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Tax incidence in differentiated product oligopoly

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Abstract

We analyze the incidence of ad valorem and unit excise taxes in an oligopolistic industry with differentiated products and price-setting (Bertrand) firms. Both taxes may be passed on to consumers by more than 100 percent, and an increase in the tax rate can increase short run firm profits (and hence the long run number of firms). We provide summary conditions for these effects to arise. The conditions depend on demand curvatures and are written in elasticity form. Surprisingly, the analysis largely corroborates Cournot results with homogeneous demand. © 2001 Elsevier Science B.V. All rights reserved.

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> ''EXCISE — A hateful tax levied on commodities, and adjudged not by the common judges of property, but wretches hired by those to whom excise is paid.''
> Samuel Johnson's *Dictionary of the English Language* (1755)

1. Introduction

Historically, selective sales taxes (excises) have been among the most contro-

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versial and despised forms of taxation in America, largely because of their ability to discriminate against particular classes of producers and consumers. Indeed, such taxes are widely considered to have been catalysts for the American Revolution, and the first U.S. excise tax enacted under President Washington, a specific tax levied on distilled spirits, incited the Whiskey Rebellion of 1794 — an uprising that ended any substantive government interest in excise taxation until late into the next century. In 1862, when the nation faced its first fiscal crisis during the Civil War, Union officials created a special agency to oversee commodity taxation on virtually all consumer goods in the North.[1] Soon after, excise taxes accounted for half of all federal revenue and became a permanent fixture in the U.S. tax system.

Selective sales taxes are still used extensively at both the federal and state levels. In 1995, federal and state excises raised $59 billion and $63 billion, respectively, with the latter figure comprising a third of total state sales tax revenues.[2] Excises can be levied at either unit (specific) or ad valorem (percentage) rates. About half of federal excise revenue is provided by the unit gasoline tax. Major state excises include unit levies on motor fuels, tobacco products, and alcoholic beverages (39 percent of state excise revenue, 11 percent, and 6 percent, respectively), with ad valorem levies imposed on public utilities (14 percent).[3]

It is well known that unit taxes are equivalent to (appropriately calculated) ad valorem taxes under perfect competition and so have the same economic impacts, but this equivalence does not hold under different market structures. The relatively small amount of work that has analyzed excise taxation under imperfect competition (e.g., Seade, 1987; Stern, 1987; Besley, 1989; Delipalla and Keen, 1992; Skeath and Trandel, 1994; Hamilton, 1999) has usually considered a homogeneous product with a corresponding single market demand curve (see also the survey paper by Keen, 1998). It has also typically been assumed that firm interaction is described by Cournot competition,[4] a description that is losing popularity in modern Industrial Organization. One difficulty with the Cournot assumption is that price is determined only indirectly from the market demand: firms do not directly

[1]The first commissioner of this new *Office of the Commissioner of Internal Revenue* characterized it as ''the largest Government department ever organized.'' (Brownlee, 1996, p. 25)

[2]Federal data taken from ''Federal Excise Taxes, Fiscal Years 1994 and 1995,'' *Statistics of Income Bulletin,* IRS, Fall 1996, Fig. B. State data taken from *The Book of the States*, The Council of State Governments, Vol. 31, 1996–97, Table 6.30.

[3]Excise taxes appeal to governments for various reasons. Since the taxes are typically included in sales prices, they are often invisible to consumers. They may also be relatively efficient methods of raising revenue if targeted toward inelastic commodities. (A tax on salt, essential for the preservation of food before refrigeration, provided a dependable source of revenue in the Middle Ages.) Excises on tobacco and alcoholic beverages, which were originally imposed as luxury-consumption taxes, persist in part to discourage use of these products.

[4]Two exceptions are Kay and Keen (1983) and Delipalla and Keen (1992). The former study considers differentiated products under monopolistic competition with fixed aggregate demand. The latter study uses a conjectural variations approach (with a homogeneous product). While this approach is largely discredited by theorists, it is sometimes felt to constitute a useful shorthand way of describing market conduct. When we refer to their results below, we take the case of Cournot competition.