

Price transparency and market integration

Richard Friberg

January 28 2013

In preparation for Handbook of Economic and Institutional Transparency, eds J Forssbaeck and L Oxelheim, Oxford University Press.

[Preliminary and Incomplete – comments welcome]

Prices of many products depend on where they are sold. An Apple Ipad may for instance be much cheaper in New York City than in Zurich. There are many potential reasons for price divergences but a lack of information about prices in other locations is one plausible contributor. In the present article we survey theoretical and empirical work that aim to help us understand the role of price transparency for market integration. Looking back a few years two trends were seen as having a potentially large effect on transparency and market integration. Both in policy circles and in the press it was stressed that increased transparency due to a common currency in Europe and due to information technology would act as an equalizing price force. Two quotes by the Economist may serve to bring out this view.

The Economist (2001, 29 November) noted that "the greater transparency the single currency brings to prices will make a big difference to the way business is conducted. Simple economic theory suggests that savvy consumers will look across European markets and note where the price of a good or service is lowest. They will then either purchase the good or service there, conducting a form of what economists call "arbitrage"; or they will use the information to prevail upon their more expensive local provider to bring the price down....In the past, manufacturers have been able to maintain price differentials because their customers found it difficult to compare prices. With the euro, it will become much easier [to compare prices]."

Regarding the market integration effects of greater transparency due to the internet – where price comparisons are only a "mouse-click away" – there were also high expectations. We again let the Economist (1999, November 19) portray this view "The explosive growth of the Internet promises a new age of perfectly competitive markets. With perfect information about prices and products at their fingertips, consumers can quickly and easily find the best deals. In

this brave new world, retailers' profit margins will be competed away, as they are all forced to price at cost.”

As these events have had some time to manifest themselves it is a good time to take stock of what we know about market integration and price transparency – with a particular focus on internet and a common currency. We start by clarifying by what we mean by market integration and the methods that have been used to delineate market boundaries. Next we consider the evidence on market segmentation – both in the general case and with a closer look to the EU and the impact of monetary union. Finally, to understand the role of price transparency for market integration we examine the different mechanisms that may lead to market integration and the empirical evidence on their effects.

Before we proceed let us be clear on some delineations that we make. In this survey we will focus on consumer goods markets - thus largely disregarding studies of financial market integration. The reason for this limitation is that the mechanisms governing the possibilities for arbitrage are very different in financial markets and in regular goods markets. We also disregard issues of market integration and transparency in markets for intermediate inputs. The reason for this omission is largely that there is a very limited number of empirical studies that examine these issues – in all likelihood reflecting the difficulties in obtaining transaction prices in upstream markets (see for instance Bonnett and Dubois (2010) for a discussion of some of the literature that has tried to analyze prices between upstream and downstream firms).

1 How do we delineate markets?

We may think of markets being delineated in two dimensions – one **geographical** and one in **product space**. In the case of a small island that is completely isolated from the rest of the world it is clear that is a separate market in the geographic dimension. In other cases we need to draw a line somewhere. Exactly where we draw the line is somewhat arbitrary. Let us exemplify with the geographic dimension and note that if cross-price elasticities are zero two goods are clearly in different markets. While it is easy to think of cases where cross-price elasticities are indeed zero – between haircuts in Wellington, New Zealand and Lund, Sweden for instance, the typical interest is in cases where elasticities are not zero but low enough that we can fruitfully think of them as separate markets. In a tradition that stretches back to at least Augustin Cournot (1838) we define the extent of the market as the area within which prices rapidly converge to equality after corrections are made for transport costs. The underlying

logic is that of arbitrage, if prices were much lower in one location it would pay for an arbitrageur to buy it there and resell in the high price region. Indeed for many commodities traded on exchanges, such as oil, silver or frozen pork bellies, arbitrage rapidly eliminates any price differences over and above transport costs. In such a market, we say that the "law of one price" (LOP) holds - the price of the good is the same irrespective of where I buy it. As we broaden our focus to typical consumer goods we need to take account of that the same physical product bought in different locations may differ along some dimensions and thus prices may to some extent differ as well. Prices of consumer goods differ across stores also in the same block since consumers are not constantly comparing prices, and also because the extent of sales services given and other aspects of the purchase may be important besides the price. Nevertheless, also for typical consumer goods we expect the price differences to be limited by transport costs. Take for instance a cheap self-service gas station that is located across the street from a somewhat more expensive full-service station. Given the differences in service content a certain price differential may be stable. However, now assume that the manager of the cheap station on a sudden whim decides to slash prices a given morning - we expect the station across the street to respond within not too long whereas we have no such belief for a gas station located in another city. That is, we expect the closely located stores to belong to the same market. Similar logic applies if we consider goods in the product space dimension. If two products have a high cross-price elasticity they belong to the same market if we were to successively order products along diminishing cross-price elasticities we can somewhere draw the line and say that two products belong to different markets. Two bottles of Burgundy wines that share similar characteristics can be expected to be part of the same market whereas bottled water is likely to be a separate market – even though all these products are liquids fit for human consumption. In this article we will focus on the geographical dimension of market definition.

