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The Nature of Financial Innovation: A Post-Schumpeterian Analysis

Çinla Akdere and Pelin Benli

Abstract: Is it possible to apply a Schumpeterian notion of entrepreneurial innovation to the financial sphere? Joseph A. Schumpeter, arguing that innovation could only be proposed by entrepreneurs and take place predominantly in the real sector, seems to propose a foundation for a contemporaray analysis of financial innovations. There is a lack of specific emphasis on the evolution of financial innovations in Schumpeter's work. The purpose of the paper is to demonstrate that Schumpeter's analysis of entrepreneurial innovation, which takes place in the real economy, also proposes a theoretical account for understanding the dynamics of financial innovations. Our aim is to propose a comparative study between entrepreneurial innovations and financial innovations. Nevertheless, analyzing financial innovations in the framework of Schumpeter's economic theory doesn't mean to legitimize them all. This is also an investigation for diversifying financial innovations according to their impact on the real economy. We provide a basic foundation for a post-Schumpeterian description of the evolution of the capitalist system.

Keywords: financial innovation, entrepreneurial innovation, Joseph A. Schumpeter, capitalist system

JEL Classification Codes: B220, B260, B310, G200

The history of finance starts with the first financial innovations and goes back to the Greek state of Lydia in the seventh century B.C.[1] As the types of financial innovations are so diverse, in defining the term M. D. Flood (1992:3) relies on J. A. Schumpeter. A change in the production process or a new product, the definition given by Flood without mentioning the

Çinla Akdere is a Lecturer on the Faculty of Economic and Administrative Sciences at the Middle East Technical University, Ankara, Turkey. Pelin Benli is an Information Technologies Auditor in the telecommunications sector. *The authors thank the editor and the anonymous reviewer for their constructive comments, which helped us to improve the manuscript. We are greatful to André Lapidus, Harald Hagemann and Christophe Schinckus for reading a previous version of the article and delivering us valuable and insightful comments. The authors would also like to thank Heinz Kurz for his support.*

[1] According to Tufano (2003), its origins date back to the seventeenth century. See also Miller (1986).

process of "creative destruction," appears very limited. The two approaches he describes in addition to the first are also limited: improved financial products in the process of contract design in securities markets, and central bankers' concerns to make innovations on monetary policy more effective. P. Tufano (2003) broadly defines financial innovation as the act of creating and then popularizing new financial instruments, as well as financial technologies, institutions, and markets. By Schumpeter's time, financial innovation had already existed as a fact for multiple centuries. It is especially with the twentieth century that financial innovations have become popular and begun to be used extensively in the financial markets. M. H. Miller (1986) explains that in the 1920s, options on commodity futures were traded on the Chicago Board of Trade. Yet it was starting with the second half of the twentieth century that the use of financial innovation reached a historically unprecedented scale.

The reason for the accelerating pace of financial innovation lies in various factors. For instance, Miller (1986) argued that two structural implementations from the 1930s and 40s, a tax system and regulatory structures related to banking activities, became inefficient and imposed a great burden on individuals a few decades later, are the two major impulses that popularized financial innovations. S. A. Ross (1989) referred to agency considerations and institutional preferences as the major motives that give rise to the demand for new financial instruments and innovations. He claimed that agency considerations, explicitly contracts and regulations, make the borrowing process costly or restricted for individuals. In these cases, individuals prefer to contract with opaque financial institutions that interact with investment banks in order to place the securities they have. The investment banks aim to create new pools of low-grade assets with these securities.

Ç. İ. Koğar (1995) announces the *raison d'être* of financial innovations as profit seeking financial institutions'' willingness to avoid regulations or to work in more suitable conditions. Central banks, whose duty is to control money movements, are supposed to keep price stability, propose better monetary policies, and support the government's directives. If needed, they change the financial structure of the country, installing new regulatory dynamics. The more financial rules are set for the long-run the more financial stability is set. Incentives that would lead central banks to change the rules of the game oblige banks and other financial institutions to deal with the new rules.

After the 1980s, these restrictions put in place by central banks left a liberal regulatory environment that put pressure on banks to compete with many new financial intermediaries. As banks had no choice, they revised their strategies and incentives to deal with the pressure to create profit generating instruments and combinations, leading economies to a system-wide financialization. Further along, the digital revolution increased the possibilities in creating alternative financial instruments that could lead to even more profit generation.

Indeed, advances in technology as a prompting factor for financial innovations have been on the agenda since the early 1980s. This is a direct consequence of V. Horne's (1985) claim that the overall financial services industry is dominated by cost effectiveness. As the computer age has both brought a continual broadening of applications to the financial services industry and lowered transaction costs, the role of technological advances in stimulating financial innovations has become crucial. In a similar vein, A. Fernandes (2005) suggests that financial development arises as a response to the contractual needs of emerging technologies. Addressing technological progress as the main motive behind the introduction of financial innovations, he asserted that financial development and economic growth are linked through the characteristics of technology. For L. White (2000) the rapid innovation in the financial services sector arises from the rapid developments in two technologies: data processing and telecommunications. He emphasized that as significant improvements in these underlying technologies have occurred, "financial engineers" have been enabled to better amass data, assess risk, and thereby meet the financial demands of individuals and enterprises—by designing new financial products and services. Starting in the second half of the twentieth century, when the interaction between financial innovation and technological advances became highly effective, financial innovation also gained significant recognition in the literature.[2]

A direct link, however, between financial innovations and economic development is challenging to observe directly. If classifying financial innovations as "Schumpeterian" is to consider them as the motor of economic development and thus confer on them a kind of legitimacy, a categorization is needed. This study contributes to the literature on financial innovations in claiming that only the ones that bring long-term growth could be considered as "Schumpetarian," in other words, subject to the "creative destruction" process.

The first section is an introduction. After we search for the traces of financial innovation in Schumpeter's theory and present the contrasting and complementary views in the literature on whether Schumpeter mentioned and/or explained financial innovations, we explore the role of banking activities and financial innovations in the production of business cycles and separate these two influences according to their contribution to economic development. A comparison between entrepreneurial and financial innovations prepares a basis for a general overview about the effect of financial innovations on the evolution of the capitalist system. We then focus on more specific effects: both negative and positive discourses will be described. Finally, the long-run positive effect of financial innovations is discussed and supported in the context of an analysis of venture capital. Lastly, we provide a conclusion.

[2] See Tucker (1976), Ben-Horim and Silber (1977), Silber (1983), Van Horne (1985), Kane (1986a and 1986b), Miller (1986), Allen and Gale (1988), Ross (1989), Merton (1990) Persons and Warther (1997), Tufano (1989 and 2003), White (2000), Lerner (2002, 2006 and 2010).

The Financial Innovations in Schumpeter's Theory

Some studies argue that Schumpeter never mentions and explains financial innovations in his works.[3] Perez (2004) argues that Schumpeter neglected the innovative side of the financier. Indeed, Schumpeter did not use the term "financial innovation" in any of his well-known studies ([1912] 1934, [1939] 1964, [1942] 1962, 1954) and even using an evolutionary approach in analyzing institutions, he clearly lacks focus on financial innovation, which can be considered as the fruit of an evolutionary financial system. L. Burlamaqui (2000) stated that, although Schumpeter focuses on banks and finance, somewhat paradoxically, financial innovation did not emerge as a real discussion topic in his theory. In the same vein, M. Knell (2015) mentioned that while Schumpeter made some references to innovation in the banking and finance industries, he shows the instability of the capitalist system only as a consequence of the entrepreneurial activity of the real sector and not the financial sector. H. P. Minsky, however, assigns the instability to the financial sector.[4]

Heller's (2012) remark is more illuminative of Schumpeter's interest for financial innovations: "Schumpeter had not heard of modern collateralized debt, securitization, and derivatives. But he understood the psychology of risk, speculation, 'overdoing' things in an upswing with easy money, 'loose banking methods', and 'political encouragement' ." In the recent documentary on Schumpeter entitled *The Man Who Discovered Capitalism* (2016), Professor Emeritus Stan Metcalfe from the University of Manchester argues that "in Schumpeter's scheme of thinking, the banking system has always played an important role. He used to talk about banks being the headquarters of the capitalist system. And if they start to malfunction, the consequences for the rest of the society are really profound." He adds that this is exactly what we witnessed during the financial crisis of 2008. Schumpeter perceives finance through banking activities because it provides the real sector capital. But not all banking activities have positive effects on production. Carlota Perez, referring also to the 2008 crisis, asserts: "[Schumpeter] was against a reckless banking system, that sort of innovation which very often has nothing to do with innovation. He would have hated that bubble..." Schumpeter ([1939] 1964, 885) clearly put that "The path that leads from the financial sector to real investment is tortuous and unsafe" and, for Ülgen (2014, 268-269), financial innovations make this path much more unsafe.[5]

For Schumpeter, new financial tools are subjects of a faster and more secure flow of

[3] L. Burlamaqui (2000), M. Knell (2015).

