A SSNIP test for two-sided markets: some theoretical considerations

Lapo Filistrucchi
Tilburg University & Università di Siena

Preliminary and Incomplete.
Comments welcome!
Please do not quote

Abstract

I discuss the design and implementation of a SSNIP test in order to identify the relevant market in a two-sided market. I argue that in such a market the traditional SSNIP test cannot be applied as it is usually conceived but rather should be modified in order to take into account indirect network externalities. I discuss the issues of which price the hypothetical monopolist should be thought of as raising, of whether we should look at profits changes on only one side or on both sides of the market and of which feedback among the two sides of the market we should take into account. In doing so I suggest a distinction between two types of two-sided markets: a) the "payment card type" (where there is a transaction between the two end-consumers of the payment card service, e.g. a cardholder buys a good from a shop) and b) the "media type" (where the transaction is not present or unobservable, e.g. a reader reads an ad). The paper fills a gap in the economic literature, so much more as market definition in two-sided markets is at the centre of many recent competition policy and regulation cases around the world.

JEL codes: L40, L50, K20

Keywords: two-sided markets, SSNIP test, market definition, payment cards, media markets

1 – Introduction

In most economic models the relevant market is simply assumed. In practice however it is of great importance for any antitrust case. A wrong definition of the relevant market might for instance lead the antitrust authority or the courts to blocking a welfare enhancing merger or to allowing a welfare detrimental one. Also, in case of appeal the recognition of a wrong market definition is sufficient for the courts to reject the whole analysis and rule in favour of the parties irrespective of any other argument brought up by the antitrust authority. Market definition is therefore the founding stone on which an antitrust case is built.

The "small significant non-transitory increase in price test" (SSNIP test) is a conceptual tool used to define the relevant market. In a standard market, the SSNIP test is implemented by first simulating a price increase by a hypothetical monopolist which owns just one product and, as long as that leads to estimated losses in profits, progressively increasing the number of products owned by the monopolist. When profits are not estimated to decline following a small but significant increase in price by the hypothetical monopolist, the set of products owned by the monopolist in the last simulation constitutes the relevant market.

Many recent competition policy cases, such as the announced merger between the two main Dutch flower auction houses, Bloemenveiling Aalsmeer and FloraHolland or the cleared merger between the London Stock-Exchange and the Milan Stock Exchange, all call for both theoretical and empirical guidance on the design and implementation of a SSNIP test in two-sided markets. A correct product market definition in two-sided markets was also crucial in many recent competition policy or regulatory cases in the payment cards market, such as that on tying between debit and the credit cards in the US and those on interchange fees in Australia and in the EU, whereas a correct geographic market definition is relevant for the implementation of the Single European Payment Area (S.E.P.A.) for retail payments.

I discuss the design and implementation of a SSNIP test in order to identify the relevant market in a two-sided market. In such a market the traditional SSNIP test cannot be applied as it is usually conceived. That is because a firm in a two-sided market sells two products or services to two distinct group of consumers and recognises that the demand from one type of consumers depends on the demand from the other type of consumers and vice versa, but consumers on the two-sides of the market do not internalise these indirect network effects. Since there is a link between demands

on the two sides of the market, the profit function of a hypothetical monopolist who raises the price in a significant non-transitory way on one-side of the market is linked to the profit in the other market and the question arises of which feedbacks between the profits on the two-sides of the market should be considered. Moreover, since in a two-sided market the profits of the hypothetical monopolist are determined by both the price level (roughly, the sum of the prices paid by the two sides) and the price structure (roughly, the ratio of the prices paid by the two-sides), it is not a priori clear whether the hypothetical monopolist should be thought of as raising a) the price level while optimally adjusting the price structure b) both prices together keeping fixed the price structure c) each of the two prices separately.

I try and address these questions. Additionally I argue for a distinction between two types of two-sided markets: a) the "payment card type" (where there is a transaction between the two consumer groups, e.g. a cardholder buys a good from a shop) and the "media type" (where the transaction is not present or unobservable, e.g. a reader reads an ad or a reader is influenced by an ad). In any case the presence of such a transaction is crucial for the development of the econometric model in as much as such a transaction and the prices charged for it to the two-sides are observed by the econometrician.

The paper proceeds as follows. Section 2 presents the relevant economic literature. Section 3 reviews the usual design and implementation of the SSNIP test in a single-sided market. Section 4 proposes a SSNIP test for two-sided markets and discusses the implementation on the two types of two-sided markets identified above. Section 5 concludes and presents plans for future research.

2 – The literature

Following the seminal works by Parker and Van Alstyne (2002), Rochet & Tirole (2002, 2003,2006) and Armstrong (2006), a growing number of papers have dealt with theoretical aspects of two-sided markets, e.g. Caillaud & Jullien(2003), Anderson & Gabszewicz (2005) and Guthrie & Wright(2007). Some of them, such as Evans(2003), Wright(2004) and Evans & Schmalensee (2005), have focused on competition policy in two-sided markets. They have pointed out for instance that, unlike the price level, due to the presence of indirect network externalities, the efficient price structure does not reflect the ratio of marginal costs on the two sides of the market and, more generally, that increased competition does not necessarily lead to a more balanced price structure nor to a more efficient one. Only very recently, Rochet & Tirole (2007), in the context of

the payment cards market, have tried to give operational content to the idea that "merchants are forced to take cards" through the proposal of a "tourist test" (asking whether the merchant would want to refuse a card payment when a non-repeat customer with enough cash in her pocket is about to pay at the cash register) and have analyzed its relevance as an indicator of excessive interchange fees. Most other policy contributions so far, except Emch & Thomson (2006) and Evans & Noel (2005a), have mainly criticized the application of standard competition policy results to two-sided markets rather then suggesting alternative ones and, from the practical point of view, they argued against existing practice rather than providing new methods to practitioners.
This is unfortunately even more true for empirical work, with the exception of Argentesi & Filistrucchi (2007), who propose a structural econometric model to test for collusion among the four main national daily newspapers of general interest in Italy and conclude that in the period under consideration they have been colluding on the cover price but not on the advertising one. Most of other scarce empirical work concentrates on testing for the presence of the indirect network effects, e.g. Rysman (2004, 2007) and Kaiser & Wright(2006).