To clarify the discussion, consider a firm that sells a particular product on two national markets, Home and Foreign. If markets are segmented we expect the firm to in each market set prices equal to marginal cost times a markup that depends on the elasticity of demand, which in turn depend factors such as income levels, demand shocks, and the set of substitute products. We can see market integration as a constraint on the prices that the firm is able to set – if markets are separate the prices can be set without any additional constraint and increasing integration can be operationalized as a tighter constraint – price differences need to be lower than a certain bound. When prices are different because of different markups this is

an instance of third degree price discrimination.¹ In the current article we do not consider the welfare effects of such price discrimination – typically some groups win, some lose and the overall effect on welfare depends on functional forms of demand (see Malueg and Schwartz (1994) for one analysis of welfare effects of price discrimination in international markets).

A large literature indeed uses price differences, and the correlation of price changes, to investigate market delineation. An important application for market delineation has been in Antitrust cases - Davis and Garcés (2010) survey the tools that have been used to delineate markets. Determining the relevant geographic market is typically crucial in cases involving the abuse of a dominant position or proposed mergers. Intuitive reasoning is used to identify plausible markets to include – if we're for instance interested in whether the Swedish market for used cars is a separate market we confine ourselves to a comparison with neighboring regions. Considering price movements is the most standard way of examining market delineation – are prices changing in tandem and, if there are shocks that affect prices in only one region, how quickly do prices react so as to limit the deviations? Clearly applications of these methods need to account for that prices may move together because of common cost shocks (prices on the markets for Rice Crispies in Sweden and New Zealand are likely to move together because both rely on rice as an important input which is traded on a global market – despite the two markets for Rice Crispies clearly being separate). Applications also need to take account of demand shocks that may be hitting both markets – a sunny summer in Toronto and in Stockholm may drive up the price of swimwear in both locations, even though they are clearly separate markets. Other ways of delineating markets rely on asking consumers about substitution patterns, examining the impact of specific events such as market entry by a new player or directly trying to estimate cross-price elasticities. In the present article we focus on price comparisons, which is also the method that exhibits the largest literature.

2 The evidence – an overview of empirical results

2.1 Transparency and price dispersion within a market

¹ In more complex setting we can also see different prices as a form of price discrimination under self-selection constraints. For instance, to take an extreme case Anderson and Ginsburgh (1999) consider the case where a product is offered in a foreign country even though there is no local demand for it. If there are costs of purchasing it in the foreign country there the firm can offer it at a lower price there, in effect using it as a low quality substitute that can be targeted to weaker consumer groups and thus act in a way so as to permit price discrimination under self-selection constraints.

Starting with Stigler (1961) a large literature examines the links between consumer search and price dispersion *within* a geographic market. Other seminal references are Diamond (1971), Salop and Stiglitz (1977) and Burdett and Judd (1983) – see Lester (2011) for a recent contribution. A central concern has been to understand the conditions under which a lack of information about all prices on the part of consumers can generate equilibrium price dispersion. Even markets where homogeneous products are sold by symmetric firms can feature different prices as long as some consumers face a search costs to learn about prices. The models point to the crucial role of information in generating price dispersion and have also formed an impetus for models of search in labor markets (see for instance Albrecht (2011) for an overview). The theoretical models are typically quite stylized and we will not cover any one of them in detail here, instead focusing our attention on the empirical literature. There is a large empirical literature that confirms the existence of consumer search costs, parts of which we cover below. Some articles set out to test a particular model of consumer search – a topic that we disregard for now even if many of the papers that we discuss below fall in this category. Instead let us focus on papers that examine if (proxies for) lower search costs are associated with less price dispersion.

The typical answer is in the affirmative. Chandra and Tappata (2011) use daily gasoline prices from essentially all gas stations in four US states and establish that prices are closer in line for gas stations at the same street intersection – where search costs are negligible given the prominent display of gasoline prices in the US. They further find that price dispersion is higher for premium grades – a fact that they argue is consistent with that consumers who purchase such grades have a higher opportunity cost of time and hence higher search costs. Two frequently cited studies in this vein are Dahlby and West (1986) and Sorensen (2000). Both point to patterns of price dispersion that are consistent with costly search and show that price dispersion is lower in submarkets where the benefits of search are likely to be higher (examining automobile insurance and prescription drugs, respectively). There is also some evidence on price dispersion from the introduction of information technology into settings where there was previously very little – Jensen (2007) examines how the expansion of mobile phone coverage affects price dispersion across local fish markets in the Kerala province of India and Aker (2010) examines the effect of mobile phone coverage on grain markets in Niger. Both find large effects, see Aker and Mbiti (2010) for an overview of research in this vein.

Before we continue let us note that in the dawn of the internet age it was sometimes hypothesized that the ease of price comparisons associated with the internet would imply a very tough squeeze on price dispersion. In contrast, a number of studies point to substantial price dispersion also for goods sold online (see for instance Baye, Morgan and Scholten (2004)). Thus while greater transparency and lower search cost reduce price dispersion an important measure of price dispersion remains.