[4] According to Schumpeter, economic development proceeds as an evolutionary process: "This is the formal nature of the process that periodically revolutionizes and innovates industrial life. It takes effect on all domains, creates new life forms everywhere. Its innermost meaning lies in the provision of new qualities of goods and in the reorganization of the economy in the direction of an ever increasing technological and commercial efficiency" (Schumpeter, [1912] 1934, 492 in Ebner, 2000).

[5] This sentence has been suggested by one of the referees.

capital to satisfy the quality and quantity of production. However, he is well aware that it is also subject to speculation. Kurz (2016a) summarizes the way Schumpeter sees the two faces of banking activities and financial innovations:

> On the one hand, Schumpeter saw the banking system as providing the needed additional liquidity to realize innovations that increase the quantity and quality of goods available in the economy. On the other hand he observed that the banking system was prone to overshooting the fueling speculative bubbles, which after bursting deepen and prolong economic crises that necessarily follow upon the absorption of the new combination into the economic system. Like Adam Smith and many other economists before him he called for judicious regulation and control of the banking sector. (Kurz, 2016a, 119; See also Footnote 9 in Kurz 2012, 878)

Schumpeter's economic theory is a source where the link between banking activity, entrepreneurial activity and financial innovations explains the business cycles.

> Financial institutions and practices enter our circle of problems in three ways: they are 'auxiliary and conditioning'; banking may be the object of entrepreneurial activity, that is to say, the introduction of new banking practices may constitute enterprise; and bankers (or other 'financiers') may use the means at their command in order to embark upon commercial and industrial enterprise themselves (for example, John Law). (Schumpeter [1951] 1991,153)

Some studies claim that Schumpeter does not mention financial innovations. However, what he explains in some parts of his work is actually itself a financial innovation, even though he does not categorize it as such. Schumpeter considers them as new practices that stimulate growth through "technological innovations." Among these studies, J. P. Raines and C. G. Leathers (2004) analyzed the role of financial innovations in the framework of Schumpeterian business cycle theory and proposed an opposing view to Alan Greenspan. Greenspan claimed that financial innovations, taking root from Schumpeter's "creative destruction," are the major contributors to the "New Economy" by inducing technology-led growth.[6] Greenspan (2000a) makes reference to Schumpeter to explain how emerging technologies push out the old financial tools and accelerate the process of "creative destruction." As financial innovation depends on improvements in information technology, the speed of cash flow is a consequence of the rapid pace of information technological innovation. The development of innovative financial products improved the process of capital reallocation worldwide through a significant unbundling of risks in capital markets under the condition of free markets and free finance. But, the fact remains that after each economic crisis the "Who

[6] New Economy is a term used to describe the new, high technology industries, which have been the major drivers of economic growth since the late 1990s and early 2000s.

to blame?" and "Who will be bailed-out by whom?" questions are asked. Free markets and free finance seem to be like a decor to be taken down when economies shake. As affirmed by D. B. Papadimitriou & L. Randall Wray (2008, XIV), "The first serious tests of financial innovations came in 1966 in the municipal bond market and the second in 1970 with a run on commercial paper—but each of these was resolved through prompt central bank action."

The Interconnection Between Banking Activity, Financial Innovations and Business Cycles

Schumpeter ([1912] 1934) made it clear that credit, or being backed by finance, is a mandatory condition for those entrepreneurs willing to realize their innovation. The source for those entrepreneurs' finance comes from the creation of money and the form of credit given by the banks (Legrand and Hagemann, 2007). Simply, Schumpeter suggested that credit is the *sine qua non* if there is an attempt to realize innovation. Given that only banks and other financial institutions are capable of giving credit and providing the institutional setting for those who create an innovative idea, they stand at the center of Schumpeter's theory. In this regard, Schumpeter ([1912] 1934) called bankers the "ephor" of the capitalist system since they control and enable the transfer of credit and money to the innovative entrepreneurs.

Schumpeter ([1939] 1964, 148) calls macroeconomic oscillations the secondary wave of cycles, subsequent to the primary wave of entrepreneurial innovations:

> In the atmosphere of the secondary prosperity there will also develop reckless, fraudulent or otherwise unsuccessful enterprise, which cannot stand the test administered by recession. The speculative position is likely to contain many untenable elements which the slightest impairment of the values of collateral will bring down. A considerable part of current and investment operations will show loss as soon as prices fall (...). Part of the debt structure will crumble.

Therefore, the (mis)interpretation of Greenspan is completely flawed.[7]

While banks and other financial intermediaries do not exist in the case of circular flow, they begin to appear in the case of steady state growth as having the passive role of equalizing investment flows and savings in terms of guaranteeing the monetary flow. Arising from this, it can be claimed that the real and financial sectors of an economy are highly interrelated and as an important component of the financial sector, financial innovations also gain centrality in this frame (Festre and Nasica, 2009). However, according to Raines and Leathers (2004), the primary role of modern financial innovation has contributed to "reckless" finance and speculative excess, which takes place in the secondary wave of the "New Economy's"

[7] This paragraph has been suggested by one of the referees.

business cycle.[8] Thus, the Schumpeterian approach towards business cycles supports the Institutionalist and Post-Keynesian assessments on the role of modern financial innovations in the "New Economy" and calls for "rational" government intervention.

Kane (1977) says that governments developed well-intended programs like credit allocation –which was needed by the public– by adjusting the tax or welfare structure. However, these adjustments have been beneficial only for some groups. In the United States, as explained by Kane (1977, 58), "federal insurance of mortgage contracts induces lenders to let certain would-be homeowners obtain credit on advantageous terms, whereas margin requirements on stock-market loans seek to limit the amount that an individual may borrow against stock-market collateral." It is almost impossible to calculate the social cost of these programs and understand their effect on the nation's budget and economic performance. The result: the policy maker was confused. And thus with good intentions an "unintended evil" was born: "A policymaker has only to promote the flow of credit to those who purchase or produce the "right" goods and services and retard the granting of credit to those who deal in the "wrong" ones. But the unintended effects of such policies must never be forgotten." (Kane, 1977, 58).

C. Goodhart (1986) focuses on the Unites Kingdom's experience with financial innovations and relates it to monetary growth. He puts the emphasis on how financial innovation erodes the "stability of the links between certain monetary aggregates and nominal incomes" (Goodhart 1986, 79). According to him, the major developments in financial intermediation played an important role in the UK economy by intensifying competition, reducing costs, changing risk characteristics and interest rates, adding more elasticity to international capital movements, creating unification of the global capital market, and changing the innovations and payments systems. Their most positive effect was improving the efficiency of monetary and financial markets, and the worst effect was to destabilize the economy and the control of the system. (Goodhart 1986, 80).

The behavior of bankers has been analyzed by Schumpeter ([1939] 1964) through his comparison between the formation of the first and second waves of business cycles. The first cycle is produced by the demand by entrepreneurs for new investments, which increase consumption afterward. As for the second wave, it is created by bankers' tendency of "granting loans without regard to the borrowers' ability to repay" (Schumpeter [1939] 1964, 148). This tendency creates the new type of banking activity: reckless banking (Schumpeter [1939] 1964, 148). For a better understanding, a focus on the activities of the banks is needed.

