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A rational expectations model for tax policy analysis: An evaluation of tax incentives for the textile, chemical and pharmaceutical industries of Pakistan

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Abstract

An intertemporal model of a firm optimizing its expected net present value was used to derive the model's estimating equations, and rental prices of capital services consistent with rational expectations. We analysed the effects of a 10 percent change in two tax incentives. For the chemical and pharmaceutical industries the benefits of the tax credit for physical investment (increased investment) far exceeded its costs (forgone tax revenue). This was also true for the R&D tax allowance for the chemical industry. For the textile industry the tax credit's costs exceeded its benefits, and for the pharmaceutical industry the tax allowance's costs exceeded its benefits.

Key words: Tax incentives; Market structure; Short-run tax shifting

JEL classification: H20; H22; H25

1. Introduction

Tax and industrial policy evaluations in a user cost of capital and production structure framework are an area of recent empirical research

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interest only, and such studies represent pioneering work for developing countries. The main objective of this paper is to examine the effect of tax incentives on physical investment as well as on expenditures for research and development (R&D hereafter). We calculate the effect of tax incentives on the rental prices of the services from physical and knowledge capital, and the effect of these rental prices in turn on physical and R&D investment, in order to determine the effect of tax incentives on both types of investment.

Pindyck and Rotemberg (1983, p. 1072, fn. 17) commented that the rental price of capital services calculated in the tradition of Christensen and Jorgenson (1969) is not consistent with a rational expectations model, because it embodies static expectations. Here we derive expressions for the rental prices of the services from both types of capital which are fully consistent with the assumption of rational expectations on the part of economic agents.

We do not take it for granted that the corporate income tax (CIT hereafter) and hence tax incentives enter the expressions for the rental prices of capital services, but test for their presence in these expressions instead. Usually in empirical studies of input demand functions the assumption is maintained that there is perfect competition, so that the possibility of short-run shifting of the CIT does not arise. Most studies also assume implicitly that taxes in general and the CIT in particular are collected effectively, an assumption that is not always justified for developing countries (we are indebted to an anonymous referee for this point). We do not maintain either of these assumptions, but test them against the alternative assumptions that the firms in the industries of our sample may have market power, and/or that there is large-scale avoidance of the CIT. If firms do not exercise their market power fully at the time of a change in the CIT, they may try to shift the CIT on to consumers by raising the price of their output. The most likely situation is perhaps that firms try to shift the CIT forward in the short run, but are only partially successful in doing so. However, instead of ruling out the possibility of complete short-run forward shifting a priori, we test for it. We show below that a perfectly shifted CIT that leaves after-tax profits unaffected, has no effect on the rental prices of capital services. Similarly, if firms were completely successful in avoiding paying the CIT in the first place, the tax would not change their profits either, and hence not influence their rental prices of the services from physical and R&D capital. The rental prices of capital services are two of the most important channels through which tax incentives may or may not influence the production and investment decisions of firms. Therefore it is important for policy-makers to be quite certain that tax incentives do indeed have an effect on these rental prices of capital services. That is why we conducted non-nested hypothesis tests (MacKinnon, 1983, 1992) in this paper which were intended to answer the question: Do the parameters of