3.2 Transparency and price levels

A closely related question to the above is if average prices are lower when there is greater transparency. The literature just mentioned points to that consumer search matters but there is little focus on transparency per se. To estimate the effects of transparency we would need some variation in time or across markets in the degree of transparency and then trace out the effect on price levels. One potential source of differences in transparency is the share of consumers that have access to online purchases. Brown and Goolsbee (2002) show that increasing internet access in a metropolitan area of the US induces a fall in the prices paid for life insurance. Their findings suggest that the growth of internet has reduced prices for life insurance by 8-15 percent. Similarly, Orlov (2011) relates price dispersion in airline fares to the internet penetration rates across US metropolitan areas for 1997-2003. He finds that higher internet penetration lowers the average price – a finding in line with many of the theoretical models that higher transparency strengthens competition. Perhaps more surprisingly, he also finds that higher internet penetration is associated with greater price dispersion within a given firm in a given location, a possible explanation is that it is easier to offer a wider variety of choices online which allows a greater extent of second and third-degree price discrimination. This highlights that in practice it is easily the case that other aspects of the choice architecture changes as transparency changes – warranting caution before we interpret results as capturing comparative statics with respect to transparency.

The literature that we covered above focuses on the transparency of prices to consumers. It has also been noted that price transparency may raise prices if it makes collusion easier to sustain. The intuition is plain – in a standard oligopolistic repeated game a trigger strategy can sustain collusion. If deviations from the (implicitly) collusive outcome are rapidly spotted by the other firms then the punishment can be swifter and collusion is easier to sustain (see for instance Ivaldi et al (2003) for an overview). A frequently cited empirical examination of a policy to increase transparency in the Danish cement market by Albaek et al (1997) points to

that such effects can be important. The Danish competition authority decided to collect and make public the transaction level prices for concrete in some Danish regions. Following this policy change the average prices in the treated markets increased by 15-20 percent relative to other Danish regions. Facilitating collusion by greater transparency is likely to be most relevant in markets where prices (or discounts) are individualized and confidential. Thus, while it is important to be aware of this possibility, the mechanism is most likely to be important for intermediate inputs rather than for consumer goods markets.² Furthermore it is not clear how this potential link between ease of collusion and transparency translates into market integration issues. With these observations made let us therefore turn to studies of *price dispersion across national markets*. Search costs are typically greater across markets – but so are transport costs and other costs that are possibly associated with trying to take advantage of a lower price in another location.

2.3 Market segmentation along national borders

The standard way to delineate a market is to consider an area within which prices relatively rapidly converge after idiosyncratic shocks. With this as motivation a large literature in international economics tests whether the law of one price (LOP) holds – if prices are equalized across locations for individual goods. Similarly, many test for purchasing power parity (PPP), whether the prices of a basket of goods are the same. In practice it is often hard to observe levels and many tests are therefore performed on the relative versions of LOP and PPP, whether price movements are such that they tend to diminish price differences. Following a depreciation of a country's currency we for instance expect prices to rise faster in that country than in other countries if LOP and PPP are useful guides to price developments.

In short, the evidence on LOP and PPP points to that markets are to an important degree segmented along national borders and that nominal exchange rate changes are an important driver of relative price variability. Deviations from PPP are highly persistent and much evidence points to half-lives of deviations in the order of 3 to 5 years (see for instance Rogoff (1996) and Burstein and Gopinath (2012)). Similarly, more detailed studies of individual prices indicates that relative prices of consumer goods commove closely with the exchange rate (see Gopinath et al (2011)) and furthermore that for many goods there are substantial level differences in prices across countries (see for instance Crucini and Telmer (2012)). A

² There are of course consumer markets that also feature secret prices – see Allen et al (2011) for a study of search costs in the Canadian mortgage market for instance. Mortgage markets are however almost completely segmented along national borders.

number of papers have also examined deviations from LOP within countries and compared with findings observed across countries. The evidence points to that while factors such as distance tend to increase deviations from LOP also within countries, there is a large effect of crossing a border on price deviations (see for instance Parsley and Wei (1996), Engel and Rogers (2001) or Fan and Wei (2006)).

In sum goods markets are to an important degree segmented along national borders. This is perhaps little surprise – many factors that affect costs are determined nationally (sales taxes, wage negotiations at national level, the composition of wholesale suppliers) as well as many factors that affect demand (incomes, tastes for different types of goods). Furthermore, many barriers to taking advantage of lower prices in other locations increase discretely at borders (transacting in a different jurisdiction and possibly in another language and other currency). A concerted effort has been made in the EU to bring down such barriers to market integration – let us briefly analyze the impact of this.