[8] In Schumpeter's theory, innovations spur economic growth in the "primary wave" of the business cycle and in the "secondary wave," speculation and reckless finance are brought to the fore. Greenspan claimed that financial innovation, the same as Schumpeterian technological innovations, leads to economic growth and creative destruction and hence, takes place in the "primary wave" of the 'New Economy's business cycle.

Two Types Of Banking Activities: Old-Style And Modern

Festre and Nasica (2009) point out the fact that banks and financial intermediaries take an active role in the last stage of economic development.[9] They provide the means that are spent on the necessary capital and labor during the realization of innovation.[10] In this regard, they observe that financial innovations could be seen as many tools of adaptations to the dynamic tension existing between industrial and banking capital.

L. Burlamaqui and J. Kregel (2005) identify two types of banking: the first one is the "old-style" one (house banking) and the second type is the "modern" one (transactional banking). The first one would lead people to finance their productive projects in a cheaper, stable and more flexible way. This one is the productive type of lending mentioned by Schumpeter in his *Theory of Economic Development*.

As Schumpeter ([1939] 2007, 116) stated,

> the banker must not only know what the transaction is which he is asked to finance and how it is likely to turn out, but he must also know the customer, his business, and even his private habits, and get, by frequently 'talking things over with him', a clear picture of his situation. But if banks finance innovation, all this becomes immeasurably more important.

The bank defined here by these activities is of the first ("old style") type.

By contrast, the second type is market-based systems, wherein the required knowledge involves markets or instruments, but not information about clients. It presents the possibility of financial innovations via rapid reverse engineering. When financial engineering processes involve and unbundle large indivisible investments for sale to households, the management of the bank's proprietary investment portfolio becomes much more difficult. The process becomes stranger to sources needed by industrial borrowers. The second type of banking is based on financial arbitrage related to particular characteristics of financial assets. Only firms or individuals that could stay in knowledge-based advantageous positions are able to profit. This second type of banking is the one that characterizes the modern financialized era. Carlota Perez criticizes such an approach saying that it doesn't lead to an efficient financial

[9] Schumpeter uses the term "development" while constructing his argument on creative destruction. Ebner (2000) distinguishes economic development and growth in Schumpeter's theory. He emphasizes that while economic growth draws from external sources and causes slow, gradual and cumulative changes in the economic system, economic development results from discontinuous internal changes by economic innovations and causes structural changes and business cycle fluctuations in the economy. Therefore, Schumpeter analyzes innovations mainly in the context of their role in the process of economic development. Some works use only the term "growth" as a synonym of development (see Dinopoulos and Şener, 2007); some other works use only the term growth (Grennes, 2003). There are also works that use both terms "growth and development" (see Ülgen, 2012). Yet, growth and development cannot be considered as synonyms (Ebner, 2000). We will nonetheless use the term "development" and "growth" as synonyms like Caballero (2008).

[10] Festre and Nasica (2009) explain that Schumpeter's analysis of economic development has three pedagogical stages and these are: the circular flow; the steady state; and the development cases.

system but to a heavy gamblers' economy. These tools aim at increasing the means and tools of undertaking shortsighted and high return-seeking speculative activities without any regard to the characteristics and needs of the real economy. As affirmed by L. Burlamaqui and J. Kregel (2005), while both the old and modern style types are significant from a Schumpeterian perspective, the modern systems have no impact on the absolute level of income.

In traditional banking, banks make investments on behalf of consumers and at the same time, they insure them against lack of liquidity. Nevertheless, even in the countries where national banking systems are well established, as was the US between 1863–1914 or England after the creation of the Bank of England, banking crises and panics have occurred (Gorton 1988 in Allen and Gale 2007, 5). But economic theorists couldn't adjust the mainstream theory or develop a new one that represents this real fact. The Glass–Steagall Act (1933), The Banking Act (1935) and the establishment of the Federal Reserve System were big steps toward the separation between commercial banking and investment banking operations. The introduction of deposit insurance helped to make banking panics disappear, albeit not permanently (Allen and Gale 2007, 5).

Schumpeter maintains that innovative activities of banks turn easily into speculative behavior, provoking reckless finance, when they go beyond their essential role (i.e. financing entrepreneurial innovations) (Schumpeter [1912]1934:106). The speculative, wild excesses—through reckless borrowing and lending in mortgage financing (Schumpeter [1951] 1991, 219) or through bubble speculations resting on new industrial opportunities (Schumpeter [1939] 1964, 277–79)—result in manias as banks withdraw from their regular activities (Schumpeter [1939] 1964, 348).[11]

The Similarity Between Entrepreneurial and Financial Innovations

Financial innovation could also be seen as a new pattern of production. Schumpeter defined innovations as the "new combinations" of capital, labor, and technology ([1912] 1934). In his later work ([1942] 1962), he searched for the dynamic effects of new combinations, for which he coined the phrase "creative destruction." Those new combinations were also the result of the negotiations between entrepreneurial businessman and financiers. In this section, we compare the types of entrepreneurial and financial innovations with an emphasis on the growing sophistication of the modern financial markets through the channel of technology.

In *The Theory of Economic Development* ([1912] 1934), Schumpeter classified five types of innovation: (1) the introduction of a new good, (2) the introduction of a new method of production (3) the opening of a new market, (4) the conquest of a new source of supply of raw materials or half-manufactured goods; and (5) the carrying out of the new organization of any

[11] This paragraph has been suggested by one of the referees.

industry or the breaking up of a monopoly position. Schumpeter did not include financial innovation in his list of innovations (Raines and Leathers 2004.), but still, it is difficult to claim that he concentrated on technological innovation only within the real sector as, in his below taxonomy, he only explicitly addressed the innovations of the real sector in the fourth type and avoided placing a specific type of innovation on the others.

There is no unique taxonomy or list on financial innovations that is yet agreed upon. Tufano (2003) mentioned that creating a taxonomy is among the main challenges faced when dealing with financial innovation. Different authors have created their own taxonomies on a case-by-case basis, depending upon what they aim to focus on. For instance, Finnerty (1988, 1992) categorized financial innovation regarding the function served by each type of financial instrument, whereas Duffy and Giddy (1981) chose to classify depending on the supply and demand factors, which gave a stimulus for financial innovation. The usual approach to financial innovation is to categorize it as (1) product innovation, which includes new financial instruments, contracts, techniques and markets; (2) process innovation, which refers to a new and improved production process; and (3) organizational innovation,

Table 1: Types Of Schumpeter's Entrepreneurial Innovation and the Usual Approach to Financial Innovation

	Schumpeter's entrepreneurial innovation	Financial Innovation
TYPES	(1) A new good	(a) Product
	(2) A new market	
	(3) A new method of production	(b) Process
	(4) A new source of supply of raw-materials or half-manufactured goods	
	(5) A new organizational form	(c) Organizational

which covers new institutions and organizational structures within financial products and services (Vargas, 2009). The usual approach enables us to take the broadest perspective on financial innovation and is suitable for making a comparison between Schumpeter's five types of entrepreneurial innovation and financial innovation. We elaborate in Table 1 using

number notations for Schumpeter's innovation and letter notations for the types of the usual approach to financial innovation.

In our comparison, we matched product financial innovation (a) both with a new good (1), and a new market (2) created by entrepreneurial innovation due to two reasons. The first reason arises from the technological evolution of the globalized financial system. As a consequence of the computerization and symbolization in the financial markets, its nature has changed and the "consumer-oriented" dimension of finance has grown, which can be illustrated by financial innovations (Schinckus, 2008). If we think in terms of today's financial capabilities, a financial instrument in the sphere of "hyper-finance" (see Schinckus, 2008) acts similar to a good in real life. Simply put, both have their own markets-goods and financial, where those goods and financial products can be bought and sold. If we take derivative markets, for instance, we see that they are fundamentally not so different from a market for electronics. In both markets, an exchange takes place between the main parties—the buyer and seller—whether it is an exchange of tangible goods, liquid assets, or information. Both markets facilitate trade as well as allocate resources. Second, even though a financial innovation is not consumable as a new good (1), labor is a common factor of production for both entrepreneurial and financial innovations. The last common feature between a new good (1) and a product financial innovation (a) is that the latter can also act as an intermediary good. A product financial innovation can be used in the formation of new financial processes, techniques or strategies, i.e., in the creation of another financial innovation (Blach, 2011).