More specifically, despite the rich literature on two-sided markets, only a few papers have dealt with market definition in two-sided markets, and in no way conclusively. Argentesi & Ivaldi (2005) discuss the issue in the context of the media market. Their paper however mainly argues for the need to take into account indirect network externalities in order to get unbiased estimates of the own and cross price elasticities of demand. They then present supporting results from a simple econometric exercise on a dataset of French newspapers in order to support their claim. Evans & Noel (2005a) argue for the need to take into account feedbacks between the two sides of the markets due to demand externalities and point to the difficulties arising in market definition when two-sided platforms compete with standard firms on one side of the market. They do not however propose general rules for the implementation of the SSNIP test in two-sided markets. Evans & Noel (2005b) propose a way to extend the Critical Loss Analysis, an alternative to the SSNIP test, to two-sided platforms and derive formulas for its implementation. Emch & Thomson (2006) discuss the design of a SSNIP test in the payment cards market and propose to apply the SSNIP test to the total price charged by the hypothetical monopolist while letting relative prices on the two sides of the market adjust optimally. Their paper however neither discusses the case of other markets nor deals with the empirical implementation of the test. Moreover, it considers only transaction fees and not adoption fees. Most recently, Holland (2007) just highlights the need not to apply acritically the standard SSNIP test , while Carlton(2007) simply claims that market definition in two-sided

markets is more difficult than in the usual single-sided markets because of the uncertainty on the choice of the price the hypothetical monopolist should raise.

3 – The traditional SSNIP test

In a potential market with three possible products J=1,2,3, assuming an ideal situation where all relevant own and cross price elasticities of demand among these products have been estimated, the question arises of identifying a threshold on elasticites for substitution to be relevant enough to include two products in the same market.

The issue is solved applying the "small significant non-transitory increase in price test" (SSNIP test). In a standard market, the SSNIP test is implemented by first simulating a price increase by an hypothetical monopolist which owns just one product and, as long as that leads to estimated losses in profits, progressively increasing the number of products owned by the monopolist. When profits are not estimated to decline following a small but significant increase in price by the hypothetical monopolist, the set of products owned by the monopolist in the last simulation constitutes the relevant market.

The basic idea behind the SSNIP test is therefore that substitution among two products is enough to include them in the same market if an hypothetical monopolist would find it unprofitable to raise the price of one product in a small significant non-transitory way, the small significant price change being usually 5% in the EU or 5-10% in the US and non-transitory meaning usually 1 year.[1]

The SSNIP test as a new method for defining markets was first introduced in 1982 in the U.S. Department of Justice Merger Guidelines introduced. In the EU it was used for the first time in the Nestlé/Perrier case in 1992 and has been officially recognised by the European Commission in its Commission's Notice for the Definition of the Relevant Market in 1997.

Mathematically, if the hypothetical firm is a monopolist over production of good 1, its profits are:

$$\Pi = P_1 \; Q_1(P_1) - C(Q_1) \qquad (1)$$

[1] There is a well-known problem in the application of the SSNIP test even to a single-sided market when it comes to choosing the strating price level for the price increase, in that in the presence of collusion or monopoly any price increase above the current level is likely to be unprofitable, leading to a wider market definition and therefore to a finding of no (joint) dominance. Itt is the so-called "cellophane fallacy" from the Du Pont case in , see Motta (2001) and Bishop & Walker (1999). We abstract here from this problem.

Then

$$P_1 \uparrow \Rightarrow Q_1 \downarrow \left(\text{and } C(Q_1) \downarrow\right)$$

$$\Downarrow$$

$$\Pi \quad = \quad ?$$

If $\Pi \uparrow$ or $\Pi =$, then there is not enough substitution towards other goods, so that the relevant market includes only good 1. (Note that necessary but not sufficient conditions for $\Pi \uparrow$ or $\Pi =$ are that respectively $P_1 \; Q_1(P_1) \uparrow$ or $P_1 \; Q_1(P_1) =$ CHECK ASSUMPTIONS ON COSTS)

If $\Pi \downarrow$, then there is enough substitution towards other good , so that the relevant market should also include good 2 (or good 3). (Note that a sufficient but not necessary condition for $\Pi \uparrow$ or $\Pi =$ is that respectively $P_1 \; Q_1(P_1) \downarrow$ CHECK ASSUMPTIONS ON COSTS)

In the latter case, a second step is necessary, in which the hypothetical firm is assumed to be a monopolist over production of both good 1 and good 2 (or good 3), so that its profits are:

$$\Pi = P_1 \; Q_1(P_1, P_2) + P_2 \; Q_1(P_1, P_2) - C(Q_1, Q_2) \tag{2}$$

Then

$$P_1 \uparrow \Rightarrow Q_1 \downarrow \text{ and } Q_2 \uparrow \left(\text{and } C(Q_1, Q_2)?\right)$$

$\Downarrow$

Π = ?