The EU is notable in that there has been a sustained effort to integrate markets – an effort that intensified with the Single European Act of 1986 that aimed to create a single market by 1992 and that also served as one motivation for the EMU that was launched in 1999 with common notes and coins introduced in 2002. There are remarkably few articles that attempt to track price developments in the EU and the impact of EMU on market integration. A notable exception is Faber and Stokman (2009) who examine price level convergence using subcategories of the consumer price index (HICP) for EU countries 1960 to 2002. They find that price level dispersion has shown a trendwise decrease over the period with an especially marked fall during the time of the single market program: late 1980s and early 1990s. Their study points to that harmonization of taxes, convergence in the price of nontraded inputs, exchange rate stability and increased openness all contributed to the fall in price dispersion and associated market integration. There is no stand-out effect of the EMU.

A handful of detailed case studies speak to the effect of EMU on market integration. Goldberg and Verboven (2004) examine European car markets using data up until 2003 that, even though large differences remained there had been a clear trend towards market integration and results point to that the common currency played a significant but still limited role. Méjean and Schwellnus (2009) use French export prices disaggregated to the firm x product x export market level – they find that European integration has had a marked effect on price convergence but find no important effect of EMU by itself. Fischer (2012) examines the

evolution of the prices of washing machines across 17 European countries 1995-2005 and finds no significant price convergence associated with EMU. Imbs et al (2010), finally, consider prices of TV sets across European countries and show that large price differences exist. Their data start in 1999 and thus they are not really able to examine the impact of the introduction of EMU – they note that price differences are smaller within EMU countries but they cannot necessarily attribute them to EMU itself.

Where does this leave us then? The safest conclusion would be that the steps taken to create a single European market have been successful in working towards market integration but that the impact of EMU itself has been limited. If expectations were that price transparency associated with a common currency would create a sharp equating pressure there is clearly little support for that. Against this backdrop let us take a closer look at possible mechanisms that link market integration to price transparency

3. What are the forces that push toward market integration – and how do they interact with price transparency?

Consider two national markets that we initially view as segmented. What are the mechanisms via which they may integrate?

3.1 Consumers may choose to buy in the cheaper location. If we consider a rational consumer she will choose to purchase a good abroad if she travels there anyway and price differences are large, if transport costs are limited, if there are few regulatory constraints and if the quality of the product when purchased abroad is sufficiently high (note that we may for instance include the quality of the salesmanship in the evaluation of the product). We would for instance expect more of a price pressure on products that are cheap to transport in relation to the product value and that differ in relatively few dimensions (are warranties valid in both countries? Are the same technical specifications and brand names used in both locations?) For most product markets and most consumers we believe that direct cross-border shopping of this type is a rather weak constraint on price setting in different national markets. Transport costs are large in relation to the potential savings for many products for a consumer who only buys to satisfy his or her own needs. There are relatively few studies of cross-border shopping – but the ones that are there point to that these standard economic mechanisms are at play. For instance Chandra et al (2012) use detailed data on border crossings from Canada to US to examine the determinants of cross-border shopping. Their regression estimates establish that Canadian households are more likely to travel across the border and purchase goods in the US

the when gas price is low and the exchange rate favorable, if the household has lower income. These are all intuitive effects – the cheaper it is to access (lower) prices abroad the more likely are you to do so. Households with a lower income are more likely to be bargain hunters and take the time to save on purchase price. They further establish that distance has a large negative effect on the decision to travel across the border. Their estimates imply a travel cost of some 30 US dollars per hour of car travel. This implies that savings need to be very substantial before they motivate a household to travel and that cross-border shopping is expected to peter off rather rapidly with distance. Indeed, they note that the median cross-border shopper lives 18 miles from the US border whereas the median Canadian lives 81 miles from the border. Asplund et al (2007) examine the cross-price elasticity of Swedish alcohol demand at the municipal level with respect to prices in Denmark and also establish that effects, while marked close to the border, die off rather quickly with distance. This suggests that for typical consumer goods we only expect cross-border shopping by consumers to be an important price equating mechanism if potential savings are very large or if many consumers live close to the border.

One implication is of course that for big-ticket items the mechanism may play a role. Indeed, a number of European court cases testify to that a) consumers try to take advantage of lower prices abroad and b) producers have in several cases tried to stop them. For example, fines of more than 100 million euro were levied on Nintendo and Volkswagen in court cases revolving around a threat by manufacturers to revoke licences by retailers that sold to foreign customers. In the case of Nintendo game consoles were up to 65 percent cheaper in the UK than in other European countries – a price difference that clearly invited consumers to take advantage of this. Goldberg and Verboven (2004) show that price differences on cars were still substantial in Europe in the early 2000s but also note that there were various exceptions to European competition rules regarding exclusivity of distribution that were not relaxed until 2002 (Brenkers and Verboven (2006) provide an analysis of these rules).

