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by

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ABSTRACT

There are products which are assembled from kits but which, once assembled, are identical to other products. An example is the roll-your-own cigarette. Because the kit requires time to assemble, it is more costly than the assembled product; in the absence of taxation, the kit is not bought or is "redundant". Regions seek to maximize the tax revenue gained by excise taxes. We show that tax competition supports strategies which tax the "redundant" product at a lower tax rate than its assembled counterpart and it is bought. A welfare loss is thereby created.

Key Words: tax competition, new products, cigarettes

Suggested Running Title: Tax Competition and Redundant Products

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1. INTRODUCTION

It is now widely understood that the competition between tax authorities seeking to maximize tax revenue is similar in many respects to the competition between firms seeking to maximize profits: the ability of a tax authority to extract tax revenue is limited by the presence of other tax authorities and this limitation may be "efficiency enhancing".[1] Most of the literature has focused on taxes associated with factors of production - namely capital and labor - although a few authors (e.g. Mintz and Tulkens (1986), de Crombrugghe and Tulkens (1990) and Kanbur and Keen (1993)) have discussed taxes associated with consumption. This paper shows that competition for excise tax revenue may lead to the creation of commodities which otherwise would not exist or would be "redundant" and discusses the welfare implications. I use the competition between Canadian provinces for tobacco tax revenue as my motivating example.

In the Canadian tobacco market there are two cigarette products - the traditional assembled cigarette and the cigarette kit (or stick). As the former product the cigarette is bought rolled and ready to smoke but as the latter product the cigarette is bought as a kit which contains tobacco and a sleeve and which must be assembled prior to smoking. Once assembled, the kit is (almost) identical to the traditional cigarette. Because their tobacco contents are the same, the firm's prices for the two products are (approximately) the same.[2] To the firm's price the consumer adds the opportunity cost of the time he spends assembling the kit so that, if there were no taxes, the kit would have a higher "inclusive price" than the traditional cigarette and would not be bought. Therefore the cigarette kit is a redundant product in the sense that it is dominated by an identical product of lower cost. However, provinces levy tobacco taxes and the model suggests that competition for tax revenue leads provinces to choose to tax the cigarette kit at a

lower rate than the traditional cigarette and the kit is bought. As such, tax competition creates a product which would otherwise not be produced.

The incentive to lower the tax on the cigarette kit arises because the province sets the legal tax rate on cigarettes smoked in the province (i.e., the tax is a destination-based tax). If Province A has a lower tax rate than Province B, there is the possibility of arbitrage: an entrepreneur can make a profit by buying cigarettes in Province A (paying the associated tax) and trucking the cigarettes across that province's boundary for sale in Province B (where the cigarettes are sold illegally and without tax being paid to Province B). In this way, by lowering its tax rate, Province A is able to gain tax revenue on the cigarettes "exported" to Province B. However, the lower tax rate must be applied to all cigarettes bought in Province A so that Province A gains less tax revenue from the cigarettes sold in Province A. The province therefore seeks to find a way to limit the tax cut to the products which are predominantly exported - these products are the kits.

In Province B a buyer of illegally-imported cigarettes may be caught and punished so that such cigarettes have a "psychological cost" or risk premium associated with their purchase. The risk premium is likely to be proportional to the income of the buyer. Therefore the individuals who buy the contraband cigarettes are likely to be of low income. However, as noted earlier, a kit must be assembled and the opportunity cost of time is a component of the inclusive price so that kits tend to be bought by low-income individuals. Therefore, by lowering its tax rate on kits, a province can target exports to individuals most likely to buy contraband cigarettes and limit the cut in its domestic tax base to the cigarettes bought by its low-income residents.

In our model the demand for cigarettes is inelastic so that, in the absence of tax

and the different tax rates levied by U.S. states on chewing tobacco and cigarettes.

The model can be considered an extension of the models of Mintz and Tulkens (1986) and de Crombrugghe and Tulkens (1990). Both of these models have destination-based taxes so that residents in the high-tax region may reduce their tax payments by crossing the border and buying the product in the low-tax region. Such cross-border shopping takes time and so it tends to be done by low-income households. The time cost of traveling across the border in their model functions in a way similar to the psychological cost or risk-premium of buying an illegal product in my model. However, in these models, there is one exogenous product which is taxed. This paper extends this to show that the tax competition between the regions may endogenously create a new product - similar to the old product except that it is marketed as a kit and requires time to assemble - and that this new product is taxed at a lower rate.