Furthermore, we matched process financial innovation (b) with a new method of production (3) since both address a change in the way of implementation. However, there is a slight difference. In the case of entrepreneurial innovation, it refers to a change in the method of production, whereas for financial innovation, this new method does not concern only production. A process financial innovation refers to the underlying method of how new financial products are invented, introduced to the marketplace, and diffused (Hu, 2009). To put it differently, any process financial innovation is unbounded to the production of new financial products and the production aspect is covered within. The former is a process financial innovation that presents customers with a new way of carrying out their financial transactions, while the latter is a technological innovation that is used in the production process of the real sector. Still, both enable carrying out tasks, whether financial or not, in a new way that is more efficient and practical than previously.

Another aspect that shows the perfect match between a new method of production (3) and process financial innovation (b) is described by O'Riordan (2009): R&D needs to be applied differently to the normal "laboratory-based research associated with manufacturing"

within the financial services sector since R&D is central both for real and financial sectors in stimulating innovation. O'Riordan (2009) suggested the following regarding the functioning of R&D, such as examining collaborative innovation, the barriers that exist to RD&I, and patenting and intellectual property within the financial services sector. Within the issue of collaborative innovation, fostering academic-industry collaboration is both an important and a controversial dimension. In this regard, Lerner (2006) pointed out that while innovation in manufacturing industries has inspired literally thousands of academic studies, the number of studies on financial innovation is substantially lower. Investigating the controversies regarding the academic-industry collaboration within the context of financial innovation, Lerner (2006) claimed that less profitable firms with strong academic ties innovate more.

So far, two types of financial innovation, (a) and (b), are matched with three of Schumpeter's entrepreneurial innovations, (1), (2) and (3). When it comes to "a new source of supply of raw-materials or half-manufactured goods," (4), a comparison has remained unfilled since (4) is directly related to the real sector and it cannot be adapted to the financial sector. Lastly, we match organizational innovation (c) easily with a new organizational form of Schumpeter (5). There is no substantial distinction since both relate to a change in the organizational structure of a firm, whether it operates in the real or financial sector.

We conclude this section by claiming that financial innovation shows quite similar characteristics to the Schumpeterian notion of innovation regarding it in three aspects. Thus, in opposition to Tilburg (2009), finance itself is subject to innovation. To the financial sector, it is possible to attribute an innovative side because the finance itself is entrepreneurial. How then do financial innovations contribute to the process of "creative destruction"? In other words, does the innovative process of the financial sector also play a role in "creative destruction"?

Financial Innovations and the Evolution of the Capitalist System

It is still difficult to understand the dynamics of financial innovations and their impact on the evolution of capitalist economies. Schumpeter differentiates real decisions that orient the production process (path to entrepreneurial innovations) and financial strategies that provide funds for the production process (path to financial innovations). While the former is directly related to economic progress, the latter indirectly supports it. Schumpeterian "entrepreneurial" innovations are made by the adventurous, creative and dynamic Schumpeterian captains of industry.

Furthermore, two of the most consequential innovations of the past three decades or so are the mortgage-backed security (securities collateralized subprime loans) and the asset-backed security (securities collateralized by car loans, boat loans, student loans, and credit

card receivables) like credit default swaps (CDSs) and collateralized debt obligation (CDO). It would seem at first blush that these innovations have contributed, on one side, especially to the expansion of household borrowing and, on the other side, substantially to rising leverage ratios and financial fragility in the period leading up to the financial crisis. The reasons why they couldn't contribute to the long-run development have been questioned broadly.

In a Schumpeterian framework, contributing to the long-run development of the economy should be accepted as the adequate condition for a financial innovation. These financial innovations were used in the deregulated atmosphere of the mortgage credit bubble and broker's moral hazard. Or, it was a generally deregulated capitalist system that created a systemic risk and had to be blamed. For B. Masters, the inventor of collateralized debt obligations, the responsibility belongs to users and their incapacity of dealing with the risk factor of financials tools (Robinson & Leising, 2015).[12] Systemic risk depends only on the use of financial tools that transfer and increase it "if major counterparties fail to manage their own risk exposures properly" (Alden, 2013).[13] A second point of view is expressed by J. Connaughton, the author of *The Payoff: Why Wall Street Always Wins* (2012). In his book, he blames inventors, banks and institutions who supply risky securities: "You can't market incredibly risky securities and then pretend you're shocked when things get out of control, especially when you and your bank have made huge profits along the way." Masters and Connaughton underline economic agents' irrational character and hypocrisy. Thirdly, Acemoğlu, Özdağlar and Tahbaz-Salehi (2015, 564) directly blame the contagious character of the system itself:

> The extent of financial contagion exhibits a form of phase transition: as long as the magnitude of negative shocks affecting financial institutions are sufficiently small, a more densely connected financial network (corresponding to a more diversified pattern of interbank liabilities) enhances financial stability. However, beyond a certain point, dense interconnections serve as a mechanism for the propagation of shocks, leading to a more fragile financial system. Our results thus highlight that the same factors that contribute to resilience under certain conditions may function as significant sources of systemic risk under others.

According to a fourth view, systemic risk has appeared because of the lack of transparency and restrictions related to the access of the banks' data. More and more, less controllable financial innovations are preferred. It was announced in the World Economic Forum that "the blockchain protocol threatens to disintermediate almost every process in

[12] Masters says: "I spent my whole career thinking about risk, markets, infrastructure, and regulation. [...] I had seen the financial crisis unfold, and I had seen the credit derivatives market get operationally ahead of itself, which resulted in systemic risk counterparty exposures."

[13] In a speech in October 2008 as chairwoman of the Securities Industry and Financial Markets Association.

financial services." (Robinson & Leising, 2015). Banks, investors, and other market players, using blockchain technology contribute to change in the way loans, bonds, and other assets are traded. These behaviors increase systemic risk.

The Schumpeterian framework explains the real functioning of the capitalist system in disequilibrium, caused by competition and innovation represented by cycles. Minsky ([1986] 2008, 243) affirmed the error of standard theory as to ignore that there is the possibility of spending more than our income: "the demand for money is related to the level of income because it bridges the intervals between income receipts and purchases." The most realistic approach for a theory would be, for Minsky, to accept that "we live in a world, however, in which capital assets exist, can be traded, and are financed by some combination of debt and equity instruments."

Financial innovations that improve especially, the speed of exchange are created by profit-seeking financial institutions. But, this speed "is a governor that regulates the pace of movement out of hedge and into speculative finance." (Minsky [1986] 2008, 236). Therefore, by definition, it is impossible to introduce crisis situations into the standard economic model without using ad hoc and very peculiar hypotheses (Minsky 1982). Minsky (1982, 6) accused mainstream theory of not being capable of capturing the unstable character of the capitalist system. He questioned the relation of financial innovations to financial and economic instability, and pointed out that markets could be seen as efficient if and only if strong assumptions were made ignoring the role of privately owned capital assets and complex financial institutions and practices by the standard model. In an era where the knowledge about uncertain future dominates, the effect of these ignored instruments are business cycles and a lack of economic tranquility. Policies and strategies are not sufficient unless some reforms are also carried out (Minsky 1982).

Papadimitriou & Wray (2008) argue that for Minsky (1957) financial innovations work against governments'' or central banks' willingness to control the money supply. As accepted by mainstream theory, a fixed money supply curve should not be accepted and the system thus becomes more vulnerable to breakdown. Minsky was also criticizing the idea that the money supply is an "endogenously determined variable" and "is responsive to demand and not something mechanically controlled by the Federal Reserve" (Minsky [1986] 2008:252-253).