If $\Pi\uparrow$ or $\Pi=$, then there is not enough substitution towards other goods, so that the relevant market includes only good 1 and good 2 (or good 3). (Note that necessary but not sufficient conditions for $\Pi\uparrow$ or $\Pi=$ are that respectively $P_1\ Q_1(P_1,P_2)+P_2\ Q_1(P_1,P_2)\uparrow$ or $P_1\ Q_1(P_1,P_2)+P_2\ Q_1(P_1,P_2)=$ CHECK USUAL ASSUMPTIONS ON COSTS)

If $\Pi\downarrow$, then there is enough substitution towards other goods, so that the relevant market should also include good 3 (or good 2). (Note that a sufficient but not necessary condition for $\Pi\uparrow$ or $\Pi=$ is that $P_1\ Q_1(P_1,P_2)+P_2\ Q_1(P_1,P_2)\downarrow$ CHECK USUAL ASSUMPTIONS ON COSTS)

Therefore, in the first step, to check what happens to Π as $P_1\uparrow$, one should check the sign of

$$\frac{\partial\Pi}{\partial P_1}=\frac{\partial(P_1 * Q_1(P_1)-C_1(Q_1(P_1)))}{\partial P_1}=Q_1(P_1)+P_1*\frac{\partial Q_1(P_1)}{\partial P_1}-\frac{\partial C_1(Q_1(P_1))}{\partial Q_1}\frac{\partial Q_1(P_1)}{\partial P_1}$$

which is equivalent to

$$\frac{\partial\Pi}{\partial P_1}=1+\frac{\left(P_1-\frac{\partial C_1(Q_1(P_1))}{\partial Q_1}\right)}{P_1}\frac{\partial Q_1(P_1)}{\partial P_1}\frac{P_1}{Q_1}$$

and therefore to

$$\frac{\partial\Pi}{\partial P_1}=1+\frac{\left(P_1-\frac{\partial C_1(Q_1(P_1))}{\partial Q_1}\right)}{P_1}\varepsilon_{P_1}^{Q_1} \qquad (3)$$

or to

$$\frac{\partial \Pi}{\partial P_1} = 1 + \frac{P_1}{Q_1} * \frac{\partial Q_1(P_1)}{\partial P_1} - \frac{\partial C_1(Q_1(P_1))}{\partial Q_1} \frac{Q_1}{C_1} \frac{C_1}{P_1 Q_1} \frac{\partial Q_1(P_1)}{\partial P_1} \frac{P_1}{Q_1}$$

and therefore to

$$\frac{\partial \Pi}{\partial P_1} = 1 + \varepsilon_{P_1}^{Q_1} (1 - \varepsilon_{Q_1}^{C_1} \frac{C_1}{P_1 Q_1}) \tag{4}$$

As a result, to check what happens to Π as $P_1 \uparrow$, one should estimate the elasticity of demand with respect to price and the elasticity of costs with respect to quantity plus the ratio of costs to revenues (as in equation (4)) or the elasticity of demand with respect to price plus the markup (as in equation (3)). WHAT IF NO COSTS?

In a second step instead, one should check the sign of

$$\frac{\partial \Pi}{\partial P_1} = \frac{\partial (P_1 * Q_1(P_1, P_2) + P_2 * Q_2(P_1, P_2) - C(Q_1(P_1, P_2), Q_2(P_1, P_2)))}{\partial P_1} =$$

$$= Q_1 + P_1 * \frac{\partial Q_1(P_1, P_2)}{\partial P_1} + P_2 * \frac{\partial Q_2(P_1, P_2)}{\partial P_1} - \frac{\partial C(Q_1(P_1, P_2), Q_2(P_1, P_2)))}{\partial Q_1} \frac{\partial Q_1(P_1, P_2)}{\partial P_1}$$

$$- \frac{\partial C(Q_1(P_1, P_2), Q_2(P_1, P_2)))}{\partial Q_2} \frac{\partial Q_2(P_1, P_2)}{\partial P_1}$$

which is equivalent to

$$\frac{\partial \Pi}{\partial P_1} = 1 + \frac{\left(P_1 - \frac{\partial C(Q_1(P_1, P_2), Q_2(P_1, P_2))}{\partial Q_1} \right)}{P_1} \frac{\partial Q_1(P_1, P_2)}{\partial P_1} \frac{P_1}{Q_1}$$

$$+ \frac{\left(P_2 - \frac{\partial C(Q_1(P_1, P_2), Q_2(P_1, P_2))}{\partial Q_2} \right)}{P_2} \frac{\partial Q_2(P_1, P_2)}{\partial P_1} \frac{P_1}{Q_2} \frac{P_2 Q_2}{P_1 Q_1}$$

and therefore to

$$\frac{\partial \Pi}{\partial P_1} = 1 + \frac{\left(P_1 - \frac{\partial C(Q_1(P_1,P_2),Q_2(P_1,P_2))}{\partial Q_1} \right)}{P_1} \varepsilon_{P_1}^{Q_1} + \frac{\left(P_2 - \frac{\partial C(Q_1(P_1,P_2),Q_2(P_1,P_2))}{\partial Q_2} \right)}{P_2} \varepsilon_{P_1}^{Q_2} \frac{P_2 Q_2}{P_1 Q_1} \quad (5)$$

or to

$$\begin{aligned} \frac{\partial \Pi}{\partial P_1} = 1 &+ \frac{P_1}{Q_1} * \frac{\partial Q_1(P_1,P_2)}{\partial P_1} + \frac{\partial Q_2(P_1,P_2)}{\partial P_1} \frac{P_1}{Q_2} \frac{P_2 Q_2}{P_1 Q_1} \\ &- \frac{\partial C(Q_1(P_1,P_2),Q_2(P_1,P_2)))}{\partial Q_1} \frac{Q_1}{C} \frac{C}{P_1 Q_1} \frac{\partial Q_1(P_1,P_2)}{\partial P_1} \frac{P_1}{Q_1} \\ &- \frac{\partial C(Q_1(P_1,P_2),Q_2(P_1,P_2)))}{\partial Q_2} \frac{Q_2}{C} \frac{\partial Q_2(P_1,P_2)}{\partial P_1} \frac{P_1}{Q_2} \frac{C}{P_1 Q_1} \end{aligned}$$

and therefore to

$$\frac{\partial \Pi}{\partial P_1} = 1 + \varepsilon_{P_1}^{Q_1} + \varepsilon_{P_1}^{Q_2} \frac{P_2 Q_2}{P_1 Q_1} - \varepsilon_{Q_1}^{C_1} \varepsilon_{P_1}^{Q_1} \frac{C}{P_1 Q_1} - \varepsilon_{Q_2}^{C_1} \varepsilon_{P_2}^{Q_1} \frac{C}{P_1 Q_1} \quad (6)$$

