Economic Systems 39 (2015) 608–631

Contents lists available at ScienceDirect

Economic Systems

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

Knowledge externalities and demand pull: The European evidence

Cristiano Antonelli [a,b], Agnieszka Gehringer [c,*]

[a] Università di Torino, Departimento di Economia "Cognetti de Martiis", Lungo Dora Siena 100A, 10153 Turin, Italy
[b] Collegio Carlo Alberto, BRICK, via Real Collegio 30, 10024 Moncalieri, Turin, Italy
Flossbach von Storch Research Institute, Ottoplatz 1, 50679 Cologne, Germany

ARTICLE INFO

Article history:
Received 8 April 2014
Received in revised form 23 March 2015
Accepted 24 March 2015
Available online 2 July 2015

JEL classification:
L16
O3
O52

Keywords:
Derived demand
Knowledge externalities
User–producer sectoral interactions
Input output tables

ABSTRACT

This paper elaborates the microeconomic foundations of the demand pull hypothesis stressing the role of vertical knowledge externalities stemming from user–producer knowledge interactions that parallel vertical transactions. The paper articulates and tests the hypothesis that such competent demand is actually able to pull technological change only when it is expressed by advanced users, able to provide relevant knowledge externalities to their customers. Using input output tables we test empirically this hypothesis for 15 European countries in the years 1995–2007. The evidence confirms that the increase in productivity of the upstream sectors is positively influenced by the sector-level derived demand, according to the upstream rates of introduction of innovations and to the intensity of the user–producer interactions. The policy implications of the analysis enable to elaborate and implement the notion of a 'competent' public demand.

1. Introduction

The positive effects of demand on innovation-led economic growth have been advocated for decades with little empirical support and increasing theoretical skepticism. The advances of the new

* Corresponding author.
E-mail address: agnieszka.gehringer@wiwi.uni-goettingen.de (A. Gehringer).

http://dx.doi.org/10.1016/j.ecosys.2015.03.001
0939-3625/

economics of knowledge and the new understanding of technological change as an emergent system property enable to articulate the foundations of the demand pull hypothesis in a novel interpretative context that stresses the central role of external knowledge spilling from innovative customers in supporting the arrival of innovations generated by the upstream producers. Thus, in this novel view, demand is not generic but competent.

The original Kaldorian demand pull hypothesis was elaborated in macroeconomic analytical framework, strongly focusing on increasing returns from public intervention to support aggregate demand. Complementarily to the analysis of Kaldor, the later work by Schmookler provided additional clearness in explaining the causal chain of effects linking the increase in aggregate demand to the positive impact on investment and, subsequently, on technological advance. In the analysis of Schmookler, not a generic demand pull, but rather the specific effects of the derived demand, originating from private investment in particular sectors, play a substantial role in shaping the future technological development, crucially based on effective and continuous transactions between upstream producers and downstream users.

Nevertheless, none of these contributions has yet taken advantage of the recent advances of the economics of knowledge and specifically of the crucial role of knowledge externalities in the generation of new knowledge to elaborate a rigorous microeconomic analysis of the mechanisms that relate the increase of demand at the aggregate level with the increase in the rate of introduction of innovations. The present contribution aims to fill this gap.

Past empirical investigations around the standard demand pull hypothesis delivered the evidence of a positive influence of investment-sustained derived demand on upstream innovativeness, stressing the role of upstream profitability in providing the necessary incentive to innovate. Surprisingly, little empirical investigation implemented input output analysis, which, instead, offers detailed information about the relations among sectors along the vertical chain of production. In our empirical investigation, in which we test the role of the competent demand in spurring upstream technological advances, we implement, thus, input output tables to measure the intensity of intersectoral transactions based on knowledge interactions.

On the conceptual side, our contribution aims at revisiting the original demand pull hypothesis by integrating the macroeconomic approach with a microeconomic analysis, which elaborates upon the central role of user–producer-transactions-*cum*-interactions as carriers of knowledge externalities. In this spirit, the derived demand of downstream users exerts a double effect on the innovativeness of upstream producers: (i) it increases the demand for the upstream products with positive effects on profitability and investments and (ii) it provides influential interactions parallel to vertical transaction flows, in which innovative downstream users support upstream innovative activity with the provision of external knowledge that is stronger the stronger their technological advance. This is to say that upstream innovations benefit not only from positive profit incentive, but also and crucially from knowledge interactions with the users of their products. In such a system of vertical transactions-*cum*-interactions, the stronger are the knowledge externalities, the more efficient is the expected outcome both for the system as a whole and for each single node of the vertical chain. Upstream producers can benefit from the technological advance of their downstream customers according to the actual amount of transactions: technological externalities do not flow in the air but require systematic interactions. Hence, the actual access to knowledge externalities is strongly conditioned on market transactions-*cum*-interactions, in which both knowledge producers and knowledge users actively participate.

Our theoretical arguments are tested empirically on a panel of 15 EU countries in the period 1995–2007. We assess which role inter-sectoral influences based on productivity growth played in the innovation-driven growth process. The results support the hypothesis that productivity-based user–producer transactions-*cum*-interactions were crucial in determining the innovative dynamics of the industrial systems in Europe. In particular, upstream innovative outcomes were not driven by generic demand-side influence, but by transactions-*cum*-interactions with the downstream innovative customers and users who directed their derived and competent demand for intermediate inputs toward upstream sectors. The stronger is technological advance and derived demand of downstream sectors and the larger the chances that upstream industries can rely on the access to external knowledge to introduce new technologies in turn.