Technological Forecasting & Social Change 80 (2013) 1247–1260

Contents lists available at SciVerse ScienceDirect

Technological Forecasting & Social Change

The impact of the economic crisis on innovation: Evidence from Europe

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ARTICLE INFO

Article history:
Received 3 April 2012
Accepted 9 May 2013
Available online 12 June 2013

Keywords:
Economic crisis
Innovation investment
Firm-level analysis
Creative destruction

ABSTRACT

Economic crises cause companies to reduce their investment, including investment in innovation where returns are uncertain and long-term. This has been confirmed by the 2008 financial crisis, which has substantially reduced the willingness of firms to invest in innovation. However, the reduction in investment has not been uniform across companies and a few even increased their innovation expenditures. Through the analysis of a fresh European Survey, this paper compares drivers of innovation investment before, during and following on from the crisis, applying the Schumpeterian hypotheses of creative destruction and technological accumulation. Before the crisis, incumbent enterprises are more likely to expand their innovation investment, while after the crisis a few, small enterprises and new entrants are ready to "swim against the stream" by expanding their innovative related expenditures.

1. The effect of an economic shock on long-term investment

Major economic shocks, such as the 2008 financial crisis, make business opportunities less certain, and, in turn, companies become less willing to invest in long-term activities where returns are risky. Most companies react to a short- or medium-term adverse macroeconomic environment by downsizing expenditures, including expenditures on investment and innovation. However, economic crises also provide an opportunity for companies, industries and entire nations to restructure productive facilities and to explore new opportunities. Smart companies do perceive that an economic crisis will not last forever and that a recovery will sooner or later arrive. A new economic cycle, however, is also likely to bring structural changes in the composition of output and demand. In order to reap the opportunities of the new cycle, successful companies need to be prepared by providing new and improved goods and services.

As already predicted by Schumpeter and the Schumpeterian literature, while an economic crisis has an adverse impact on most of the economic agents, in the long-run it will not generate losers only. On the one hand, a few economic agents may emerge as winners and we assume that they will be found among those companies that understand earlier than others that the composition of output and relative prices to emerge from the crisis will be very different from the past. On the other hand, losers are more likely to be found among those firms that react not only just by reducing employment and productive capacity in general, but also downsizing their investment in innovation. Which are the key characteristics of the companies belonging to the two categories?

The 2008 economic crisis offers a unique opportunity to test two models of innovation originating from Schumpeter and the Schumpeterian economics and that can be labelled creative destruction and technological accumulation. In turn, these models may help us to identify what will be the typology of companies that will lead the recovery. Our paper is an attempt to test the interplay between the forces of creative destruction and accumulation in innovation before, during and after the financial crisis that started in the Fall of 2008. In fact, there was a substantial drop of innovative investment in Europe [1], and this leads us to wonder what

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http://dx.doi.org/10.1016/j.techfore.2013.05.005

are the best strategies that should be taken at the country level [2].

Our analysis is made possible thanks to a recent wave of the Innobarometer Survey designed and collected by the European Commission in 2009 [3]. Each year the Innobarometer introduces a different topic and the 2009 survey emphasises innovation related expenditure, including the effects on it of the economic downturn. Enterprises from the 27 EU member states, plus Norway and Switzerland responded to the survey.

The paper is structured as follows. Section 2 discusses the state of the art against which the paper is set. Section 3 develops the conceptual framework by providing a sketch of the two ideal type models of creative accumulation and creative destruction. Section 4 introduces the dataset and methodology. Section 5 presents the results that are discuss in the last section.