Thus, to check what happens to Π as $P_1 \uparrow$, one should estimate the own and cross elasticities of demand with respect to price and the elasticities of costs with respect to quantities plus the ratio of costs to revenues (as in equation (6)) and the ratio of revenues to revenues or the own and cross elasticities of demand with respect to price plus the markups and the ratio of revenues to revenues (as in equation (5)). WHAT IF NO COSTS? NOW EVEN JOINT COSTS NECESSARY. AND WHAT IF ONLY NO COSTS FOR ONE GOOD?

In practice, usually the analysis proceeds as follows:

- first, the critical elasticity of demand is calculated; this is the value of elasticity of demand necessary to leave profits unchanged following a small significant price increase and is equal to $\left| \dddot{\varepsilon}_{P_1}^{Q_1} \right| = \frac{1}{m+x}$, where m is the pre-merger price cost margin and x is the minimum price increase considered significant, i.e. usually 5% EXPLAIN RELATION WITH EQUATION (3)
- second, the elasticity of demand is estimated
- third, the estimated elasticity of demand is compared to the critical elasticity of demand; if firm's own elasticity of demand is less than critical elasticity, then a small significant price

increase would be profitable and the market is defined; otherwise, the market is assumed to contain also another product and the analysis is repeated

An alternative method to applying the SSNIP test where demand elasticities cannot be estimated, is the Critical Loss Analysis (CLA). The critical loss is defined as the maximum sales loss that could be sustained as a result of the price increase without making the price increase unprofitable. Where the likely loss of sales to the hypothetical monopolist is less than the Critical Loss, then a 5% price increase would be profitable and the market is defined.

In practice:

first, the critical loss in sales is calculated; this is the value of defined as the maximum loss in sales resulting from a price increase that would still make the price increase profitable and is equal to $L = \frac{x}{m+x}$, where m is the pre merger price cost margin and x is the minimum price increase considered significant, i.e. usually 5% EXPLAIN RELATION WITH EQUATION (3)

- second, the loss in sales following a significant price increase is estimated
- third, the estimated loss is compared with the critical loss; if the likely loss of sales is less than the critical loss, then a small significant price increase would be profitable and the market is defined; otherwise, the market is assumed to contain also another product and the analysis is repeated

Correctly estimating the own and cross price elasticities and the availability of costs data or estimates of them is therefore both necessary and sufficient for the implementation of the SSNIP test in a single-sided market. The same is not true of a two-sided market where estimation of indirect network effects between demands on the two-sides of the market is also necessary.

4 - A SSNIP test in two-sided market

When discussing the extension of the SSNIP test to a two-sided market, two main issues arise which make the analysis more complex than in the standard case discussed above:

a) given that in a two-sided market there are indirect network externalities, should we take into account also (all?) feedbacks from one side of the market to the other? should we look at what happens to profits on only one side or on both sides of the market? how do we deal with products which are competing on one-side of the market but not on the other-side?

c) given that in a two sided market the hypothetical monopolist sets (at least) two prices, which price should he be thought of as raising?

In a two-sided market one can distinguish the price level (the sum of the two prices)

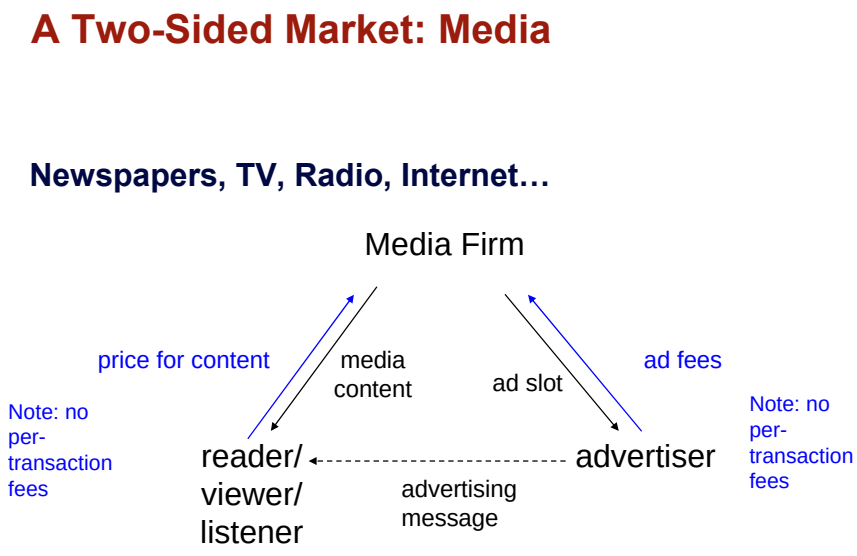
b) the price structure (the ratio of the two prices)

In particular, with regard to b), note that in a two-sided market one can distinguish the price level (the sum of the two prices) from the price structure (the ratio of the two prices). Should then the hypothetical monopolist be thought of as raising:

- both prices together keeping fixed the price structure?
- first one of the two prices keeping the other fixed and then the other price keeping the first fixed?
- first one of the two prices and then the other price, each time adjusting optimally the price structure?
- the price level adjusting optimally the price structure?