Schumpeter did not comment directly on the effect of financial innovations on economic development. Ülgen (2014) proposes, in monetary terms, that a Minsky-inspired interpretation of Schumpeterian institutional dynamics could fill the gap—pointing out major consequences of financial innovations on economic stability. What could make financial innovations contribute to growth without creating financial instability? For Minsky

an "active and tight rational regulation" was needed.

The most important characteristic of money-credit-based capitalist economies is bubbles. Bubbles bear the principle responsibility for systemic risk. The nature of financial innovations is hard to describe because they are based on sophisticatedly structured forms of debt structure. The strategy of investment of one financial innovation is not one-fold, because many types of investment tools (such as options, derivatives, swaps, commodities, stocks, insurances, currencies etc.…) are included into it. Since there is not only one type of product there is not a single aim promised by the product.

M. Hudson (2010) explains that financial innovations contribute to the creation of a Bubble Economy, which puts a great debt burden on national fiscal policies. Some incentives like tax favoritism for real estate and credit expansion create more debt. A Bubble Economy is also called "a postindustrial economy" where capital gain is not used mostly for production but "to pay the interest and taxes falling due." Firms and banks start to function differently to get profit. In spite of production or capital gain they "extract interest," "generate banking fees" and "register stock market gains for the banking and financial sector." Financial innovations become the tool of asset-price inflation and debt leveraging to speed "wealth creation." The negative effect is summarized in the following paragraph:

> This is the tragedy of our financial system today. Credit creation, saving and investment are not being mobilized to increase new direct investment or raise living standards, but to bid up prices for real estate and other assets already in place, and for financial securities (stocks and bonds) already issued. The effect is to load down the economy with debt without putting in place the means to pay it off, except by further and even more rapid asset-price inflation—and sale or forfeiture of property from debtors to creditors. (Hudson 2010, 33)

According to Leathers and Raines (2013), the speculative bubble fueling character of financial innovations was not *inné*. The institutional environment where they are in use shaped their effect. This environment has been supplied by practices defended by Greenspan in opposition to the regulatory framework of government, especially regarding the use of financial derivatives. What we have seen with Greenspan as, "a primary wave of prosperity driven by technological innovations" was actually a speculative bubble that was grounded in financial innovations. Leathers and Raines (2013) confirm that this speculative process that created a bubble of the housing market, doesn't look like the process of "creative destruction."

Financial Innovations: Bad, Good, Both

In his later work Schumpeter ([1942] 1962) searched for the dynamic effects of new combinations, which he coined as "creative destruction" and claimed it to be the essential

fact about the innovative process that makes the capitalist system function. Through entrepreneurial innovations, Schumpeter described "creative destruction" as the replacement of the existing technologies, skills, ideas, and organizations with the newer or better, which, in turn, leads to economic development ([1942] 1962, 83).

For R. R. Rajan and L. Zingales (2003), competitive free markets are useful, as financing new ideas is the act behind "creative destruction." High attention should be paid to financial markets because "many of the most important changes in our economic environment in the last three decades are due to changes in the financial market." But this comes with situations to avoid, like economic crises. So the authors ask the following question: who will preserve markets from their biggest enemy? Will the existence of a "political goodwill" be present to work for their existence and infrastructure?

The dominant/major financial innovations of recent decades (since the 1980s through the liberal regulation era) are new forms of derivatives, securities, alternative risk transfer products, exchange traded funds, and variants of tax-deductible equity. They seem to be regular tools of a profit maximizing economy in that they increase the speed, spread and complexity of financial operations, but at the same time, they add to the fragility of the actors' positions. These tools have different functions like "reallocating risk, increasing liquidity, reducing agency costs, reducing transactions costs, reducing taxes or circumventing regulatory constraints" (Finnerty 1988, 1992, 2001 in Tufano 2002, 5) All these tools listed by Tufano (2002, 5) don't help much to realize the task of designating their positive and negative effect on growth.[14] The net benefit or impact of financial innovations should be understood by focusing on specific cases with access to all necessary data because understanding the complexity of the effect of the financial innovations is related to grasping the complexity of the social costs that it creates. Put another way, bad business decisions create social costs. Financial innovations' capacity for creating market volatility and crashes oppose the private benefits and the social welfare implications. It then is very "difficult to identify the boundaries of a particular innovation, if one wanted to measure its costs." (Tufano 2012, 33-34).

The approaches of Minsky to financial markets (see section 6), on the one hand, and the new literature of financial innovations, on the other, are different. While the former sees finance as sources of instabilities and the results of ill-market design; the latter promotes the more the positive effects rather than negative consequences to society. In the contemporary Schumpeterian debate, the negative and positive characters of financial innovations are visited broadly.

[14] "a list of 1,836 unique 'security codes' used from the early 1980s through early 2001, each purporting to be a different type of security." (Tufano 2002:7)

Bad

There is a negative attitude among the literature regarding the destruction that financial innovations cause to the global economy.[15] Yet, this destructive side of financial innovation has only recently attracted attention with the global crisis.[16] For example, F. Ülgen (2012) analyzed financial innovations in the process of "creative destruction." For F. Ülgen (2012) financial innovations are monetary in nature. They create the financial secondary wave of the business cycle. He sees financial innovations as harmful because they may provoke "destructive evolution in a liberalized environment" and break the stability of capitalist economies. But, on the other side, for some authors a well-behaved financial system, creating credit, transferring saving from "unproductive liquid assets to productive illiquid ones" could contribute to economic growth.[17] Ülgen (2012) concluded that unlike entrepreneurial innovations, financial innovations often provoke a destructive creation path, i.e., rather than a "creative destructive" one. Financial innovations, in this sense, lead to "destructive creation." Therefore, he suggested that the Schumpeterian intellectual legacy should be developed and applied to the modern financial system to make financial innovations able to stimulate economic growth and development under the control of government regulation. Regulations should been reformed and sophisticatedly diversified because financial products are diverse. Bhagwati (2008), Tett (2009), Wolfe et al. (2011), and Soete (2011) argue also that innovations in finance are subject to a process of destructive creation. Unlike the entrepreneurial innovations that generate positive outcomes on economic development, financial innovations lead to reckless finance and this makes "creative destruction" a destructive creation process for the economy. By the same token, Raines and Leathers (2004) argue that modern financial innovations, especially financial derivatives, contribute to "reckless finance" and speculative excesses in the second phase of Schumpeterian business cycles in deregulated financial markets and institutions. Arising from this fact, while the authors did not mention Ülgen (2012)'s term "destructive creation," they explicitly opposed A. Greenspan (2002)'s claim of modern financial innovations' contribution to "creative destruction." Bhagwati (2008) also stated that unlike entrepreneurial innovation, financial innovation results in more upheaval with lethal downsides, which is called "destructive creation" in such cases. Kimmel et al. (2010:378) proposes a guide to make business decisions that require financial information. The 2008 financial crisis is presented as the most relevant period regarding this where 804 companies cut their dividends since 1995, the date when

[15] Johnson and Kwak (2012), Ülgen (2012)

[16] See Aydın and Takay (2012), Beck et al. (2012), Sánchez (2010), Park (2009).

[17] See Levine (2004), Bencivenga and Smith (1991), Bernanke (1986), Dorrucci, Meyer-Cirkel and Santabárbara (2009).

such data started being collected by Standard & Poor's. The "bad debt" structure is seen as responsible. A "bad debt" is a debt that becomes unpayable because of a decline in the sales of the debitor as a result of an economic breakdown. This risk appears automatically when business is made on a credit basis.

