



Industrial subsidies and technology adoption in general equilibrium

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Abstract

Industrial subsidies to failing establishments are common across developed economies. The paper constructs a dynamic general equilibrium model with a view to study the effects of this policy. Interestingly, subsidies to failing plants may increase productivity and accelerate the diffusion of new technologies. In spite of this, labor productivity, employment and income decrease, as resources are devoted to maintaining and updating establishments that would otherwise have closed.

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1. Introduction

A significant portion of public expenditure in many countries is directed towards the support of production units and, while some of these outlays support R&D and

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other innovative activities, more often than not they are directed towards establishments that are unproductive.

The paper asks what are the quantitative effects of industrial subsidies to failing establishments. This question is of interest for several reasons. First, such policies may have a significant effect on aggregate productivity via changes to the composition of the establishment pool. Second, an extensive literature examines the aggregate effects of labor market regulations, particularly those that impose penalties upon establishments that are reducing their workforce. This is partly because differences in institutional firing costs have been pinpointed as a likely cause of the divergent labor market outcomes of the US and Europe.¹ However, several authors have observed that Western European plants that were failing and needed to reduce their payrolls in recent decades were less likely to be taxed than *subsidized*.² Consequently, the effect of industrial support upon *employment* is of particular interest. Third, a policy that directly affects the establishment lifecycle could have significant implications for plant dynamics. Hazard rates, job flows and patterns of technological adoption are just some features that could be affected.

In the paper, I develop a general equilibrium model of establishment dynamics. Surviving units gradually fall behind the best practice technology, and may choose in each period whether to upgrade, continue dropping behind, or shut down. Into this environment I introduce industrial support to failing establishments.

Interestingly, subsidies have the effect of increasing the average productivity of plants in operation. This is because an establishment's optimal technology adoption rule follows an (S, s) policy, censored by the decision to exit in the face of sufficiently adverse conditions. As a result, subsidies that enable plants to survive longer allow more of them to enter the stage of their life at which renewing their technology becomes optimal. Thus, the underlying determinants of technological adoption are an important part of the response of the economy to industrial support. Nonetheless, the economy spends a lot of resources on keeping alive plants that would otherwise have shut down, and this results in a reduction in both output and employment on the aggregate.

That the details of the plant lifecycle might be related to the aggregate effects of public finance regimes has not been raised in the literature. [Fuest and Huber \(2000\)](#) and [Restuccia and Rogerson \(2004\)](#) study the effects of industrial subsidies: however, their models lack any lifecycle dynamics, and their subsidies are not directed towards failing plants – indeed there is no notion of a failing plant in those models. [Samaniego \(2006a\)](#) articulates such a notion to study the effects of firing costs upon exit, but does not consider industrial subsidies nor technology adoption.

Section 2 provides an overview of industrial subsidies, and Section 3 introduces the theoretical model. Section 4 characterizes the equilibrium behavior of the model, and Section 5 outlines the calibration procedure. Section 6 studies the effects of industrial support in the context of the model.

¹See [Bentolila and Bertola \(1990\)](#) and [Lazear \(1990\)](#), inter alia.

²See [Ford and Suyker \(1990\)](#), [Leonard and Van Audenrode \(1993\)](#), [OECD \(1996\)](#), [Murphy and Pretschker \(1998\)](#) and [Fuest and Huber \(2000\)](#).

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