The paper is organized as follows. Section 2 presents the model and Section 3 solves the model for the case when the regions are symmetric. Section 4 considers the case when the regions are asymmetric in population and in their wage distributions. *Ceteris paribus* a less-populated region is more aggressive in trying to create sales in the other regions. In consequence it has a lower tax rate and exports the product. These results are similar to the results of Kanbur and Keen (1993). Section 5 discusses the welfare implications. Section 6 concludes.

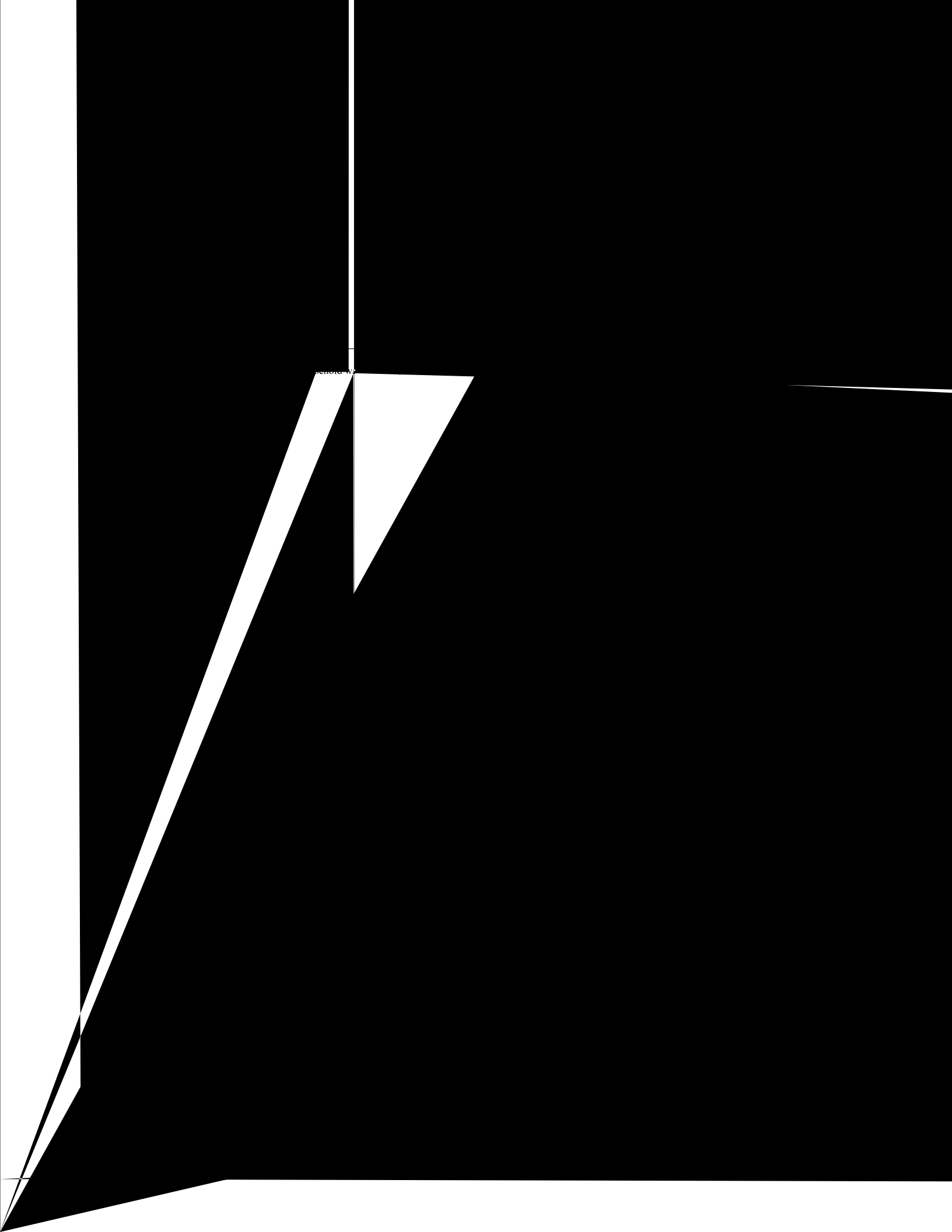
(3) *cigarette kits taxed by his own Region i*: the region levies an excise tax t_k^i on cigarette kits. It takes time T for an individual to assemble the kit so that the inclusive price to an individual of the cigarette bought as a kit is $p + t_k^i + wT$.