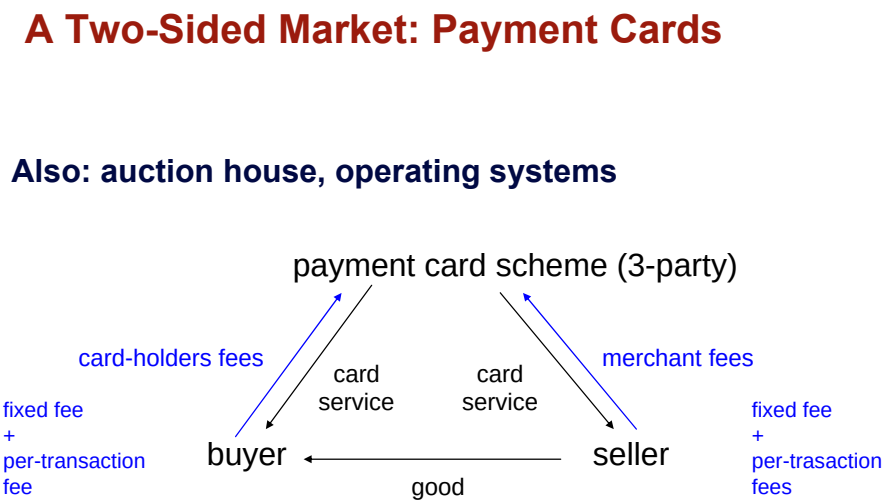
I believe that answering the questions as the ones above requires first a distinction between two types of two-sided markets: a) the "payment card type", where there is a transaction between the two consumer groups (e.g. a cardholder buys a good from a shop) and the "media type", where the transaction is not present or unobservable (e.g. a reader reads an ad or a reader is influenced by an ad). Loosely speaking, one could say that a transaction is present in a usage model such as the one of Rochet & Tirole (2006) and is instead absent in the membership model of Armstrong (2006). This two-types of market are quite different from a practical point of view, but

Figure 1



Note that in a two-sided market of the "media type" in the presence of multi-homing a product can be in the relevant market on one-side but not on the other, e.g. TV might be a substitute for newspapers for an advertiser (as he just cares to reach his potential consumers) but not for a reader/viewer (as for instance a person can/likes to read his newspaper on the metro on his way to work and can/likes to watch TV at home in the evening). The same is not true in a "payment card" market, e.g. a card is either in the relavnt market on both sides (if a transaction takes place) or not.

Figure 2



With regard to which price the hypothetical monopolist should be thought of as raising:

- If the hypothetical monopolist were to raise both prices together keeping fixed the price structure, although it would seem a natural extension of the one-market case to a two-markets one, it does appear to me evident how one could interpret the test in terms of "enough substitution" in the light of the original idea behind the SSNIP test.

- If instead the hypothetical monopolist were to raise first one of the two prices keeping fixed the other and then the second price keeping fixed the first, the extension of the test to two-sided markets might be easy to interpret in terms of "enough substitution", but the issue arises in the "media type" markets of how to make sure the market definition on on-side is consistent with the one used to define the market on the other side (see figure 5). In addition, it is not evident why the hypothetical monopolist should not be allowed to adjust optimally the price structure. If the benchmark to decide when "substitution is enough" in a single-sided market is "what would happen to profits of an

hypothetical monopolist" there is no reason why the latter should not be the benchmark also in a two-sided market. Finally, designing the test without allowing the hypothetical monopolist to optimally adjust the price structure in a two-sided market with two positive indirect demand externalities would lead to a too wide market definition if, as argued below, all feedbacks between the two-sides of the market were to be taken into account.

- If the hypothetical monopolist raises the price level adjusting optimally the price structure, the SSNIP test would appear to bear the same relationship with checking market power that it has in a single-sided market, but differently from a two-sided market it would not be easily interpretable in terms of "enough substitution". What's more, although it could be easily done in a two-sided market where a transaction is present, it is a bit ambiguous in a market without an (observable) transaction as one then faces the issue of how to calculate the price level, given that the two prices refer to two different goods. One would ideally want an extension of the SSNIP test to two-sided markets which, despite differences in the practical implementation, is the same for all types of two-sided markets.
- If instead the hypothetical monopolist were to raise first one of the two prices and then the other price, each time adjusting optimally the price structure, although the issue arises in the "media type" markets of how to make sure the market definition on on-side is consistent with the one used to define the market on the other side (see figure 5), the extension of the test to two-sided markets would be easy to interpret in terms of "enough substitution" and would allow to keep the benchmark of "what would happen to profits of an hypothetical monopolist" to decide when "substitution is enough", as in a single-sided market. Finally, designing the test in this way would mitigate the otherwise unjustified worries of antitrust authorities that in a two-sided market with two positive indirect demand externalities considering all feedbacks would lead to a very wide market, as allowing the hypothetical monopolist to adjust optimally the price structure would tend to increase the profitability of the price rise.

Given the discussion above, the extension of the SSNIP test to a two-sided market should be done by first raising one of the two prices and then the other price, each time adjusting optimally the price structure.

Therefore in a two-sided market, the proposed SSNIP test should run mathematically as follows.

