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A working paper from April 1985: Which demand elasticities do we know and which do we need to know for policy analysis?☆

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Abstract

This paper presents some results on the theory and estimation of intertemporal allocation mechanisms. The results rely heavily on the distinction between anticipated changes and unanticipated changes.

Keywords: Intertemporal allocation; Life cycle; Precautionary motive; Anticipated changes; Frisch demands

1. Introduction

The efficacy of a wide range of policies depend on the reaction of consumers to changes in prices. As an illustrative example, consider a proposal to reduce capital taxes and increase taxes on some goods that have the avowed intention of increasing the savings rate. If we include leisure amongst our goods then it will be clear that we are looking at possible changes in earned income, capital and commodity taxes. The proposed decrease in capital taxes lowers the discounted price of all goods in the period after the implementation of the change relative to the price of goods before. The increase in tax on some goods off-sets this to a certain extent and also increases the relative price of these goods in any period after the implementation of the policy. The effects of these price changes on demands will determine the success or failure of the proposal but they are not easy to predict.

☆ This paper was written and distributed in April 1985 by Martin Browning. As it is a classic paper, we are delighted to publish it in this issue of Research in Economics.

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The central theme of this paper is that the analysis of inter-temporal decisions is much facilitated if we make a distinction between anticipated (or evolutionary or dynamic equilibrium) changes and unanticipated (or parametric or dynamic disequilibrium) changes. The reason for this is that anticipated changes have only substitution effects which can often be unambiguously signed. Unanticipated changes, however, have both income and substitution effects which invariably have ambiguous outcomes. The motivation for using the anticipated/unanticipated dichotomy for analysing tax changes is that major changes tend to be few and far between so that in the periods between announcements the effects are anticipated.

To illustrate: the announcement of a cut in capital taxes has a once and for all positive income effect for those who, before the announcement, were planning to save (see Tintner, 1938). As well as this, the cut makes consumption in any period cheaper relative to consumption in the period before. For any pair of periods after the announcement these effects are 'anticipated'.

In a world of perfect certainty all changes are anticipated. In such a world rational agents facing perfect capital markets will keep the marginal utility of discounted expenditure constant from period to period. In Section 2 we discuss demand functions that, under the assumption of inter-temporally additive preferences, depend only on prices within the period and the (constant) marginal utility of expenditure that is Frisch demand functions. It is the elasticities associated with these functions that give us responses to anticipated changes. We discuss when Marshallian (constant expenditure) or Hicksian (content utility) elasticities are close to these. Our conclusion is that for the sorts of changes in prices induced by tax changes the use of the inappropriate demand elasticities may give misleading results.

As is well known, we may move from Marshallian elasticities to Hicksian elasticities (and back again) by using the Slutsky equation. We can also move from Frisch elasticities to Marshallian elasticities. However, to move from Marshallian elasticities, which are essentially static, to Frisch elasticities, which are dynamic, we need one extra parameter. This parameter is the inter-temporal substitution elasticity. This parameter indicates how (discounted) expenditure changes following an equi-proportional change in all (discounted) prices. A value of ϕ for the intertemporal substitution elasticity implies that a one percent fall in all (discounted) prices (that is a one percent own real interest rate for all goods) leads to a fall of $(1+\phi)$ percent in (discounted) expenditure.

We can either estimate Frisch responses directly or derive them from independent estimates of Marshallian responses and the inter-temporal substitution elasticity. If we choose the former route then we can use the implied estimates of Marshallian elasticities to check our system. The latter course leads to the joint estimation of demand systems and consumptions functions. Much of the rest of the paper is devoted to the estimation of Frisch responses.

One other topic dealt with in Section 2 is the interpretation of the specific own-price substitution effect in an inter-temporal context. It is well known that we can decompose the Hicksian (fixed utility) substitution effect into a specific and a general substitution effect (see Houthakker, 1960). The specific substitution effect is the fixed marginal utility of expenditure or Frisch effect. We propose a further decomposition of the own-price specific substitution effect in a temporal context into an inter-temporal effect and an intra-temporal effect. These take account of the fact that a price change for any single good from one period to another constituted a change in the price between periods and a change in intra-period