What is the role of price transparency in the decision to cross-border shop? There are two facets to this – one is whether consumer know about prices and assortment in another location and another is if they find the price comparison transparent. The cost associated with the first source of transparency has clearly fallen sharply in the last decade with increased online presence from retailers. The second issue, whether the price comparison is transparent would revolve around issues such as how are international payments charged to the credit card, are there hidden fees and is it difficult to compare prices expressed in different currencies. It is

clear that there is some (small) time cost associated with checking the relevant exchange rate and some (small) mental cost of performing the calculation. The evidence points to that both of these channels are relevant. On the other hand, the time costs of cross-border shopping suggest that they only take on importance in markets where other frictions are low.

The discussion above has focused on goods that have to be purchased in a brick and mortar store abroad. For products that are available online prices are relatively transparent, available at a low search cost, and the consumer can perform the purchase abroad from the comfort of her own home. Even in cases such as this the evidence points to substantial price differences however. Cabolis et al (2007) for instance examine prices of textbooks on the US and UK sites of Amazon in 2002. At the time prices of textbooks produced by commercial publishers were some 50 percent higher in the US than in the UK. Overall they interpret their evidence as pointing to that prices differ because of markup differences. Thus – the transparency associated with having prices available online are not sufficient to equalize prices. One interpretation of this finding is that transport costs and other costs associated with shipping internationally (such as customs, adding of VAT, different delivery systems, differences in returns policy, frequent customer rebates) are large enough to make the purchasing of consumer products from abroad too costly, even if the prices per se are transparent. Boivin et al (2012) examine text books sold in the US and Canada on Barnes & Noble and Amazon. They find that prices are essentially unresponsive to foreign competition and, using sales ranks as a proxy for quantities, that demand is relatively unresponsive to lower foreign prices as well. Why online competition is largely fragmented by the Canada-US border is not clear. One potential clue is that there is evidence that consumers engage in little search, also online. Johnson et al (2004) consider internet search patterns of some 10 000 US households. They find that on average households visit only between 1 and 2 internet sites when they purchase books, compact discs or air travel.

A complicating factor in cross-border purchases on the web is that in many cases the providers try to segment markets by requiring an IP address of certain nationality or a domestic credit card – leading to limited possibility to benefit from transparent prices. We return with a discussion of such tactics by firms. For now we note that there is a dearth of studies examining international price differences of products that are delivered electronically – one such study is by Ng (2012) who examines prices of iTunes gift cards sold on eBay. These gift cards allow for downloading of iTunes content at US prices also for consumers residing outside the US. That gift cards are trading above face value is a clear indication of at

least some consumers trying to benefit from the lower prices (and possibly different assortment) offered in the US iTunes store.

A common difficulty in testing for the law of one price is that goods sold in different locations may differ in many respects, some of which may be hard to observe for a researcher. Differences in warranties, regulations or taxes can create price differences across different jurisdictions even in the face of fully transparent prices. Identifying the relative importance of different frictions is a challenge – but let us here cover some of the papers that have tried to address aspects of this. Asplund and Friberg (2001) note that in some duty-free stores the same good is priced in different currencies. We use data from Scandinavian duty-free stores to examine the role of different currencies in generating price dispersion. Since the goods examined are identical in all respects apart from the currency in which price is set, we are able to isolate this reason for price deviations. We find that prices can differ up to 10 percent before retailers adjust the relative prices. This clearly points to one mechanism whereby a lack of transparency allows price differences. Bachis and Piga (2011) examine online prices of low cost airlines in Europe 2002-2004 and their results point in the same direction – having different currencies greatly increases price dispersion.

Summing up: the evidence points to an important role for the transparency in integrating markets – but only in the rather particular cases where there are few other impediments to benefit from a lower price. Some of those impediments may be endogenous, an issue that we return to below.

3.2 In bargaining markets consumers more information may allow the consumers to bargain for a better price. Most consumer markets are characterized by take-it-or-leave-it prices posted by sellers. In a few markets there may be some amount of bargaining however, car markets being one such case. When there is bargaining, reservation prices are private knowledge but if (foreign) transactions prices are observed low foreign prices can be used as a bargaining chip against the sellers to lower the price. There is some intra-national evidence that this mechanism can play a role. Zettelmayer et al (2006) show that Californian car buyers who use an internet comparison site are able to bargain a price reduction of on average 1.5 percent for their car purchase.

This may be of some importance in business to business negotiations but unlikely to play an important role in a typical consumer market.

3.3 Arbitrageurs may buy in the cheaper location and resell in the dearer. In financial markets this of course is operating at high frequency. In regular goods markets the constraints on such behavior are much tighter and constrained by the need to physically transport and store goods. A further cost to an arbitrageur in a typical goods market is that reselling may be subject to lemons type problems – if I buy a ten new iPads in New York and attempt to resell them in Zurich I’m likely to need to offer a much lower price than the Zurich Apple store in order to sell. Is it counterfeit? Is it really the same specification? How does the warranty work? These, and a host of other concerns, lower the price that an arbitrageur can charge. Contrast this with a financial arbitrageur that purchases stock of a cross-listed firm in the US and sells the same stock in Zurich – she faces no such constraints.

