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Research Report

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“The Law of one price in Scandinavian Duty-Free Stores: A Report”

Aleksandar Vasilev

Asplund and Friberg (2001) start with a case study and build a model of nominal rigidities. Prices set by the two ferry operators and the airline are both state- and time-dependent, much in the Calvo spirit. There are also real rigidities in their setup: as we see later on, consumers do not always optimize and that decreases sellers' incentive to optimize as well. The contribution of Asplund and Friberg (2001) is the additional twist of international and cross-currency trade. They claim that the deviations from LOP are a by-product of price rigidities, coupled with fluctuations of the ER. This mix of the two factors is an important contribution to the literature of rigidities. Paul Krugman and Kenneth Rogoff are advocating the idea of imperfect financial integration, which is a Keynesian type of behavior in international context.. Sellers have to consider not only production cost, but also exchange-rate movements and other information and “soft” factors such as reputation, etc. This setup is very much in line with menu costs and monopolistic competition: products are differentiated and consumers pay a premium for the brand name or the trade mark. In the paper the products sold by the duty-free shops are similar but not perfectly homogenous. Demand, and optimal prices are likely to differ across locations. Moreover, there is also a local cost component and some potential for arbitrage (the examples of IKEA furniture and European car markets). However, the cost of product in duty-free outlet is independent of the currency in which consumer chooses to pay.

The data authors use is from IFS: monthly ER, taken at the end of the period. The frequency of data does not correspond to that of underlying decision, which can lead to the so-called “working problem”. A better measure was to use the averaged one over the month. Higher frequency data like in Goldberg and Hellerstein (2005) would have been even better. However, since the within-month variation was quite modest, there are no major losses in terms of price changes.

Theoretically, $\log(\text{NER}) = (\log P - \log P^*)$. That relationship usually fails in the short-run but holds in the long-run. Even if LOP fails in the long-run (because NER is RW, or RER is non-stationary, etc), relative price still tracks the LOP with some deviation. The reason behind that is that the cost of adjusting may be high than the loss in profits from non-adjusting. That is, monopolistic sellers face a relatively flat profit function and the loss is second-order with respect to the menu costs. As we will see below, there will be factors on the demand side that will make this profit function even flatter. There are different shocks in their setup – inflation, exchange rate fluctuations, onshore excise taxes, change in customer composition and/or currency type revenue. When the shock is so big that the border is hit, prices are readjusted. Inside the band of inaction deviations follow RW, but to larger deviations firms react quickly to restore LOP.

On the consumer side, there is costly arbitrage – it is not riskless and costless to make profit from the dual pricing scheme. On the seller side, goods sold are not easily spoiled and require little storage cost so there is no pressure to change prices as compared to fresh vegetables, for example. Moreover, most of the goods are luxury goods, e.g. high quality perfumes, so you do not consume more if prices are a little

lower. The others, like tobacco and alcohol are usually rationed to one stack of cigarettes and one bottle of liquor. This makes the gain from arbitrage negative if we count the time and effort needed to resell the good. Even when we abstract from those two specific categories, that are subject to excise taxes, passengers face carrying and storage and transportation costs – they cannot take great quantities to justify the fixed cost. The band of inaction will increase even more. Indeed, some of the buyers were elastic - frequent travelers exchanged currency a few days in advance, held both types of money and bought cheap. The majority of the passengers, however, were inelastic. This serves in itself as an ample reason not to change prices very often.

Thus we can regard the majority of travellers as near-rational like in Akerlof and Yellen(1985): Travellers face information costs, such as finding the current exchange rate and making the price comparison. They also face transaction costs, especially the cost of changing currency. Credit card fees are non-negligible – they are tied to quantity. The fee is usually non-linear because it consists of fixed and variable component. Moreover, credit cards usually charge you a couple of days later, at the ER on day the clearing is executed. Unfortunately, data on individual transactions is impossible to obtain, so it is unobservable. Another impediment for travellers is that carrying too much cash is also not useful – it is not only a bulk in your wallet, but also there is an interest foregone when you carry bank notes.

