

# **REACTION TO DEMAND SHOCK IN SMALL FIRMS: INNOVATION AND MARKET EXPLORATION IN THE CASE OF AUTOMOTIVE SUPPLIERS IN PIEDMONT**

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## **Introduction**

The automotive sector is particularly interesting for innovation scholar. Economists and commentators write cyclically the obituary of the industry at each economic downturn. However, the industry and its player, like the mythological Phoenix that never dies and arises from its ashes, each time show renewed capacity to react to crises, through a mix of adaptation and innovation. To investigate these broad issues we were lucky enough and could directly observe a sort of natural experiment, this consisting in the major crisis that affected Fiat Auto and its main suppliers at the beginning of the 21st century.

Precisely, the specific contribution of this paper is threefold:

- To analyze the role of (intermediate) demand as a factor affecting small firms' competitive performances
- To investigate the strategies that small firms implement in order to react to a shock in the demand
- To identify the factors that counterbalance or on the contrary magnify the effect of a demand shock

Much industrial economics finds in final demand shock an incentive for corporate diversification. These contributions are mostly confined to large firms and very few studies tackle this problem for SMEs, which are often providers and subcontractors to large firms, and whose relevant demand is hence intermediate. At the same time, very often innovation scholars investigated how crises and periods of downturns affected innovative investments. To the best of our knowledge however, there are no analyses focusing on the other direction of this relations, i.e. whether (past) innovative investments allow firms to better adapt and react to negative market conditions.

We believe that in an age of global productive and financial crisis, to know whether firms with higher innovative capacity are also more equipped and possibly resilient in the face of market downturns, has major policy and managerial implications.

## **Literature background**

We are interested specifically in the mismatch between producers' expectations and demand conditions.

Following the seminal works of Penrose (1959), Chandler (1962) and Rumelt (1974), the dominant literature has focused its attention almost exclusively on large firms, founding that exploration of new markets is the appropriate response to a mismatch between expectations and market conditions (e.g.: Ansoff, 1958; Fligstein, 1985; Montgomery, 1988 and 1994; Pavitt et al., 1989; Chatterjee, 1991; Garcia-Vega, 2006).

However very few studies have addressed the theme of market exploration in small firms as a reaction to changing demand opportunities (Donckels et al., 1987; Robson et al., 1993; Iacobucci and Rosa, 2005).

Evidence on SMEs survival confirmed that diversified small firms have higher chances to survive (Audretsch, 1991; Baldwin and Gorecki, 1991), and that the degree and success of diversification is positively correlated with investments in innovation and knowledge accumulation (Schutjens and Stam, 2003; Baptista et al., 2012).

Again very few studies (Chen and Martin, 2001; Bumgardner et al., 2011; Latham, 2009) tested whether encountering performance downturn and market size decline, small firms use market diversification to deal with these problems.

In this context, we formulate our first research question and first hypothesis as follows:

**RQ1: How do small firms react to a mismatch between their expectations and their market conditions, i.e. to a negative shock in their demand?**

**Hypothesis 1: A mismatch between productive expectations and market opportunities due to a negative demand shock forces small firms to explore new markets and change their clients.**

Concerning the second dimension we investigate in this paper, i.e. the role of innovative capacity during demand shocks, innovation scholars investigated how periods of downturns affect firms' innovative investments, also in SMEs (Audretsch and Mahmood, 1995; Antonelli, 1998; Malley, 1999; Francois, 2003; Varum, 2011).

The literature on (new) firms' survival and "survival of the fittest" found that the rate of survival of (small) firm is promoted by the accumulation of innovative activity (Audretsch, 1991; Cefis and Marsili, 2005 and 2006; Cantner et al., 2009 and 2012), the nature of technology (Malerba and Orsenigo, 1999), the industry life-cycle (Suarez and Utterback, 1995; Agarwal and Gort, 2002), market size (Mata and Portugal, 1994).

However, to the best of our knowledge, there are no analyses focusing on the effect of past internal innovative investments on the strategies of SME exposed to a (negative) demand shock. Innovative capacity might either help in finding appropriate explorative strategies or viceversa in supporting the supply of existing products.