In a two-sided market with three possible products J=1,2,3 on each side m=A,B of the market, if the hypothetical firm is a monopolist over production of good 1, its profits in an adoption model are:

$$\Pi = F_1^A \, N_1^A(F_1^A, N_1^B) + F_1^B N_1^B(F_1^B, N_1^A) - C(N^A, N^B)$$

Then

$$If \quad \begin{matrix} N^b = N^b(F^b, N^s) \\ N^s = N^s(N^b, F^s) \end{matrix} \Rightarrow \begin{matrix} N^b = n^b(F^b, F^s) \\ N^s = n^s(F^b, F^s) \end{matrix}, \text{ then}$$

$$\Pi = F_1^b \, n_1^b(F_1^b, F_1^s) + F_1^s n_1^s(F_1^b, F_1^s) - C(n_1^b(F_1^b, F_1^s), n_1^s(F_1^b, F_1^s))$$

So that

$$\frac{F^b - c^b}{F^b} = \frac{1}{\left|\varepsilon_{F^b}^{n^b}\right|} - \left(\frac{F^s - c^s}{F^s}\right)\left|\varepsilon_{F^b}^{n^s}\right| \frac{F^s n^s}{F^b n^b} \frac{1}{\left|\varepsilon_{F^b}^{n^b}\right|}$$

$$\frac{F^s - c^s}{F^s} = \frac{1}{\left|\varepsilon_{F^s}^{n^s}\right|} - \left(\frac{F^b - c^b}{F^b}\right)\left|\varepsilon_{F^s}^{n^b}\right| \frac{F^b n^b}{F^s n^s} \frac{1}{\left|\varepsilon_{F^s}^{n^s}\right|}$$

$$\frac{F^b - c^b}{F^b} + \frac{F^s - c^s}{F^s} \frac{n^s}{n^b} = \ldots$$

$$\left(F^b - c^b\right) + \left(F^s - c^s\right) \frac{n^s}{n^b} = \ldots$$

Solving

$$\frac{F^b - c^b}{F^b} = \frac{1}{\left|\varepsilon_{F^b}^{n^b}\right|} \left(\frac{\left|\varepsilon_{F^s}^{n^s}\right| \left|\varepsilon_{F^b}^{n^b}\right| F^b n^b - \left|\varepsilon_{F^b}^{n^s}\right| \left|\varepsilon_{F^b}^{n^b}\right| F^s n^s}{\left|\varepsilon_{F^s}^{n^s}\right| \left|\varepsilon_{F^b}^{n^b}\right| F^b n^b - \left|\varepsilon_{F^b}^{n^s}\right| \left|\varepsilon_{F^s}^{n^b}\right| F^b n^b} \right)$$

$$\frac{F^s - c^s}{F^s} = \frac{1}{\left|\varepsilon_{F^s}^{n^s}\right|} \left(\frac{\left|\varepsilon_{F^b}^{n^b}\right| \left|\varepsilon_{F^s}^{n^s}\right| F^s n^s - \left|\varepsilon_{F^s}^{n^b}\right| \left|\varepsilon_{F^s}^{n^s}\right| F^b n^b}{\left|\varepsilon_{F^b}^{n^b}\right| \left|\varepsilon_{F^s}^{n^s}\right| F^s n^s - \left|\varepsilon_{F^b}^{n^s}\right| \left|\varepsilon_{F^s}^{n^b}\right| F^s n^s} \right)$$

[…]

In a two-sided market with three possible products J=1,2,3 on each side m=A,B of the market, if the hypothetical firm is a monopolist over production of good 1, its profits in a usage model are:

$$\Pi = (p^b + p^s - c) \, T(p^b, p^s)$$

So that

$$\frac{p^s + p^b - c}{p^s} = \frac{1}{\left|\varepsilon^T_{p^s}\right|}$$

$$\frac{p^s + p^b - c}{p^b} = \frac{1}{\left|\varepsilon^T_{p^b}\right|}$$

$$\frac{p^s + p^b - c}{p^s + p^b} = \frac{1}{\left|\varepsilon^T_{p^s} + \varepsilon^T_{p^b}\right|}$$

Note that the profit maximizing price level $p^*=p^b+p^s$ is determined by the total elasticity of transactions. The price structure p^b/p^s is then determined by maximising the number of transactions given p*

$$\max_{p^b, p^s} T(p^b, p^s)$$

s.t.

$$p^* = p^b + p^s$$

[…]

Having costs data or estimates of them and correctly estimating not only the own and cross price elasticities of demand but also the indirect network effects is therefore both necessary and sufficient for the implementation of the SSNIP test in atwo-sided market.

With regard to the questions of which feedbacks between the two-sides of the market should be taken into account and of whether we should look at what happens to profits on only one side or on both sides of the market, keeping in mind that the SSNIP test should aim at establishing whether there is "enough substitution", we should look at what happens to profits changes on all sides of the market and take into account all feedbacks (see figure 3 and 4). The antitrust authorities worries that in a two-sided market with two positive indirect demand externalities, considering all feedbacks would lead to a much wider market definition than single-sided market is unjustified as the point is exactly that the market is two-sided and should be treated as such. One should stress that there would be no feedback effect if there were not initial substitution effect in the market were the price has been increased (see figure 3 and 4). What's more, the issue arises only in an adoption model, not in a usage one, as in the usage model the feedback are already included inside the elasticities of the number of transactions with respect to the price changes, the number of transactions depending on the two prices in some way determined by a kind of bargaining process between the seller and the buyer.

With regard to the issue of how to deal with products which are competing on one-side of the market but not on the other-side, one should take into account all potential feedbacks (see figure 5). As argued above, in a "media type" market it is perfectly possible that a media is present on one side of the market but not on the other.