Good

There is a positive attitude among the literature defending the idea of "creative destruction," arguing namely that it is an integral part of economic growth. Financial innovations are useful tools because "in the form of new financial instruments, services, institutions, technologies, and markets mobilize financial surpluses from ultimate savers and channelizes them into most productive investment avenues thereby raising the rate of capital accumulation, and hence, the rate of economic growth" (Mishra, 2008, p. 1). It leads to higher levels of economic growth mainly through the channel of technological advances. In this respect, technology also acts as a bridge between financial innovation and economic growth. Michalopoulos, Luc and Levine (2009) addressed the issue of financial innovation in order to examine its role in economic growth in line with the Schumpeterian endogenous growth model, in which technological and financial innovations reflect the decisions of profit maximizing agents. Linking financial and technological innovations, they found a positive correlation and suggested that financial and technological entrepreneurs interact to shape economic growth. Pointing to the vital role of financial innovation in stimulating economic growth, they emphasized that technological innovation and economic growth will eventually stop unless financiers innovate.

As mentioned earlier, in the late 1980s, many advantages deriving from the interaction between technology and financial innovation have been experienced, both in the financial and real sectors. In various cases, financial innovation has proven to be cost-efficient and timesaving, as it addressed the agency problems and incomplete markets, as well increased globalization and risk sharing (Tufano (2012). Most financial innovations such as ATM, EFT, online banking, currency and interest rate swaps have clearly benefited individuals in many ways and replaced some old banking and financing methods with the newer and/or better.

The most significant impact of financial innovation on the overall economy has been its promoting growth (Ebner 2000). In this regard, King and Levine (1993) examined Schumpeter's view on the nexus between financial development and economic growth.[18] They show that Schumpeter might have been right about the significance of finance for

[18] See Kuznets (1955), Goldsmith (1969), McKinnon (1973), Shaw (1973), Finnerty (1988), Lucas (1988), Roubini and Sala-I-Martin (1992), King and Levine (1993), Levine and Zervos (1996), Rajan and Zingales (1998), Khan and Semlali (2000), Chin and Chou (2001), Levine (2005), Chou (2007), Ceccetti and Kharroubi (2012) on the relation between the financial development and economic growth.

economic growth since financial development is strongly associated with economic growth through the channel of capital accumulation and economic efficiency. Furthermore, leading to the creation of new securities, financial innovations enable the investor to invest in various types of securities. As a result, while the investors earn interest, financial institutions promote economic growth by investing the capital they acquire (Kimmel et al., 2010).

Securitization processes are financial innovations that amplify different ways of transforming illiquid non-commercial commitments into liquid assets focusing on augmenting marketability that may lead to proliferation of transaction-oriented banking (trading and financial market activities). Papadimitriou & Wray (2008 [1986]) affirm that the dot-com boom, the real estate boom and the commodities boom, for all three the speculative excesses and innovative instruments and practices are responsible. Minsky ([1986] 2008) defends the idea that a transformation is needed for the financial system but it can only be realized through regulation of commercial and investment banks, thrifts, and credit unions, as well as money market funds. The continued growth of mutual and pension funds, and the emergence of the vast institutional offshore holdings are the entities responsible for the creation by securitization of certain instruments. But better banking was another focus of Minsky's ([1986] 2008, 203) and he studied the cost structure of banks as securitization became something of an obligation for them: "bank participation in securitization is part of the drive, forced by costs, to supplement fund income with fee income." For Schumpeter, financial innovations, if accompanying entrepreneurial dynamics, could have a positive role on the whole economy. But new financial tools that allow faster flow of capital should be secure, not carriers of high systemic risk.

Both

Many authors evince a mixed attitude toward financial innovations. Understanding the positive and negative effects of financial innovations on growth also means formulating an economic model integrating such effects. And yet, standard theoretical growth literature doesn't do so. [19] In the model presented by Chin and Chou (2001), technological progress and human capital accumulation are endogenous. Financial innovations, without differentiating one financial innovation from another, are integrated into the model within the human capital-producing sector. Studying the relationship between finance and growth outside of the standard model, they present financial innovations as an answer to market frictions derived from information and transaction costs. They pay attention to the multiple functions of financial innovations like facilitating the trading, hedging, diversifying, and pooling of risk; allocating resources; monitoring managers and exerting corporate control; mobilizing

[19] Like Romer (1990), Lucas (1988).

savings; and facilitating the exchange of goods and services. As a consequence, they affect capital accumulation and technological innovation. The more sophisticated the financial tools are, the higher the innovation rate is. For such thinkers, financial innovations affect the long-run growth rate only through assisting the real R&D sector, such as in providing a venture capital role during the incubation period of technological innovation. Even though government subsidies are supporting finance, the parameters in the financial innovations equation don't affect the steady-state growth rate of the economy. In the context of an endogenous growth model, Chin and Chou (2001) also investigated how and through which channels the increasing variety of financial products, as well as the increasing sophistication of financial markets, lead to economic growth. They identified two channels: (i) capital accumulation, through which financial intermediaries transform household savings into productive investments by firms; and (ii) venture capitalists, which fund risky technological projects with high potential payoffs. Their study also found that financial innovation ultimately leads to long-run growth through technological innovations, i.e. through their venture capitalists role; whereas the transformative role of the financial sector only leads to temporary growth.

Tufano (2012) states that innovations in financial services are broadly beneficial, both within the industry and throughout the wider economy. Financial innovations mainly provide valuable financial functions that drive economic development through the strong relationship between the financial sector and the rest of the economy. However, in light of the experience with the 2008 financial crisis, some financial innovations may also produce unintended negative consequences such as loss of market integrity, consumer disservice and systemic risk.

M. Sánchez (2010) brings up the condition of "prudential regulation" and standardization to protect against excessive risk taking in the future to make financial innovation contribute to finance and welfare. He doesn't blame the excessive use of collateralized debt obligations (CDOs) and credit default swaps (CDSs) as causes of crisis directly because these were tools that had been in use for a long time. For him, what made them dangerous tools was the fact that they were deepening the informational problems related to mortgages and excessive risk taking: "Notwithstanding these facts, the contribution of innovation to the crisis deserves careful evaluation. Credit derivatives and default swaps have existed for a long time, and their availability and role in facilitating loan expansion hardly make them the root cause of a crisis. Derivatives per se do not create risk, they merely transfer it" (Sanchez 2010:26). Discussing the roles of financial innovations, first, he affirms that they have "a crucial and positive role in financial modernization, leading to the improvement of economic wellbeing" (Sanchez 2010:26). For him, financial innovation has helped to realize mutually advantageous

exchanges; this type of exchange is the key for individuals and businesses to realize their investments. To support his position he takes Mexico's experience with financial innovation as an example. Mexico, while in the heart of the crisis in 1995, activated foreign exchange (FX) transactions, the domestic debt market, and banking sector practices. These practices helped to improve their case.

Some financial innovations could be abused and transformed into flammable gauzes as soon as someone fires the bullet. Credit default swaps (CDSs), collateralized debt obligations (CDOs), and mortgage-backed securities (MBS) render the global financial system discredited. Derivatives are seen as financial weapons of mass destruction in a non-regulatory atmosphere.[20] On one side, new financial innovations like blockchain, bitcoin and cryptocurrency technologies reinforce the non-regulatory and non-transparency mechanism with "disintermediate-ing almost every process in financial services" (Robinson & Leising 2015). But, under the cover of efficiency, Nasdaq CEO Bob Greifeld states that "the blockchain is going to bring levels of efficiency to the financial markets that we've never seen before." Regulation creates costs for lenders. Such new technologies save $20 billion annually in settlement, regulatory, reporting, dissemination of data and cross-border payment costs to lenders (Robinson & Leising, 2015).

Leathers and Raines (2013) defend the idea that modern financial innovations could contribute to the "creative destruction" if more regulation occurs. They focus on Schumpeter's lessons taken from John Law's experience of being a banker and entrepreneur at the same time. These two roles, if separated properly, could ensure that entrepreneurial ventures are correctly financed. This is what happens in the first wave. However, financial innovations affect the economy in a different way during the second wave. Greenspan's blind defense for the use of financial innovations seems inept for this phase. "In the "primary wave," a growth spurt in the real economy occurs when banks create credit to finance entrepreneurial ventures that introduce new products or new processes that increase productivity. A "secondary wave" of general prosperity is induced by entrepreneurs' spending for the construction and operation of their new ventures, but is carried forward by speculative spending, made possible by the spread of easy credit to all parts of the economy." (Leathers and Raines 2013:668). This study also draws attention to the fact that "most bankers are the capitalists who bear all the risks" (Leathers and Raines 2013:670). Behind the encouragement of speculation and financial instability, and the consequent need for regulation, there is the difficulty of managing this risk.