(4) *cigarette kits taxed by the other Region j ($j \neq i$)*: the excise tax levied on cigarette kits by Region j is t_k^j. In addition to the cost of assembling, wT, these cigarettes are smuggled and buying an illegal product imposes the psychological cost of $w\delta$. Hence the inclusive price to the individual in Region i of a kit taxed in Region j is $p + t_k^j$ for the individual in Region i. The individual chooses

Region *j*.

2.2 Intuitive analysis for the lower tax rate on kits

This section provides the intuition for the reduced tax rate on kits. For ease of presentation I focus on the case of identical regions. Initially I suppose that regions are required to set the same tax rate on all cigarette products so that at equilibrium $t_k^1 = t$. Figure 1 shows how the prices of the different cigarette products vary in



$$N Q f(0) \frac{\Delta t_k^1}{T} \Delta t$$

-12-Because on1.3y a fe97.92 698.ndividuals are switching to the

a best response of Region 1 and t^1 cannot be a Nash Equilibrium. Because

3. THE SYMMETRIC NASH EQUILIBRIUM

I proceed heuristically to characterize the symmetric Nash Equilibrium by considering the tax rates from which small perturbations give noonsU7 TmCsd considering

taxed

in Region 1; residents buy kits for whom $p +$ or for whom ,

The firsts term is the tax revenue from domestic sales of kits, the second term is the tax revenue from domestic sales of assembled product and the third term is tax revenue from sales of kits exported to Region 2.

Similarly, if Region 1 raises its tax rate on kits above t , its residents switch to imported

is raised above t_k^2. Otherwise, if $N^1 \neq N^2$, is discontinuous at .Finally, for small deviatio

The above discussion is heuristic and focuses on small deviations from the equilibrium

the tax rate on the kit. By so doing, it ensures he production of the “redundant” product.

4. ASYMMETRIC REGIONS

I now consider the asymmetric cases of unequal populations and different wage distributions. First, suppose that Region 1 is the smaller region, $N^1 < N^2$, and that the two regions continue to have identical wage distributions. The larger market size of Region 2 means that there is a greater advantage to Region 1 than to Region 2 in lowering its tax rate on kits and having kits exported. Conversely, having a larger domestic tax base, Region 2 is more reluctant to lower its tax rate to defend its tax base from marginal imports. Therefore Region 1 is more aggressive or $t_k^1 < t_k^2$. This is now shown formally.

PROPOSITION 3:

associated tax revenue. If Region 1 is setting its tax rates as the best response to the tax rates applied by Region 2, these effects must offset so that no additional revenue is generated. Compare these results with those of an alternative thought-experiment in which Region 2 lowers its tax rate on kits and on assembled product by the same amount as Region 1 raised them. Region 2's smaller tax base means that it loses less tax revenue on its pre-existing sales than the tax revenue that was gained by Region 1 on its pre-existing sales. Kit imports decrease so that Region 2 gains the same quantity of own kit sales as Region 1 lost in the earlier thought experiment. However, it is charging a higher tax rate so that this gain of kit sales translates into a larger tax revenue gain than the tax revenue loss of Region 1 in the earlier thought-experiment. Overall, if Region 1 experiences no change in tax revenue from the tax rate increase, Region 2 must gain tax revenue from the tax rate decrease. Or Region 2's tax rates cannot be a best

APPENDIX A: PROOF OF PROPOSITION 2

$$R^{1*} = \left(\delta + \frac{\overline{r}}{\quad}\right)$$

(2) To show that a necessary condition for the proposed Nash Equilibrium is that $\delta > T$.