Figure 3

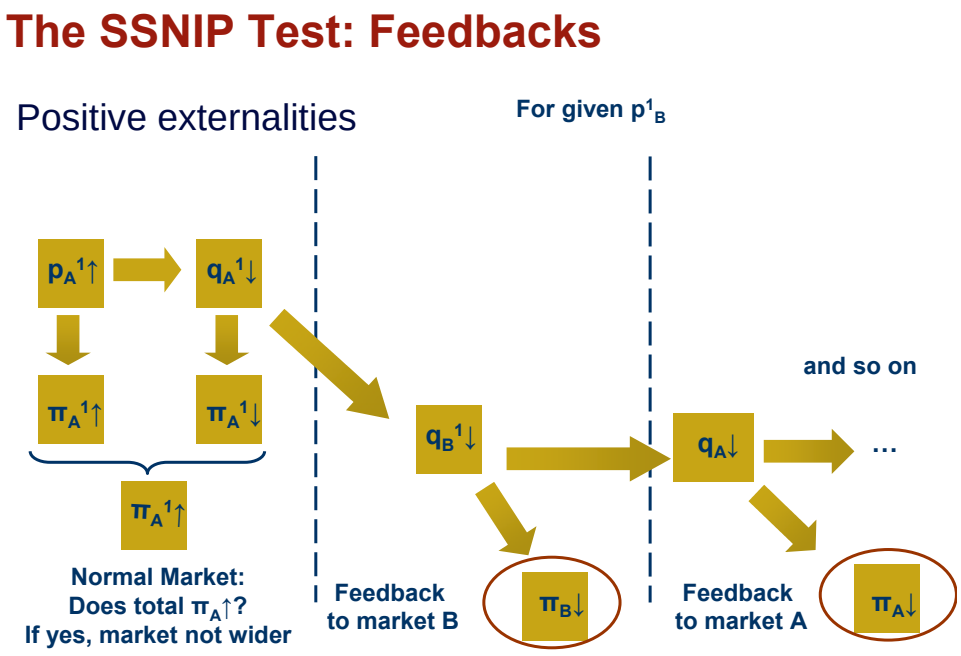


Figure 4

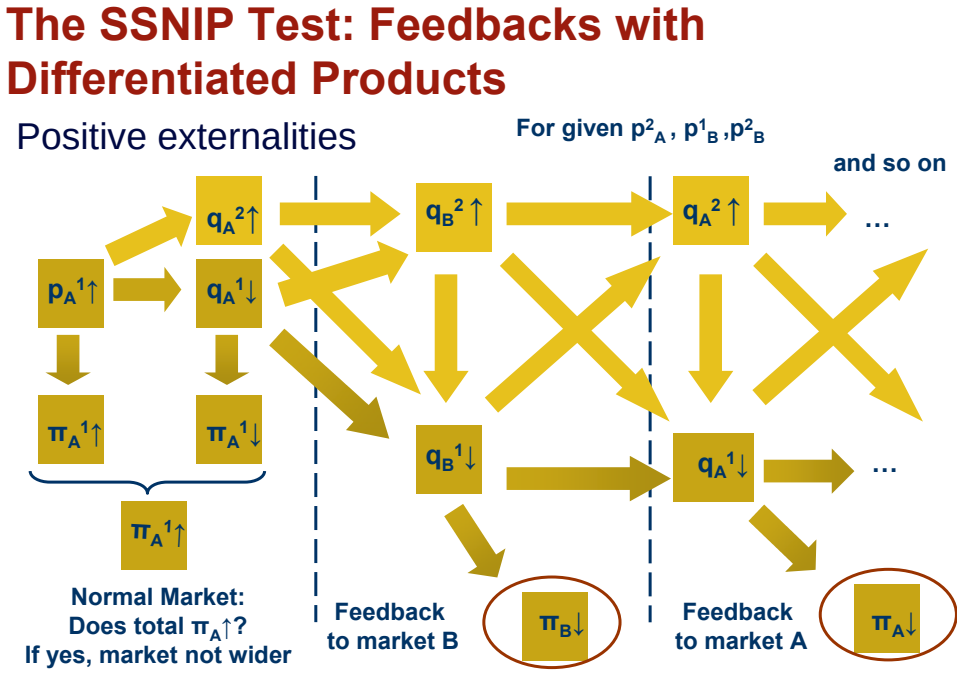
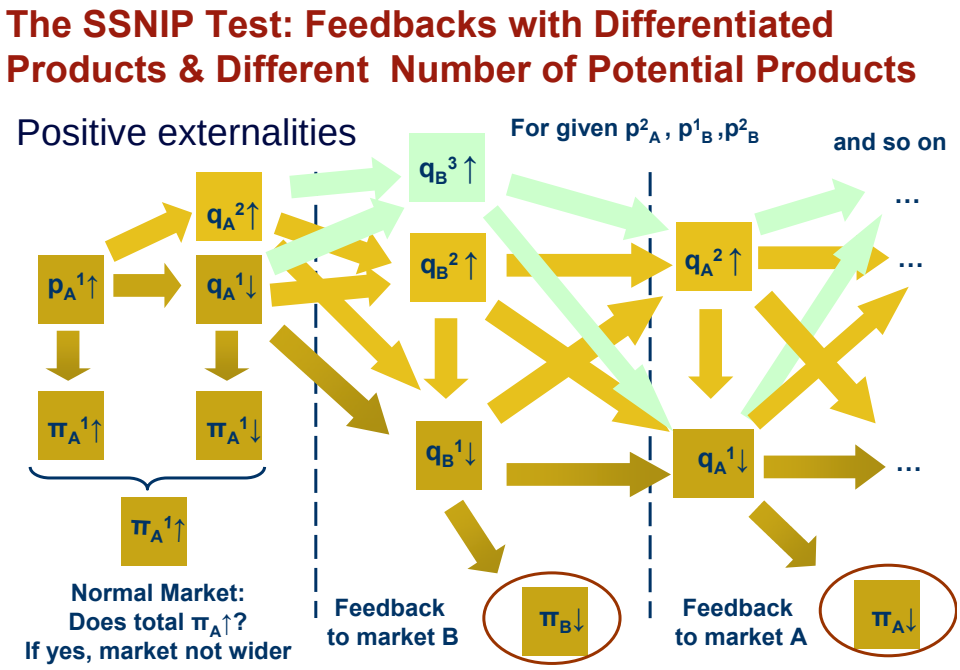


Figure 5



5 – Conclusions

I discussed the design and implementation of a SSNIP test for market definition in two-sided markets. I argued that in such a market the traditional SSNIP test cannot be applied as it is usually conceived. I proposed a SSNIP test for two-sided markets and suggested a distinction in the implementation between two types of two-sided markets: a) the "payment card type" and b) the "media type".

