The graduate tax when education is a signal

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ABSTRACT

This paper investigates the effects of a graduate tax when the return to education is uncertain and wages are determined through equilibrium in a labor market with signalling. The consequence of uncertainty is that both ability and initial wealth matter for educational choice. Compared to a constrained first-best the market outcome with uncertainty and signalling results in an inefficiently high number of people entering higher education. Due to the positive wealth effect over-entry is proportionately greater for high-wealth individuals. The graduate tax reduces entry into education so enhances efficiency. However, it has undesirable distributional consequences: low-wealth individuals are deterred from entering education but high-wealth are encouraged. In this respect, the graduate tax has clear failings as a method of financing higher education.

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1. Introduction

The idea of introducing a tax on graduates has often been proposed as an alternative way of recovering the costs of education.[1] The basic concept of a graduate tax is that students would not have to pay the up-front cost of their education. Instead, the costs would initially be borne by the government with repayment by graduates through a tax premium during their working lives. If the tax is progressive with the rate linked to income, under such a scheme successful graduates will subsidize the less successful. Proponents of the graduate tax argue that it is a fairer method of financing higher education since graduates obtain significant private benefit from education in terms of future higher earnings. It is also regarded as a good method of widening access for those from less privileged backgrounds since it avoids the need to pay up-front fees and provides a degree of insurance against future income uncertainty.

If the returns to education were purely private and certain, and the capital market were perfect, then each individual would assess whether the net benefit of education was positive and the perfect capital market would make the timing of repayment of costs immaterial. In these circumstances there is no need for a policy to assist the less privileged since initial wealth would not be a determinant of educational choice. It is unlikely that the market for education conforms to this description. In practice, the return to education is uncertain since individuals cannot perfectly predict the outcome when making educational choices and imperfect capital markets will impose borrowing restrictions. When education involves the

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production of human capital a standard argument for the graduate tax is that, due to the risk in the future return to education and imperfect capital markets, there will be under-investment in higher education and too little human capital accumulation. The under-investment will be particularly severe for individuals with less initial wealth who find it harder to borrow. Hence, without a corrective policy entry into higher education will not be at the efficient level. In these circumstances a graduate tax may result in a more efficient level of entry.

The accumulation of human capital is not the only explanation of a positive return to investment in education. Weiss (1995) provides compelling evidence that part of the return to education (perhaps, even the entire return) is determined by the effect of signalling rather than through the accumulation of human capital. Both signalling and uncertainty in returns have implications for the properties of a graduate tax. In particular, when they are present it is no longer clear that private educational decisions will remain publicly rational even though they are privately rational. In the absence of intervention signalling provides an incentive for too many people to choose to undertake higher education: the average product is paid to each worker which, for those on the margin between choosing higher education or not, is higher than the marginal product. In these circumstances, the argument in favor of the graduate tax needs a careful reassessment.

The present paper addresses how a graduate tax affects participation in higher education and, hence, the impact of the tax on efficiency. The analysis begins by exploring the implications for the demand for higher education of uncertainty about future wages, and wages are determined through equilibrium in a labor market with signalling as in Spence (1973). We extend the analysis of the graduate tax of García-Peñalosa and Walde (2000) by explicitly modelling intertemporal utility maximization, as in Levhari and Weiss (1974) and Kodde (1986). Our model allows for heterogeneity in ability and initial wealth and, because of signalling (or screening) in the labor market, education acts as a signal to potential employers or is used by potential employers to sort workers according to their unobserved abilities.[2] It is important to note that in contrast to human capital theory, in the signalling model education does not augment productive capacity. Instead, it is just a process to convey information about the unobservable ability level that existed before any education took place. Consequently, if ability were observable it would be efficient to have no education. When ability cannot be observed the efficient education level trades off the benefit of sorting individuals into occupations (placing the high ability into the occupation which is most socially valuable) against the cost of education. We consider the success of the graduate tax against this second measure of efficiency.

The introduction of the graduate tax is modelled through the government subsidizing higher education costs and taxing successful graduates while maintaining a balanced budget. The results show that uncertainty has important implications for the desirability of a graduate tax. When the return to education is uncertain an individual's initial wealth level has an impact upon educational choice: a high-wealth individual will choose to undertake higher education in circumstance in which a low-wealth individual with the same ability level will not. This positive wealth effect is consistent with the results of Levhari and Weiss (1974) and Kodde (1986). We show that the graduate tax discourages people from choosing higher education even though it provides a subsidy to costs. Since there is over-education without the tax this is a beneficial outcome. However, the graduate tax proves more discouraging to low-wealth individuals than to those with high-wealth, so exacerbates the positive wealth effect. After implementation of the graduate tax proportionately more high-wealth individuals receive higher education. Hence, the graduate tax in conjunction with a subsidy to costs is not a mechanism that provides encouragement for low-wealth individuals to undertake higher education.

These results have important policy implications. If signalling does play a significant role in determining earnings, individuals have an incentive to signal their innate ability and this may cause over-investment in education. The extra supply of educated workers drives down the wage for those with higher education. The uncertainty with regard to future income results in a positive wealth effect but the introduction of a graduate tax still fails to encourage people with high ability but from low-wealth backgrounds to invest in education. Thus, even if the capital market is perfect, when education acts as a signal the introduction of a graduate tax will not be an efficient solution since it will further intensify the problem of over-investment among the wealthy with low ability.

The paper is organized as follows. In Section 2 we present our model of educational choice with signalling. Section 3 explores the division of the population between educational choices and demonstrates the positive wealth effect and excess education result. Section 4 demonstrates the effect of the graduate tax on equilibrium and shows that its effects depend upon wealth level. Section 5 discusses the outcome under alternative assumptions on information structure. Conclusions are provided in Section 6. The proofs of the results are given in the Appendix.

2. The model

Following Levhari and Weiss (1974) and Eaton and Rosen (1980) we model educational choice in a two-period setting. Let x_i^1 and x_i^2, $i = e, n$, denote consumption in the first- and second-period of life where the subscript e denotes that higher education has been chosen and n that it has not been chosen. Preferences are represented by the time separable expected

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[2] Weiss (1995) distinguishes between the signalling model in which the informed (students) move first by choosing an education level and the screening models in which the uninformed (firms) move first by offering contracts. In equilibrium the relationship between wages and education could be the outcome of either students choosing an education programme to signal their ability, or the education level being chosen in response to the relative wage offers of firms, in which case wages would serve to screen workers. Our model corresponds to the signalling interpretation.