Suppose $\delta \leq T$ and Region 2 sets tax rates as $t_k^2 = \delta \bar{w}$ and t . I find a strategy forRegion 1 whicl

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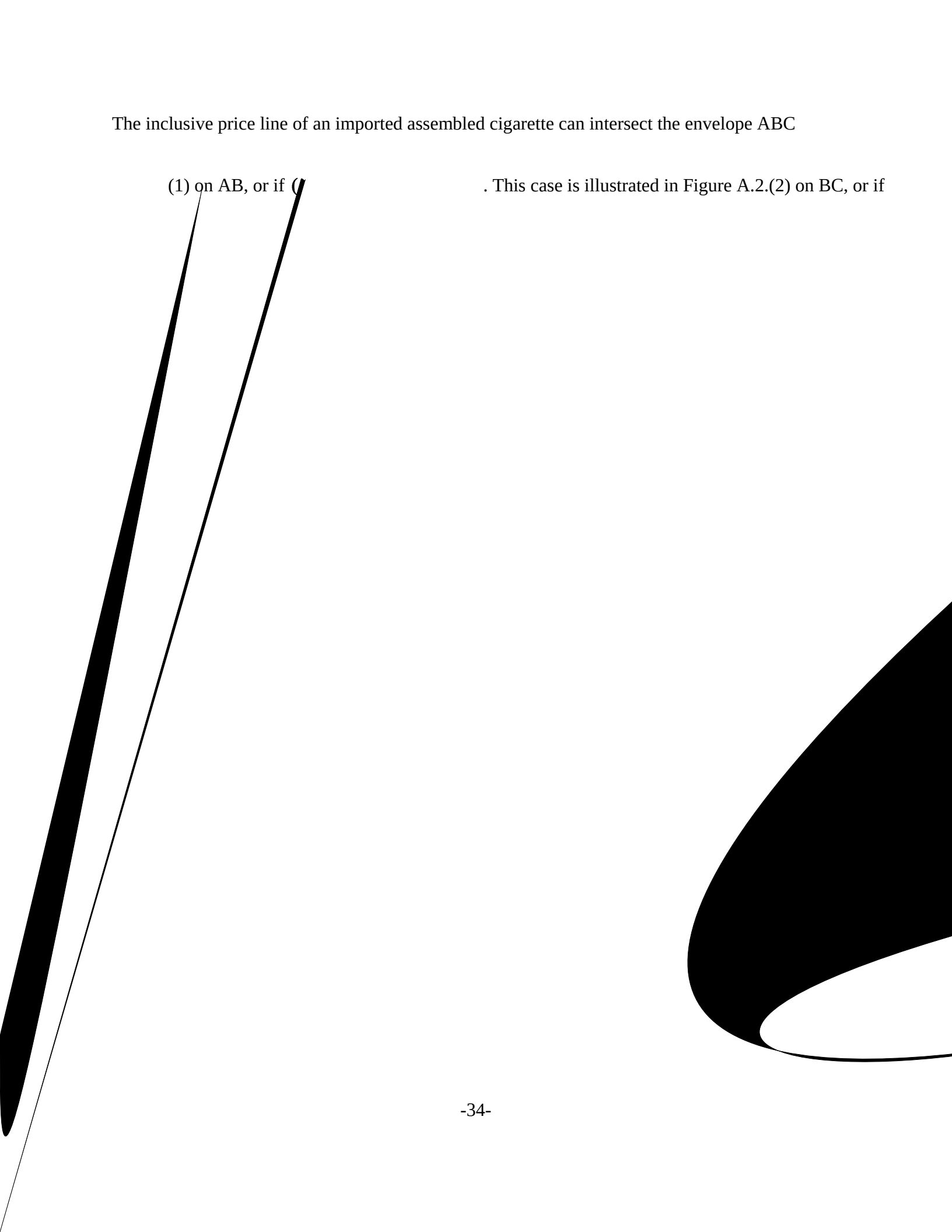
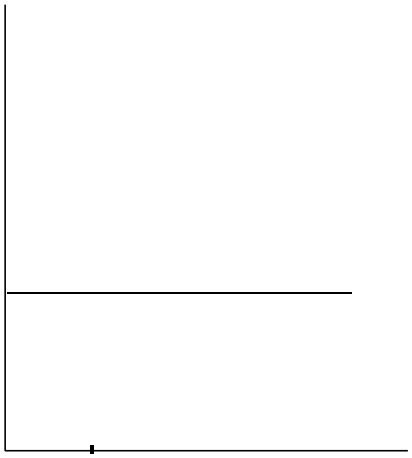
The inclusive price line of an imported assembled cigarette can intersect the envelope ABC