We are able to formulate the following research questions and related hypotheses:

**RQ2: Do internal innovative capacities induce firms to explore new markets or help them in maintaining their shares in the original markets?**

**Hypothesis 2: Greater levels of internal innovative capacity allow firms to keep going on their original markets [counterbalancing the effect of losing importance of their main clients].**

**RQ3: What is the impact of the different strategies in terms of firms' performances?**

**Hypothesis 3: Strategies that rely more on innovative capacities than in market exploration positively affect firms' performances**

## **Data and empirical design**

We use cross-sectional data from a survey collected in 2006 by the Institute for Economic and Social Research in Piedmont (IRES) on a selected sample of small and medium enterprises active in the automotive supply chain within the Piedmont region. The precise identification of the set of economic actors that make up the automotive supply chain within a region is not an easy task, given the wide spectrum of economic activities related with the manufacturing of auto-vehicles. In order to have a representative sample of the regional population of small and medium enterprises involved in the car manufacturing process IRES has followed a careful strategy of stratified sampling. The final sample consisted of 297 firms who answered to the survey.

The survey refers to the time span 2000-2005. The aim of the survey was to understand how small and medium enterprises belonging to the automotive supply chain reacted to the prolonged crisis of FIAT Auto during these 5 years. The firms were then asked about the strategies undertaken in the period 2000-2005, with a specific focus on the issues of innovation.

The period of observation covers the years from 2000 to 2005. The firms were asked about:

- structural data (employment, sales, being part of a group)
- investments in innovation and innovative output (R&D, patents, product and process innovation)
- main obstacles for their economic activity
- strategies adopted to face Fiat crisis

We test whether firms facing a reduction of their traditional demand (mainly due to FIAT crisis) remain in their own market, or alternatively explore new markets in order to find new opportunities. Our preferred measure of the degree of exploration of new markets by a firm relies on the distribution of its sales across different market segments: more specifically we are interested in the change of such distribution overtime. We are able to build an index of instability of these shares for each firm in the period from 2000 to 2005. Indeed each firm is asked which are the shares of sales proceeding from distinct types of markets/customers (FIAT group; Other car manufacturers; Suppliers of car manufacturers; Other markets not related with automotive) in 2000 and in 2005.

We test Hypotheses (1) and (2) by estimating how the instability index of each firm varies in response to a) a shock of demand (firms who claimed to have faced specific obstacles related to a lack of demand) b) and to the presence of previous investments in innovative capacity, as measured by the presence of R&D labs and design departments. In order to avoid the endogeneity problems related with the estimation of the demand-effect on exploration strategies, besides simple OLS we also adopt an instrumental variables (IV) strategy. Furthermore to investigate further the determinants of the choice to explore new markets we also implement a Tobit Type II model in order to distinguish between: a) the factors that affect the probability to change the distribution of a firm's share of sales across markets and b) the factors that influence the intensity of such change. Finally we test Hypothesis (3) by checking whether the instability index has an effect on the ability of firms to react to the crisis, specifically on the growth of their employment levels.

## **Results**

Our results show that the higher the impact of demand shrinking on the performances of a firm, the higher will be its propensity to explore new markets and find new customers. On the other hand, we find that having previously invested in R&D instead has a negative impact on the instability index, thus indicating that firms that were already investing in R&D in the past have on average a lower level of instability of their own market shares. Greater levels of internal innovative capacity allow firms to keep their market shares also in periods of demand reduction.

More specifically the results of Tobit Type II model show that demand-factors influence the probability to explore, while innovative capacities exert a negative effect on the intensity of such exploration. These findings confirm once more that all firms exposed to a demand shock resort to some extent to explorative strategies, but that firms with innovative capacities are less likely to change dramatically their existing markets and customers.

Finally we find that explorative strategies have a positive effect on firms' performance, in terms of employment growth, but only up to a certain threshold. A moderate exploration might reduce the

impact of a negative demand-shock on firms' level of employment, while excessive exploration on the contrary will have a negative effect.

Summing up, our findings confirm that the exploration of new markets is a typical reaction of firms to negative demand shocks, however possessing innovative capacities allows firms to reduce the extent to which they resort to such strategy. Indeed the choice to explore new markets is beneficial for firms only when this is moderate, when instead firms change dramatically their existing market shares the probability to observe employment reduction at the firm level increases.

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