most economists different forms of finance were not very relevant for economic performance. The Modigliani and Miller, 1958 capital structure irrelevance principle had shown that, under some conditions, debt and equity systems were yielding equivalent evaluations of the firm. The different nature of the incentive problems stemming from debt and equity were, of course, recognized but it seemed that no criterion could efficiently separate the types of projects to be mainly funded with one of these two instruments. The Anglo–Saxon model seemed to mark the end of history the Corporate Law. It was the model definitively required for efficient financial corporate governance (Hansmann and Kraakman, 2003).

Indeed, because of the focus on the incentive problems, a great deal of the literature expressed a preference for debt and, implicitly, for highly leveraged firms. According to conventional wisdom, increasing the debt/equity ratio seemed to have a twofold advantage. On the one hand, the repayment of the debt limited managerial digression and involved the substitution of the private benefits of control for the search of profits. On the other hand, it concentrated the ownership of the firm's shares and increased the incentives to monitor managers. The increased risk of bankruptcy, which was the other side of the coin, attracted a limited attention not only in the academic but also in the political world. Regulations dividing the realms of debt and equity, such as 1933 Glass–Steagall act, were repealed in 1999 and no real qualitative distinction between the projects to be mainly financed by debt and by equity seemed to exist.

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http://dx.doi.org/10.1016/j.strueco.2015.11.005
0954-349X/

In this framework, an important exception was Williamson's (1988) seminal paper, where he argued that the firm's financial choices between equity and debt financing were driven by asset specificity. The degree of asset specificity entailed a criterion to distinguish the cases where debt and equity funding, far from being neutral, had a comparative advantage due to the nature of firm's investments. According to Williamson's insightful intuition, the debt-equity choice was analogous to the make-buy decision, which was at the core of the Coasian transaction cost approach (Coase, 1937)[1]. Firms could either rely on "external finance" (analogous to the buy-decision) in the form of debt or on "internal finance" (analogous to the make-decision) in the form of equity.

The governance structure of debt could be outlined in a rather simple way: the firm gives back the debt increased by interest payments and accepts the interference of the funding agents on the investments decisions of the firms. Under debt financing, lenders should simply monitor that the firm keeps on being endowed with an amount of re-deployable (non-specific) capital, to be easily obtained in case of liquidation. However, in Williamson's view, this governance mode becomes increasingly costly when the most efficient available technologies require a greater intensity of specific resources. At some point, when the opportunity cost of renouncing to specific investments under debt financing is high enough, a system of equity finance becomes more convenient. Under this alternative type of governance, financiers will be remunerated with the uncertain residual profits of the firm and need some power to monitor managerial choices.

Williamson's path breaking contribution clarifies why, from the point of view of the funded party, the convenience of debt/equity ratio changes with different technologies (i.e. different degrees of specificity of the resources involved in the project). However, since, in his own approach, debt and equity are different governance structures empowering different agents, technology cannot be assumed to be exogenous and it is, indeed, well likely to be influenced by the agents holding this power. When the governance structure gives more power to debt-holders, they will try to make the firm adopt a more general-purpose technology. By contrast, when it empowers more the shareholders, they will pressure the firm to adopt a more specific technology whenever it increases profits. These conflicting interests, concerning the risks of specific assets, arise from the fact that, while debt-holders happen to be bounded in their gains by earning a fixed interest, shareholders' losses are truncated by limited liability.

The main goal of this paper is to explore the complementarities between firm's financial and technological choices[2]. Since technology is influenced by the same governance structures that are supposed to select, there could not be a universal convergence to a *super-governance mode*, which selects debt and equity funding according to the specificity of the most efficient technology. Williamson observes that this super-governance mode, which he calls *dequity*, does not, indeed, characterize real-life systems, as multiple organizational arrangements exist in different sectors and in different countries. We will argue that this multiplicity and path-dependence of financial systems can be explained by the self-reinforcing complementarities existing between finance and technology.

A consequence of our argument is that state intervention must take into account real sector–financial sector complementarities: any policy acting only on one side of the governance mode may generate the risk of neglecting possible relevant feedbacks on the other side. Technological and financial choices are interdependent and their co-evolution affects the incentives of stakeholders in a rather complex way. Thus, our conclusion provides a new argument, in the post-crisis debate on corporate governance rules, for regulating the limits of each form of governance and for understanding the variety of arrangements existing in real life economies.

The paper proceeds as follows. In the following section, we extend Williamson's analysis to deal with the interdependences stemming from the complementarities between technological and financial domains. In section three, we model these complementarities and show the conditions under which multiple and path-dependent financial–technological equilibria exist. In the concluding section, we focus on the policy implications of our analysis and argue that, if there is no automatic mechanism driving debt and equity towards their efficient mix, regulations separating the two fields can improve efficiency and avoid damaging defaults. We argue that the analysis of institutional complementarities in corporate governance can help to finalize appropriate reforms in corporate governance. However, we caution that each institutional complementarity cannot be taken in isolation from the multiple complementarities that characterize modern capitalist economies. A comprehensive representation of their interactions is required to obtain a reasonable understanding of the economic system and useful tools for economic policy decisions.

2. Finance and technology: A two ways relation

Standard theories on incomplete contracts and hold-up problems (Williamson, 1985; Hart, 1995) have been typically based on the implicit assumption that parties had either 'deep pockets' or immediate full access to the financial resources needed to carry out a given transaction. Thus,

[1] For an account of the Coasian contributions see Pagano (2012).

[2] Aoki examined a related problem in his (1994) seminal article which, according to Gagliardi (2014), is the first paper where the concept of institutional complementarity was introduced in economic analysis. Aoki's paper focuses on the complementarity between different workers' skills (specific or team oriented vs. general-purpose) and different financial structures (shareholders governance vs. relational banking). Since human capital cannot be owned by others or be used as collateral, Aoki's results are different from those obtained in this paper. Relational banking has an important role in Aoki (1994) contribution because he focuses insiders' skills. By contrast, as in Williamson (1988), we will assume that asset-specificity refers to non-human assets and creditors are simply bondholders, who find it less risky to lend to firms having a low intensity of specific non-human capital. As argued later in the concluding section, a satisfactory assessment of a particular variety of capitalism requires the analysis of numerous institutional complementarities.