Cluster Markets: What They Are and How To Test For Them

by

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Introduction

Although markets are usually defined in terms of opportunities for demand and supply-side substitution, there are numerous instances in which competition centres on the sale of packages of items which are economically distinct but in some sense complementary. Subject to certain conditions being met, the package involved can be viewed as constituting the relevant market, which is then conventionally referred to as a "cluster market".

The "cluster market" approach was first used in a 1963 U.S. banking case, and has since been extensively applied in the U.S., primarily in anti-trust cases involving the financial services and health care industries. Despite its extensive use, however, the approach has attracted relatively little attention from researchers[1], and the appropriate tests to be applied remain uncertain. The more analytical approach to market definition which, in recent years, has influenced substitutability-oriented tests seems to have had relatively little impact in this area, with the result that the case law relies on a heterogeneous mix of criteria in determining whether goods (the term being taken here to include services) do or do not fall into a cluster market.

This note addresses the issues involved in defining cluster markets and illustrates these issues through a discussion of market definition in telecommunications. The structure of the note is as follows. Following these introductory remarks, section 2 sets out the concept of a cluster market and derives tests for demand-side clusters. Section 3 applies these tests to international telecommunications. Section 4 concludes.

[1] The main exception being Ayres "Rationalizing Cluster Markets" 95 Yale L. J. 109 (1985). This note differs from Ayres in setting out specific tests for identifying demand-side clusters.

The concept

A cluster market arises when the economies of scope are such as to require firms to compete not on individual items but rather on a set of items taken jointly. These economies may operate at a range of levels: in production, with joint production (say, of wool and lamb) being an extreme case; in distribution, as in the optimal assortment of goods sold in retail stores; and in consumption, as in the likelihood of consumers purchasing razors and blades from the same supplier. Examples of clusters (which are merely provided as illustrations and may be controversial in specific instances) include aggregates such as "in-patient services", which reflects the economies of scope hospitals can derive from providing a full set of the relevant medical equipment, staff and services; "transactions banking services", which groups together the range of functions for which a branch network is required; and "grocery stores", which will generally have a core assortment of frequently-purchased "convenience" goods.

Thus, to say that good A and good B form a cluster is to imply that a firm selling only A or only B would not be able to compete with one selling both A and B -- either because the supply cost of producing A and B jointly is substantially below that of producing them separately, and/or because consumers incur additional costs when they purchase A and B separately as against purchasing them jointly. This, in turn, implies that a cartel which -- out of an initially competitive market -- grouped all the firms which jointly produced A and B, but excluded those which produced only A or B, could profitably increase the joint price of A and B, and hold that price above the competitive level for so long as entry into full-line supply did not occur. It is consequently the cluster of A and B which meets the "ideal collusive group" test that underpins modern approaches to market definition.

Demand-side clusters

It is tempting, but misleading, to view cluster markets in terms of functional complementarity. In fact, such complementarity is neither a necessary nor a sufficient condition for a cluster market to be defined. Thus, cars and petrol are undoubtedly functional complements but there is no sense in which suppliers compete in a joint market for "cars and petrol". Rather, cluster markets arise when unbundled supply is

impossible or (more usually) uncompetitive because of economies of scope which may arise in either demand or supply.

While the factors which give rise to economies of scope in production are relatively well understood, somewhat less attention has been paid to economies of scope in demand. As noted above, these economies are at work when consumers realise savings from aggregating their consumption into a package. The items comprised in the package must be such that, at least in principle, they could be purchased separately; however, the transactions costs this would impose must be sufficient to make joint purchasing prevalent. Another way of saying this is to say that consumers would face a higher cost in switching some part of their consumption among competing suppliers than they would in switching the entirety of that consumption. When this kind of switching cost (which I will refer to as the cost of unbundling) is substantial, consumers, in choosing a vendor, will focus on the price of the cluster as a whole, rather than on that of its components.

It is useful to illustrate this using an example in which the obstacles consumers face to unbundling are absolute. Thus, assume all razors were designed in such a way that they could only be used with proprietary blades. In this case, consumers could not combine a razor bought from one supplier with less expensive blades produced by another. As a result:

1. Single element price differentials among vendors would be irrelevant, since consumer costs would ultimately depend on charges for the system as a whole. Informed, rational consumers, in selecting among suppliers, would act on the basis of "razor-plus-blades" prices, rather than on the basis of the price of blades or of razors alone (it obviously being a matter of debate whether consumers can in fact be assumed to act in this way).