(1) on AB, or if (. This case is illustrated in Figure A.2.(2) on BC, or if





$$\frac{\delta \bar{w} - t_a^1}{\delta - T} \leq \frac{\bar{w}}{2}.$$

Using the uni75Tc-0.00

APPENDIX B: PROOFS OF PROPOSITIONS 3 AND 4

The proofs of Propositions 3 and 4 are similar and so I combine the analysis. Denote the

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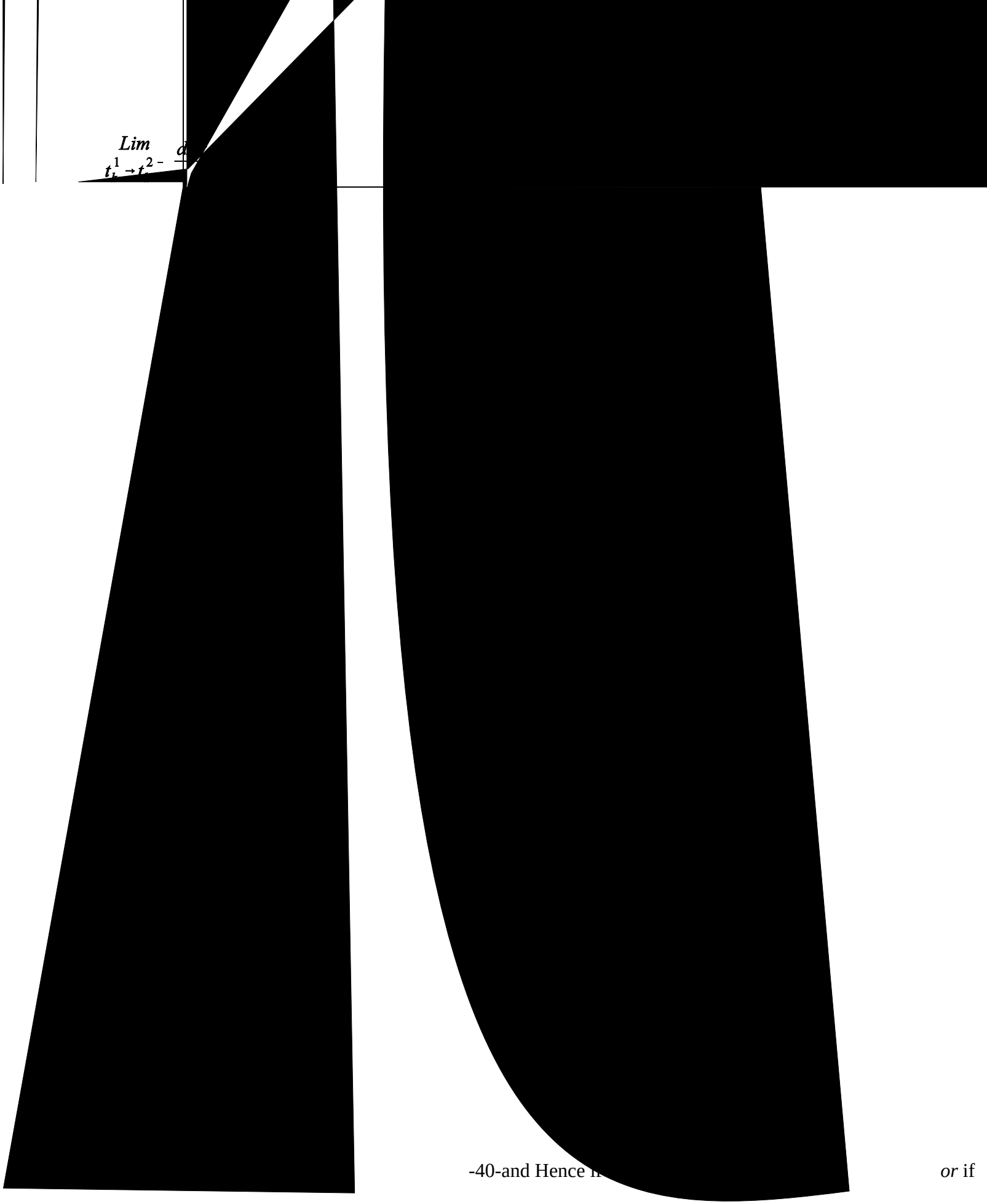

or if

(B.9)

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