For goods that are covered by trademarks and other forms of intellectual protection only retailers authorized by the trademark holder have the right to sell the product in a particular country. For instance a pharmaceutical product sold in Canada can’t simply be imported into the US and sold by a retailer there. However, in the EU the policy follows what is known as community exhaustion of intellectual property rights – which has allowed parallel importers to ship goods from low price locations in EU to high price locations. For instance parallel importers are buying pharmaceutical products in Greece and reselling them in Sweden. In several cases this has been associated with a substantial impact on prices, see for instance Ganslandt and Maskus (2004) for a case study of parallel imports of medicine in the EU. Some aspects of transparency are likely to matter for parallel imports – in particular uncertainty and a lack of transparency about the legal status of parallel imports may deter arbitrageurs from taking the fixed costs of building up capacity to engage in parallel imports. As regards price transparency itself it is hard to see that it matters to any important degree for third party arbitrageurs however: The literature on search costs imply that the greater the potential gains from searching, the more will agents search and learn about prices. For someone looking to buy large quantities, the potential gains are clearly orders of magnitude greater than for an individual consumer only looking to satisfy her own consumption. It is also clear that the large potential volumes cut the link between the price of an item and cross-border trade. While it may be tempting to travel abroad to save thousands of euros on a car a Swedish consumer will not travel to Poland to purchase a week’s supply of Coke even if it is 40 percent cheaper in Poland. In contrast, an entrepreneur loading a truck full of Coke cans in Poland and reselling to cafés and small restaurants can make a handsome profit and such actions may act as an important constraint on firm pricing policies.

This section has been short but the conclusions are no less important for that. For most goods third party arbitrage is likely to be much more important than cross-border shopping by consumers themselves to take advantage of lower prices abroad. Price transparency is not likely to play an important role for such third party arbitrage.

3.4 Consumer dissatisfaction may limit the possibility for price differences. When investigating the price differences in Scandinavian duty-free in Asplund and Friberg (2001) the managers told us that an important impetus to adjust relative prices were customer complaints rather than consumers choosing to buy in the stronger currency. One of the major ferry lines that we approached to receive a time series of prices in different currencies informed us that old catalogs were “confidential” – also suggesting a concern that consumers may be angered if they learn that they consistently are paying higher prices than some other consumer group. Similarly Boivin et al (2012) points to customer anger as a source of price adjustment in their examination of prices of text books in Canada and US.

An outpouring of research in the last two decades has made it clear that consumers react negatively to behavior that they view as unfair. In a seminal paper Kahneman, Knetsch and Thaler (1998) show that people claim to be upset if retailers raise the price of snow-shovels. Customer anger at firms that are perceived to not be sufficiently altruistic vis-à-vis their customers may lead firms to refrain from pricing practices that otherwise would be profit maximizing. In ultimatum games many respondents are willing to walk away from deals that give them less than 30 percent of the divisions of a cake (Thaler (1998), Henrich (2000)). If we apply such findings to relations between firms and customers they suggest that customers may choose not to buy even if the price is below the reservation price as commonly defined if they believe that the price is unfair. Rotemberg (2011) presents a model of this type where the fear of angering a minority of customers can be sufficient for even a firm that only cares about profit to behave altruistically. Notions of what is seen as fair depend on the social context. Lower prices to students don't seem to anger consumers but a simple thought experiment of a restaurant that asked people to show their passport and then quoted a price suggests that some forms of price discrimination across countries may anger consumers. Here transparency may play a role – if prices are expressed in different currencies, and price comparisons are largely influenced by swings in floating exchange rates even publicly available prices may not trigger a response. If people are not searching for a bargain abroad they will react to price differences only if these price differences are transparent.

If prices are transparent, and price differences are motivated by differences in demand elasticities rather than in costs this may result in customer anger and in such cases transparency will tend to equalize prices. Evidence about fairness concerns are abundant and there is considerable anecdotal evidence that it has been one factor in some price adjustment processes. Beyond this it is hard to know how effective the mechanism can be.

4. Transparency is partly endogenous

As we have seen transparency may have important market integrating effects for big ticket items or for products that are retailed online. The last subject that we would like to raise in relation to this is that transparency, and the ease of arbitrage is endogenous. Consider the case of a differentiated product such as a bicycle sold on two national markets. Making prices available online and having retailers offer international shipments are two choices that one can refrain from, and thus make arbitrage more costly. Furthermore, firms have the choice of using different brand names and different packaging in different locations. Consider a product like Pringles chips that has text on some XX languages and looks the same across all across Europe. An arbitrageur selling to mom-and-pop video stores could charge a price only a little below the local price and still sell. In contrast, if the product was the same but the label only in Polish, the willingness to pay by Swedish consumers would be lower. Only selling in your own wholly controlled retail outlets (such as IKEA, H&M or Zara) takes away the risk that retailers buy from parallel importers. Also rules and regulations can be endogenous. DVDs use different formats in the US and Europe for instance, which allows some degree of price discrimination. If markets were wholly segmented there would clearly be no need for such different formats. Likewise many internet sites only allow you to access some web pages from IP addresses located in a certain country.