Tufano (2012), in the World Economic Forum Annual Meeting 2012's report, states that innovations in financial services are broadly beneficial, both within the industry and

[20] https://www.theguardian.com/business/2008/sep/20/wallstreet.banking

throughout the wider economy. Financial innovations mainly provide valuable financial functions that drive economic development through the strong relationship between the financial sector and the rest of the economy. However, as experienced in the 2008 financial crisis, some financial innovations may also serve unintended negative consequences such as the loss of market integrity, consumer disservice and systemic risk. According to Tufano (2012), the reasons behind the revealed negative outcomes lies basically in these factors: the weakness of the existing governance framework for risk management, Knightian uncertainty (immeasurable risk) and the dynamic nature of the financial services innovation environment and the unpredictability of customers' responses to the innovations. In order to downsize these negative outcomes, some recommendations for both individual institutions and industry groups and regulators were asserted, such as adapting existing risk management mechanisms so they are more sensitive to the specific contribution of innovation to uncertainty and risk, and strengthening risk oversight and monitoring.

Raines and Leathers (2013) also describe the positive and negative effect of financial innovations. For them Greenspan's confused interpretation of Schumpeter's "creative destruction" became much more visible. The effects of financial innovations on the economy, for Greenspan, is providing flexibility and stability for the entire financial system, keeping its competitive character. It was another way to define "creative destruction" for him. In his 1998 speech,[21] he expressed that deregulation of financial institutions and markets should be FED's aim as if Glass-Steagall Act's separation of commercial banking and investment banking was totally sufficient to regulate over-the-counter financial derivatives. Creating a direct analogy between entrepreneurial innovation and financial innovation, he wanted to say that, under the influence of the improvements of information technologies, "unregulated financial innovations were having the same positive "creative destruction" effect as technological innovations." (Raines & Leathers 2013: 505) Financial innovations are contributing to the evolution of the capitalist system by "a significant unbundling of risks made possible of innovative financial products, not previously available." [22] But, as affirmed by Andrews in Raines and Leathers (2004) the 2008 crisis shows that Greenspan was wrong. His role was as the town crier (or blogger), encouraging banks and financial institutions to take risks.

Long-Run Effect of the Financial Innovations

"Schumpeter is fascinated by Léon Walras' theory of general economic equilibrium," affirms H. Kurz (2016b, 3), perceiving Walras' work as "a guiding light in a sea of darkness"

[21] Greenspan (1998).
[22] Greenspan (1999); Greenspan (2000b).

(Kurz 2016b, 3).[23] But, at the same time for Schumpeter, the Lausanne economist's theory is "incomplete" and "badly in need of amendment." The serious deficit of Walras' theory consists in the lack of dynamics in its use of statistics. Since according to Schumpeter capitalism as an economic system is permanently in movement, it is a real challenge for the economist and this change is represented by the "circular flow." Change represents fluctuations from the equilibrium. For Schumpeter, circular flow is the tendency toward equilibrium on one hand versus a change in economic routine or data on the other: "New innovations continually upset the system so that none of these stationary states will ever be reached. The system is incessantly in movement, in a state of unrest, where the centrifugal force of innovations compels the system to leave the beaten tracks, while the centripetal force of competition moulds for it new ones" (Kurz 2016b, 3) (See also Kurz 2012). Under the influences of Marx and Walras, Schumpeter defines the creative entrepreneur as the *persona causa* of "disequilibrium (i.e. change) in a competitive economy" (Ekelund & Hebert 2007, 516-519).

Burlamaqui (2000) and Perez (2004) stated that although in the Schumpeterian framework, finance and financial institutions both play a strategic and a fundamental role, the financial world is not entrepreneurial in the sense that it doesn't contribute to long-run growth. It is well known that the performer of Schumpeter's innovation is the entrepreneur; however, we do not exactly know who performs a financial innovation. Is there an entrepreneur behind a financial innovation? Or, do only financial institutions produce it? Or, are all given the possibility to create an innovation for the finance sector in the spirit of an entrepreneur?

Today's financial industry and its growing facilities enable one to become an entrepreneur of financial innovation, especially in telecommunications and data sourcing. Recently, financial innovations have begun to be served in the form of Internet applications and facilities, which is a new development in the financial sector. Most of these financial innovations provide free, online financial service for users and they have brought a new meaning to the notion of financial innovation by expanding the services served to customers

[23] Therefore, it could be said that, although, Schumpeter borrowed the concept of entrepreneur from L. Walras, he didn't share the theoretical views of the French economist. When Schumpeter develops "the circular flow of economic life," a dynamic approach, he proposes an alternative to mainstream economics' static general-equilibrium approach. For him, equilibrium does not exist in the dynamic world where everything is changing as a consequence of the competition process. Thus, 'creative destruction' occurs with the coming up of new combinations and new markets. Schumpeter updated Walras' passive figure of the entrepreneur with a creative, courageous one who is open to novelty. He admits Marx' emphasis on the importance of 'change' during the economic process: "Schumpeter conceives of business cycles and long waves of economic development not as an expression of the malfunctioning of the capitalist economy, but on the contrary as an expression of its 'law of motion"', a concept he borrows from Marx. He is thus also not of the opinion that economic policy can make cycles and waves disappear without at the same time abolishing the innovation dynamics that is a characteristic feature of capitalism" (Kurz 2016b, 4).

in an unusual way. Indeed, these new examples have become so popular that for instance, in Forbes magazine, the list of top financial innovations that make our lives easier in 2012 are all related to such technologized financial innovations.[24]

Those new kinds of financial innovations that the financial world was not familiar with until very recently, are not merely served via financial institutions. All are new websites and applications that are formed in order to serve customers an easy and practical way to carry out various financial transactions. Rather than a financial institution, this primarily requires someone with not entrepreneurial but computer engineering skills. By way of new facilities through the technological advances, today, not an entrepreneur but an engineer can create an innovative idea in finance and realize it. This clearly shows that it is not only financial institutions that can realize a financial innovation; but it can also be someone who just has new ideas.

This rising trend in the financial world can be explained within the framework of Schumpeter's "rationalization" process, where the innovation-making activity becomes routinized ([1942] 1962, 132). According to Schumpeter,

> This social function is already losing importance and is bound to lose it at an accelerating rate in the future even if the economic process itself of which entrepreneurship was the prime mover went on unabated. For, on the one hand, it is much easier now than it has been in the past to do things that lie outside familiar routine-innovation itself is being reduced to routine. Technological progress is increasing becoming the business of teams of trained specialists who turn out what is required and make it work in predictable ways (Schumpeter [1942] 1962, 133).

During the rationalization process, entrepreneurs become employed in big firms and eventually the spirit of entrepreneurship disappears from the capitalist scene as they lose importance in a system where the economic progress tends to become depersonalized and automatized (Schumpeter [1942] 1962, 133). In the case of financial innovation, we suggest that this rationalization process has become a "backwards rationalization" process. While before it was only the "large firms" that were making financial innovations, today, we see simple individuals or groups of people with software skills rising in this area. The entrepreneur is supposed to have disappeared not in large firms but because of the lack of computer programing skills.[25]

Financial technology, also known as FinTech, is a term that simply refers to the use of technological advances in the financial sector with the main aim of making the business

[24] Available at http://www.forbes.com/sites/moneywisewomen/2012/01/10/10-financial-innovations-that-make-your-life-easier-in-2012/

[25] Satoshi Nakamoto is the name used by the unknown person or persons who designed bitcoin, with the underlying blockchain technology, as a digital currency that is independent of government and banking systems.

of the banking sector much cheaper, faster and easier. While it has a long history before then, with the 2008 global crisis it not only started to shape the future of financial services industry, but also stands as a new challenge for the global economic order, what with the introduction of major advances such as blockchain technology. The global crisis of 2008, which caused people to lose their faith in financial institutions and the government in regulating markets, created a very favorable environment for the rise of financial technology. It led FinTech companies to step onto the scene as a new player, holding mobility benefits and providing money transfers and financial solutions to individuals who increasingly demand technological products and solutions that allow further profit generation. FinTech products and companies have changed the relationship between banks and consumers as today, most retail financial services are being conducted through digital platforms such as mobile wallets and online lending platforms. All of these developments have created alternative options for consumers and started to put the traditional and established banking systems behind.