The authors point out in the article that the cost of changing money on board was a serious impediment because travellers are locked-in. Since this is a big enough friction, equalizing pressure from arbitrage is independent of the price of the good. That is a good reasoning for the on-ferry buying behavior, but insufficient explanation for on-shore transactions. That is because at the latter you can make ER comparisons. The additional twist in the story is costly optimization, or that buyers follow a rule-of-thumb behavior – they pay in your currency because it was usually cheaper. It is worth mentioning that the products are duty-free so they are always cheaper in the domestic currency since no excise taxes are paid. When you exit a country, you try to get rid of local currency by spending it on some small-ticket items. However, the greater the deviation from the LOP, the greater was the share of customers who paid the lower price of the two optional quotes.

In this aspect, dual pricing may be regarded as a service to customers, a way to attract them, like a permanent promotion. This gave more flexibility to consumers. What is more, people were complaining if deviations were too big. The seller did not want to damage customer relations, reputational concern. Thus, after the shop adjusts the prices, LOP should hold. However, when demand for duty-free items differs because of different tastes, income, onshore prices in the two countries, that could lead to price discrimination. Thus, there will be adjustments once the deviation from the NER becomes sufficiently large, but LOP will not hold because of those distortions. In this sense discrimination diverts the shop from equilibrium.

For Birka Line, a ferry operator between Finland-Sweden (75-98), exchange costs were lower. Still, the differences in tax regimes mattered. Thus, many passengers used the ferries to purchase primarily products that are heavily taxed in the two countries. On the other hand, substantial nominal rigidities were present even in case of moderate inflation. However, new catalogues usually tracked new excise taxes on tobacco and alcohol. Birka Line used the same relative price for every product most

probably because that makes it easier for the company to re-adjust. In addition, the persistence in the deviation from LOP was independent of product characteristics. 26 catalogues were issued for 13 years, that was one catalogue every 6 months, the normal spell of non-adjustment in other empirical studies as well.

The fixed cost of printing catalogues was not the main reason not to adjust, because in 82-88 there were 5 catalogues printed with old prices. 20 of the catalogues had prices in both currencies - SEK, FIM. The last 6 were in SEK only – In 1992, the dual pricing scheme was discontinued because there was a great volatility of SEK, which in turn made arbitrage opportunities more lucrative. Still payment in FIM was possible, but converted to SEK using current ER. That happened because of the change in composition of customers. Thus tastes and consumer treatment are factors that affect demand.

Viking Line (91-97) is another ferry operator surveyed, which also used dual pricing and the same relative price. Price adjustment was infrequent, sometimes the relative price was held constant for 9-16 months. Viking Line allowed for larger deviations than Birka Line, but always adjust prices when printing new catalogue. During 91-97, there was a higher variability of the NER, higher uncertainty, persistent shocks. Nevertheless, much of the pattern in relative price adjustment was the same as of Birka Line. The reason behind that was the stable share in terms of currency revenue. Even when it was 7.6% cheaper to buy in one currency, no significant changes in the currency type payments. There was an even mix of Finns and Swedes, and dual pricing was kept throughout 91-98 - it was attractive for Viking Line even though ER was fluctuating. Indeed, frequent travelers tended to shop in the more favorable currency. They held both currencies and were quick to compare the relative prices with the current ER. For Viking Line the band of inaction made sense as long as the ER was stable. When it fluctuates, uncertainty increases because the variability of the deviation of NER from the relative prices increases, which subsequently pushes the difference to the border of adjustment more frequently.

The last piece of evidence comes from SAS airline(95-98), which set prices in USD, as well as Scandinavian currencies (DKK, NOK, SEK). There was not a unique relative price and that is an important difference from the other two cases because deviations from the LOP differ across products. Prices were frequently adjusted, so menu costs proved not to be important: SAS acted to reduce large deviations from LOP. Although relative price was thought to be important for big quantities, only 2.5% deviation was observed. In addition, cheaper products had greater variation, which is consistent with similar findings in the literature that small-ticket items have greater price sensitivity.

Prices quoted in USD were more expensive. This meant that those who paid in this currency were less informed about the Scandinavian ER, and that group put less equalizing pressure on prices. Adjust when the benefit of following relative price exceeds the cost of following relative price. Since most of the products offered by SAS were imported, prices changed every time there was a movement of the ER vis-à-vis the USD. This is an evidence of a delayed pass-through of ER effects into consumer prices and inflation.

Reference

Asplund, M, and Friberg, Richard (2001). "The Law of One Price in Scandinavian Duty-Free Stores." *American Economic Association*, vol. 91(4), pages 1072-1083, September.