There are plenty of examples where firms engage in measures to lower transparency and Ellison and Ellison (2009) examine this theoretically and present evidence that such attempts to decrease transparency played a role in one market for computer parts (see also Ellison and Wolitzky (2012) for further theoretical developments).

There may also be interactions between investments to make price comparisons less transparent and variability of demand. Friberg (2001) notes that the more optimal prices differ between two locations the higher is the value of being able to segment these markets. If a monetary union lowers the possibility of future changes in willingness to pay across markets it could thus lower the incentive to invest in market segmentation. Friberg (2003) further

develops the model to an oligopoly setting – in both cases there is an option value associated with being able to segment markets. Goldberg and Verboven (2004) note that the restrictions on wholesale cross-border trade in cars in Europe were relaxed at about the same time as EMU was implemented. One potential reason is that the perceived need for being able to segment markets was lower when the potential for large exchange rate swings was diminished. The lower price differences among countries that were long part of the D-Mark block are also consistent with such a channel (Anderton et al (2003), Faber and Stokman (2009)).

Conclusions

New information technology and a common currency foster greater transparency. This greater transparency has important market integrating effects – but only if other barriers that separate markets are low and sellers are not able to endogenously create barriers. Overall the market integrating effects of greater transparency associated with new technology and a common currency in Europe has been limited so far.

References

- Aker, Jenny C. (2010) “Information from markets near and far: Mobile phones and agricultural markets in Niger” *American Economic Journal: Applied Economics* 2(3): 46–59.
- Aker, Jenny C. and Isaac M. Mbiti (2010), “Mobile phones and economic development in Africa”, *Journal of Economic Perspectives* 24(3), 207–232.
- Albrecht, James, (2011), “Search Theory: The 2010 Nobel Memorial Prize in Economic Sciences”, *Scandinavian Journal of Economics* 113(2), 237–259.
- Allen, Jason, Robert Clark and Jean-Francois Houde (2012), “Price negotiation in differentiated products markets: Evidence from the Canadian mortgage market”, manuscript, Wharton.
- Anderson, Simon P. and Ginsburgh, Victor A. (1999), “International pricing with costly consumer arbitrage”, *Review of International Economics* 7(1), 126–139.
- Anderton, Robert, Richard E. Baldwin and Daria Taglioni (2003), “The impact of monetary union on trade prices” Working Paper Series 238, European Central Bank.

Asplund, Marcus and Richard Friberg (2001), “The law of one price in Scandinavian duty-free stores”, *American Economic Review* 91(4), 1072-1083.

Asplund, Marcus, Richard Friberg, and Fredrik Wilander (2007) “Demand and distance: Evidence on cross-border shopping”, *Journal of Public Economics* 91 (1-2), 141–157.

Bachis, Enrico and Claudio A. Piga (2011), “Low-cost airlines and online price dispersion”, *International Journal of Industrial Organization* 29, 655-667.

Baye, Michael R., John Morgan and Patrick Scholten (2004), “Price dispersion in the small and in the large: Evidence from an internet price comparison site”, *Journal of Industrial Economics* 52 (4), 463-496.

Boivin, Jean, Robert Clark, and Nicolas Vincent (2012). “Virtual borders: Online nominal rigidities and international market segmentation”, *Journal of International Economics* 86 (2), 327–336.

Bonnet, Céline and Pierre Dubois, (2010) “Inference on vertical contracts between manufacturers and retailers allowing for non linear pricing and resale price maintenance”, *RAND Journal of Economics* 41(1), 139-164.

Brenkers, Randy and Frank Verboven (2006), “Liberalizing a distribution System: the European car market”, *Journal of the European Economic Association* 4(1), 216-251.

Brown, Jeffrey R. and Austan Goolsbee (2002), “Does the internet make markets more competitive? Evidence from the life insurance industry,” *Journal of Political Economy* 110(3), 481-507.

Burstein, Ariel and Gita Gopinath (2012), “International prices and exchange rates”, manuscript in preparation for *Handbook of International Economics Vol IV*, downloaded on Jan 8 2013 from http://www.economics.harvard.edu/faculty/gopinath/files/prices_oct20_2012.pdf

Cabolis, Christos, Sofronis Clerides, Ioannis Ioannou and Daniel Senft (2007), “A textbook example of international price discrimination”, *Economics Letters* 95, 91-95.

Chandra, Ambarash and Mariano Tappata (2011), “Consumer search and dynamic price dispersion: An application to gasoline markets”, *RAND Journal of Economics* 42 (4), 681-704.

Chandra, Ambarish, Head, Keith and Tappata, Mariano, (2012), “The economics of cross-border travel, SSRN Working paper available at <http://ssrn.com/abstract=1722423>

Cournot, Augustin, 1838(1897), “Researches into the Mathematical Principles of the Theory of Wealth.” New York: Macmillan.

Crucini, Mario J. and Christopher I. Telmer (2012), “Microeconomic Sources of Real Exchange Rate Variability” NBER Working Paper No. 17978.