The SSNIP test in a two-sided market should take into account changes in profits on both sides of the market and all feedbacks between profits on the two sides of the market following the hypothetical monopolist raise in prices. In addition it should be implemented by raising first the price on one side of the market then the price on the other side of the market, each time allowing the hypothetical monopolist to optimally adjust the price structure.

The antitrust authorities worries that in a two-sided market with two positive indirect demand externalities, such a test would lead to a much wider market definition than single-sided market, is unjustified as the point is exactly that the market is two-sided market and should be treated as such.

Two extensions of the paper are planned in which the proposed SSNIP test for two-sided markets is applied to the daily newspaper industry in Italy and to the flower auction house market in the Netherlands.

The dataset on daily newspapers in Italy contains, on one side, monthly observations on circulation, cover prices and content characteristics of 7 daily newspapers in Italy for 31 years and, on the other side, monthly observations on advertising quantity, prices and readers characteristics on those same newspapers for 16 years (market level data). The paper will test empirically whether the traditional classification of newspapers into general interest, financial and sport, originally devised by the Italian Federation of Newspapers Publishers (F.I.E.G.) and used by the Italian Antitrust Authority is valid according to economic theory.

The dataset on flower auction houses in the Netherlands contains instead observations on auction house characteristics, transaction characteristics, buyer's characteristics, buyer's fees, seller's characteristics and seller's fees. The paper will test empirically whether the geographic market definition should include only the Netherlands or should be a wider one.

A good preliminary version of the former paper should be available by the spring. Data for the second paper are still being collected.

References

- Argentesi E, Filistrucchi L. 2007. Estimating Market Power in a Two-Sided Market: The Case of Newspapers. The Journal of Applied Econometrics (forthcoming).
- Argentesi E, Ivaldi M. 2005. Market Definition in Printed Media Industries: Theory, Practice, CEPR Discussion Paper n°5096.
- Armstrong M. 2006. Competition in Two-Sided Markets. Rand Journal of Economics,37(3):668-691.
- Bishop S, Walker M. (1999): The Economics of EC Competition Law. Sweet and Maxwell.
- Caillaud B, Jullien B. Chicken and Egg: Competition among Intermediation Service Providers. Rand Journal of Economics 34(2): 521-552.
- Carlton DW. 2007. Market Definition: Use and Abuse. Competition Policy International. Vol 3(1)
- Evans DS, Noel MD. 2005a. Analyzing Market Definition and Power in Multi-sided Platform Markets, mimeo.
- Evans DS, Noel MD. 2005b. Defining Antitrust Markets When Firms Operate Two-Sided Platforms. Columbia Business Law Review, 667-702
- Evans DS, Schmalensee R. 2005a. The industrial Organization of Markets with Two-Sided Platforms, NBER Working Paper 11603.
- Evans DS. 2003. The Antitrust Economics of Multi-Sided Platform Markets. Yale Journal of Regulation 20: 325-381.
- Guthrie G, Wright J. 2007. Competing Payment Schemes, Journal of Industrial Economics, 2007, 55, 37-67.
- Holland M. 2007, Two-Sided Markets: A Challenge to Competition Policy?, mimeo.
- Ivaldi M, Lorincz S. 2005. A Full Equilibrium Relevant Market Test: Application to Computer Servers, IDEI Working Paper n. 341.
- Ivaldi M, Lorincz S. 2007. Implementing Relevant Market Tests in Antitrust Policy: Application to Computer Servers, mimeo.
- Kaiser U, Wright J. 2006. Price Structure in Two-Sided Markets: Evidence from the Magazine Industry. International Journal of Industrial Organization 24, 1– 28
- Parker GG, & Van Alstyne MV. 2002. Two-Sided Network Effects: A Theory of Information Product Design, Management Science, 51(10):1494–1504

- Rochet, JC, Tirole J. 2002. Cooperation among Competitors: The Economics of Payment Card Associations, Rand Journal of Economics, 33(4), 1-22.
- Rochet JC, Tirole J. 2003. Platform Competition in Two-Sided Markets. Journal of the European Economic Association 1(4): 990-1029.
- Rochet JC,Tirole J.2006. Two-Sided Markets: A Progress Report. Rand Journal of Economics, 37(3):645-667.
- Rochet JC, Tirole J. 2007. Must-Take Cards and the Tourist Test," DNB Working Papers 127.
- Rysman M. 2004. Competition Between Networks: A Study of the Market for Yellow Pages. Review of Economic Studies 71(2): 483-512.
- Rysman M. 2007. An Empirical Analysis of Payment Card Usage. Boston University, Journal of Industrial Economics, 55, 1-36.
- Wright J. 2004a. One-Sided Logic in Two-Sided Markets, Review of Network Economics, 1(3):42-63.
- Wright J. 2004b. The Determinants of Optimal Interchange Fees in Payment Systems, Journal of Industrial Economics. Vol. 52(1), 1-26.