2. Innovation generated through technological accumulation and economic creative destruction

The young Schumpeter [4] looked at innovation as an event that could revolutionize economic life by bringing into the fore new entrepreneurs, new companies and new industries. The mature Schumpeter [5], on the contrary, observed and described the activities of large oligopolistic corporations, able to perform R&D and innovation as a routine by building on their previous competences. On the ground of these insights, the Schumpeterian tradition has further investigated the relative importance of the two processes (see [6–10]). Creative destruction is described as a result of a regime characterized by low cumulativeness and high technological opportunities, leading to an environment with greater dynamism in terms of technological ease of entry and exit, as well as a major role played by entrepreneurs and fierce competition. Creative accumulation is associated with a technological regime that is characterized by high cumulativeness and low technological opportunities, bringing about more stable environments in which the bulk of innovation is carried out by large and established firms incrementally, leading to a market structure with high entry barriers and oligopolistic competition.

There are arguments supporting the relevance of cumulativeness and of reinforcing patterns of technological development and innovation, and arguments lending support to a "destruction/discontinuous hypothesis". Concerning the former, several studies suggest that learning processes that underlie innovation activities are both local and cumulative resulting in path-dependency (e.g. [11–13]). In addition, empirical evidence indicates that there is a degree of persistence in innovation and among innovators [14]. Concerning the latter, it has often been stressed that there are periods of turbulence associated with a change in the leading sectors and/or the emergence of new sectors, which brings about a decline of technological and profit opportunities in established industries [15]. This, in turn, might lead to a change in the knowledge and technological base for innovation and could substantially affect the hierarchy of innovators [16]. Other research has stressed the fact that firm-specific organisational routines and capabilities can bring about inertia and hamper the capacity of established firms to keep up with major discontinuities [17–19].

This should also be related to the "continuity" thesis advocated by Chandler [20] and his followers on the grounds of the fact that the population of incumbent, large firms has remained stable over the last decades. This thesis has been challenged by Simonetti [10], Freeman and Louca [21] and Louca and Mendonca [22], who claim that a stream of new firms has joined incumbent firms during periods of radical discontinuities. This can also be contingent to the specific knowledge base and technical skills attached to different industries. For example, while Klepper and Simons [23] show that firms established in making radios were successful in developing colour TVs, Holbrock et al. [24] illustrate that this pattern is not mirrored in the evolution of the semiconductor industry.

In this paper the emphasis is not on specific industries or technologies, but rather on how an external shock, represented by the financial crisis, is affecting companies' innovative strategies. As a result, we expect to find an array of different innovation drivers both before and in response to the crisis. These are examined in view of the changes at the macrolevel, as we aim to understand whether the crisis has led to some variation/discontinuity at the aggregate level as a result of a different composition among innovating firms.

3. An attempt to identify the core characteristics of creative destruction and technological accumulation

To guide the analysis we elaborate on the ideal type models of creative destruction and creative accumulation as two possible aggregate outcomes of microbehaviours. Creative destruction describes a dynamic environment in which new firms emerge as the most significant innovators as a result of a major discontinuity such as an economic downturn. Creative accumulation is underpinned by a more stable pattern of innovation which emphasises cumulativeness and persistency of innovative activities in response to the crisis. We make here an attempt to identify these two patterns in relation to firm behaviour rather than to the evolution of technological regimes. In this sense, our approach is complementary to the research pioneered by Malerba and Orsenigo [8] to identify Schumpeterian patterns of innovation with reference to various technological fields.

A sketch of the differences between the models of creative destruction and creative accumulation is given in Table 1 where four categories are singled out: i) characteristics of the innovating firm, ii) type of knowledge source dominant in the innovation process, iii) type of innovations, and iv) characteristics of the market.

In the empirical part of the paper some of these factors, those more directly associated to our data, will be used to test if the two ideal type models can be related to the patterns of innovation investment of firms.

3.1. Characteristics of the innovating firms

The creative accumulation model assumes that incumbent firms explore systematically technological opportunities. For them, to innovate is a routine, and it is one of the core things that the top management supervises. They have to upgrade periodically their products, often because they operate in concentrated oligopolistic industries. A stream of incremental innovation does not only guarantee that costs and prices are kept competitive, but also that products are differentiated and improved compared to those of the competition. This provides the possibility to accumulate knowledge and often not just in the