Dahlby, Bev and Douglas S. West (1986), “Price dispersion in an automobile insurance market”, *Journal of Political Economy* 94, 418-438.

Davis, Peter and Eliana Garces (2010), “Quantitative Techniques for Competition and Antitrust Analysis”, Princeton University Press: Princeton N.J..

Ellison, Glenn and Sara Fisher Ellison (2009), “Search, obfuscation, and price elasticities on the internet”, *Econometrica* 77(2), 427-452.

Ellison, Glenn and Alexander Wolitzky (2012), “A search cost model of obfuscation”, *RAND Journal of Economics*, forthcoming

Engel, Charles and John R. Rogers (2001), “Violating the law of one price: Should we make a Federal case out of it?”, *Journal of Money, Credit and Banking* 33 (1), 1-15.

Fan, C. Simon and Xiangdon Wei (2006), “The law of one price: Evidence from the transitional economy of China”, *Review of Economics and Statistics* 88 (4), 682-697.

Fischer, Cristoph (2012), “Price convergence in the EMU? Evidence from micro data”, *European Economic Review* 56, 757-776.

Friberg, Richard (2001), “Two monies, two markets?: Variability and the option to segment,” *Journal of International Economics* 55(2), 317-327.

Friberg, Richard (2003), “Common currency, common market?,” *Journal of the European Economic Association* 1(2-3), 650-661.

Ganslandt, Mattias and Keith Maskus (2004), “The price impact of parallel imports in pharmaceuticals: Evidence from the European Union”, *Journal of Health Economics* 23(5), 1035-57.

Goldberg, Penelopi K. and Frank Verboven (2004), “Cross-country price dispersion and the Euro”, *Economic Policy* 19, 484-521.

Gopinath, Gita, Pierre-Olivier Gourinchas, Chang-Tai Hsieh and Nick Li (2011), “International prices, costs and markup differences”, *American Economic Review* 101(6), 2450-86.

Henrich, Joseph (2000), “Does Culture Matter in Economic Behavior? Ultimatum Game Bargaining among the Machiguenga of the Peruvian Amazon,” *American Economic Review* 90(4), 973-979.

Imbs, Jean M., Haroon Mumtaz, Morten O. Ravn and H el ene Rey (2010), “One TV, one price?”, *Scandinavian Journal of Economics* 112 (4), 753-781.

Ivaldi, Marc, Bruno Jullien, Patrick Rey, Paul Seabright, and Jean Tirole (2003) “The economics of tacit collusion”, report for the European Commission, downloaded Jan 7, 2013 http://ec.europa.eu/competition/mergers/studies_reports/the_economics_of_tacit_collusion_en.pdf

Jensen, Robert T. (2007), “The digital divide: Information (technology), market performance and welfare in the South Indian fisheries sector”, *Quarterly Journal of Economics* 122(3): 879–924.

Johnson, Eric J., Wendy W. Moe, Peter S. Fader, Steven Bellman and Gerald L. Lohse (2004), “On the depth and dynamics of online search behavior”, *Management Science* 50(3), 299-308.

Kahneman, Daniel, Jack Knetsch and Richard Thaler (1986). “Fairness as a constraint on profit: Seeking entitlements in the market.” *American Economic Review* 76, 728-741.

Lester, Benjamin (2011), “Information and prices with capacity constraints”, *American Economic Review* 101(4), 1591-1600.

Malueg, David A. and Marius Schwartz (1994), “Parallel imports, demand dispersion, and international price discrimination”, *Journal of International Economics* 37(3–4), 167–195.

M ejean, Isabelle and Cyrille Schwellnus (2009), “Price convergence in the European Union: Within firms or composition of firms?”, *Journal of International Economics* 78, 1-10.

Ng, Chen Feng (2012), “Arbitrage across borders: Why iTunes gift cards sell above face value on eBay”, *Economic Inquiry*, forthcoming.

Orlov, Eugene (2011), “How does the internet influence price dispersion? Evidence from the airline industry.” *Journal of Industrial Economics* 49 (1), 21-37.

Parsley, David and Shang-Jin Wei (1996), “Convergence to the law of one price without trade barriers or currency fluctuations”, *Quarterly Journal of Economics* 111(4), 1211-1236.

Rogoff, Kenneth (1996), “The purchasing power parity puzzle”, *Journal of Economic Literature* 34, 647-668.

Rotemberg, Julio J. (2011), “Fair pricing”, *Journal of the European Economic Association* 9(5).

Sorensen, Alan T (2000), “Equilibrium price dispersion in retail markets for prescription drugs”, *Journal of Political Economy* 108(4), 833-850.

Thaler, Richard H. (1988), “Anomalies: The Ultimatum Game”, *Journal of Economic Perspectives* 2(4), 195-206.

Zettelmeyer, Florian, Fiona Scott Morton and Jorge Silva-Risso (2006), “How the internet lowers prices: Evidence from matched survey and automobile transaction data”, *Journal of Marketing Research* 43(2),168-181.