Nevertheless, both big and small firms enter anyway into the process at the moment of making the product profitable through the market. Blockchain technology, which has started to appear in almost every area, including health services, donation systems, e-commerce and financial markets, caught the attention of entrepreneurs. Besides that, whether the product is used in a digital or a real platform, the characteristics of a successful entrepreneur do not change. We hope that more research will be made in this exciting and challenging subject matter.

As has been seen, it is hard to evaluate in general the contribution of financial innovations to the increase of GDP. Given the analysis of Schumpeter ([1939] 1964, 1027) with regard to the recovery period (Banking Act of 1933) after the 1929-33 crisis, one could argue that the possible positive effects of financial innovations are conditional to the provision of tough prudential regulation to discourage excessive risk taking in the future.[26] As has been shown in this section, the usual literature focuses more on the regulatory environment as a sufficient condition for financial innovations to contribute to economic development. The quality of regulatory framework matters. According to Chin and Chou (2001), deregulation of the financial sector could produce a positive effect on the productivity of financial innovators that could also increase the steady-state per-capita capital stock but it will not be capable of raising growth rates.

However, we defend the idea that for a financial innovation to produce an effect similar to that of entrepreneurial innovations on the economy it should have a direct effect on long-term growth, like venture capital, that accompany entrepreneurial dynamics (this will

[26] This sentence has been suggested by one of the referees.

be analyzed in the next section). Or, tools like social impact bonds,[27] first launched in 2010, which could be useful to improve the situations of the disadvantaged and help to realize better allocation of proceeds. To let financial innovations contribute to growth, they should be considered as tools that have direct connection with real investments and create social impact.

The Positive Role on Growth: Venture Capital as Example

As Kurz (2016b) affirms, the length of periods of innovation is important because entrepreneurial innovations require a certain wherewithal. The necessary financial tool to realize investments could be in different forms like credit, venture capital or other forms. Schumpeter was in favor of developing the financing opportunities that support investment activities. As it takes time to get a return from innovative projects, "very often it takes a long time for a novelty to become known and to sell" (Kurz 2016a, 118). Banks finance projects by lending money with the lowest interest that will bring the highest return. With the help of experts, each project is evaluated. Even though among forms of financing investment "the emphasis [is] on bank credit" (Kurz 2016a, 118).

Practice such as venture capital makes a positive and net contribution to the real economy. Venture capital is a type of financial innovation in which the investors invest in technology based start-up firms with long-term growth potential. The venture capital system has been crucial in providing finance and incubation services for high-tech startups in Silicon Valley and elsewhere, some of which have been fabulously successful. The venture capital industry has been innovative, valorized new knowledge and played an important role in the process of "creative destruction" becoming realized. Venture capital could be an example of practices that mix both types of banking called "social finance" that provide peer-to-peer lending using sophisticated financial tools and involve improving social conditions.

At this point, it is important to highlight that for venture capital, the innovative structure of the startup firm is amongst the main criteria in making investment decisions. The venture capitalist seeks a high rate of return and innovation is the key factor behind such a decision to invest. As the venture capitalists invest, they also monitor the performance and get actively involved in activities related to the management of the assisted firm. Thereby, the venture capitalists not only provide financial funding but also technological and/or managerial expertise.

As T. K. McCraw (2007) mentioned, Schumpeter (not surprisingly for a broad-visioned man) was one of the first economists to use the phrase "venture capital." The role of technology as a facilitator of entrepreneurship and thereby, innovation, has grown

[27] See C. Schinckus (2017) for more information on the effect of social impact bonds.

tremendously in the past few decades, and venture capital has also become a dominant force in financing those innovative entrepreneurs. Today, most of the innovative companies such as Microsoft, Google, Intel, Apple, and Facebook have all been supported by venture capital in their early stages. Also, most of those once venture-backed companies now have their own venture capital funds that seek to invest in other innovative start-ups.

Kelly and Kim (2013) suggest that venture capital-backed firms enjoy a growth premium relative to non-venture capital-backed firms following venture capital investment and venture capital-backed firms grow faster in terms of their assets, number of employees, revenue, sales and wages. As venture capital stimulates the creation and growth of technology-based firms, it further triggers innovation. In this sense, the positive impact of venture capital on economic growth and development is significant. According to a report by Ernst &Young (EY) (2015), 2015 saw US $148b invested through 8,381 deals, which is the highest venture capital activity in nearly two decades. In 2015, the value of U.S. venture capital investments amounted to nearly 60 billion U.S. dollars. The software sector dominated the U.S. venture capital investments in 2015, with 40 percent of the market share. The venture capital investments in the Silicon Valley, where a large amount of hi-tech companies are concentrated, accounted for the largest part of the U.S. venture capital investments.

Venture capital has many advantages. The entrepreneur is still not the risk bearer when venture capital is being used. It is rather the venture capital firm who bears the risks of investment, i.e. a possible failure will not bear upon the entrepreneur. Another advantage is that the venture capitalist supervises the entrepreneur and monitors the firm's progress and innovation closely.

Conclusion

Excluding the study of financial innovations from Schumpeter's analysis of innovation is like burying one's head in the sand like an ostrich. This is the reason why in this study, we explored Schumpeter's notion of entrepreneurial innovation which takes place in the real economy, to understand the dynamics of financial innovations. We explored the process of these two types of innovations, questioning their roles in the "creative destruction" process. We developed a post-Schumpeterian perspective to describe the evolution of the capitalist system, relating it to the growing sophistication and computerization of the financial markets, and the interrelation between technology and the finance industry. We also show that Schumpeterian theory, treating the "circular flow" and not static equilibrium state, proposes an alternative to the standard theory.

We questioned the contribution of financial innovations to the "creative destruction" process. We found out that, after the 2008 crisis, judicious regulation and control of the

banking sector have been the focus of works that analyze the contribution of financial innovations to economic development. While the regulatory environment might be a necessary condition for financial stability, it is not sufficient to ensure it. For the "creative destruction" process to occur through the push of new innovations, these innovations should contribute to the real economy. Venture capital has been given as an example of a financial innovation that has the potential to contribute to long-term growth.

Financial tools have long been innovated by complex, huge capital, managing financial groups and investment banks instead of the small, adventurous and dynamic Schumpeterian captains of industry. But, does this still apply today? The most recent improvements related to the financial world wag one's finger at the fact that the focus is moving away from them onto individuals. Technological facilities like FinTech instruments, especially the application of blockchain like bitcoin, are developed by individuals or groups of individuals. Therefore, the rationalization process defined by Schumpeter, the cause of the disappearance of creative entrepreneurs, functions backward; a "backward" rationalization process occurs for financial innovation. The collaboration between the financial industry and technology in an intensive and effective manner has been stressed. Financial progress becomes personalized in the framework of financial engineering. Only individuals who have the ability to manage computerization can innovate the new digital tools and make them function in an atmosphere devoid of controls, regulations and centralization.

All financial innovations do not satisfy the criteria of contributing to the economic development process. This is the reason why they all cannot be considered as Schumpeterian. Attentive and long-term research should be done to measure the direct and indirect effects of each financial innovation to growth. Meticulous tests or experiences should be provided using experimental design possibilities developed by behavioral economists.

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