2. Even in a strongly competitive market with informed, rational consumers, the charge for each element in a particular vendor's razor-plus-blades cluster could durably and significantly depart from marginal cost, so long as the overall consumer cost of the cluster remained close to the cost of supplying its components jointly.

3. A cartel, formed out of such a strongly competitive market, but which only covered one of the two components (say, razors) would be unworkable: firms would cut the price of the excluded item (blades) until the joint price was back to the competitive level.

It is consequently apparent that the relevant market would be the system as a whole, rather than its component parts.

In most instances, however, the issue is not absolute feasibility but convenience: that is, consumers could unbundle the cluster (buying some part from one supplier, and the rest from others) but would incur some additional transactions cost in doing so. In this case, the margins over cost charged on any element by a producer in a strongly competitive market will be bounded by the extent of these additional costs.

The relevant costs can take a number of forms:

1. Using a supplier may entail a fixed cost (for example, the cost of transport to a store). As a result, per-unit transactions costs will be minimised if all purchases are made from one supplier (and conversely, will be greatest when purchases are spread over many sources). In some instances, the fixed cost may have a once-off nature, as with the charges involved in establishing an account; in others, it may be periodic, as in instances where some minimum number of transactions must be carried out each month.

2. Alternatively, transactions costs may be variable either with the number of units or the size of the bill. For example, loyalty rebates, such as those offered under frequent flyer programs, create a gap between the average price per transactions and the price of the marginal transaction. When a consumer patronises an airline other than that he or she normally uses, that consumer incurs a variable cost consisting of the frequent flyer benefits foregone.

3. There may be a trade-off between the fixed and variable costs of unbundling -- a consumer might, for example, establish frequent flyer accounts with several airlines (incurring a fixed cost) so as to reduce the variable costs involved in spreading his or her custom among airlines.

Identifying the extent and nature of the costs involved in unbundling is a first, crucial, step in establishing that a collection of goods forms a cluster market.

Necessary and sufficient conditions

While unbundling costs are a necessary condition for a demand-side cluster, they are not sufficient to ensure that such a cluster exists. Three points can be made in this regard.

First, whether these costs have an effect on the pattern of competition will depend on their extent relative to the extent of consumption. Presumably, consumers would at least consider incurring an inconvenience valued at (say) $10 a month if their monthly outlays were several orders of magnitude greater than that amount. Conversely, consumers expecting to spend only a few dollars could not be expected to incur a fixed charge of $10 for so doing.

This rather obvious point has the important implication that the impact of unbundling costs will be sensitive to the distribution of outlays among consumers. In effect, if the bulk of consumption is accounted for by a relatively small number of consumers, and these consumers' outlays are high relative to reasonable estimates of the relevant costs which unbundling entails, then competition will occur on an unbundled basis. Whether the smaller consumers are or are not protected by the willingness to unbundle of the larger poses issues no different from those which arise from market segmentation generally, with the outcome presumably depending on the ability of suppliers to profitably price discriminate.

Second, the extent to which the costs of unbundling affect the pattern of competition will also depend on the degree to which demand for the items being bundled really is correlated. As a practical matter, consumers, faced with component parts which are available separately, are unlikely to focus on the price of the cluster as a whole if their consumption is largely of one part of the cluster rather than the others. For example:

1. It may be that consumers have a preference for buying bread and cheese from the same vendor; but if there are some consumers who buy large amounts of bread and very little cheese, it is the price of bread which (in the absence of unusual elasticities) will mainly determine their purchasing decisions among competing suppliers.

2. Moreover, the prospect of making even a small gain by buying bread from a specialist supplier may well induce at least these consumers to unbundle their purchases.

3. As a result, a supplier of "bread and cheese" will not be able to durably charge these customers more than the stand-alone price of bread.

4. If these "bread intensive" consumers account for a very high share of demand for bread, then the average price of bread, even when it is generally supplied as part of a cluster, will likely be constrained by competition in the stand-alone supply of bread, rather than by that in the supply of the cluster as a whole.

Third, again as a practical matter, patterns of rivalry will be affected by salient differences in consumer attitudes to, and perceptions of, the distinct items involved. These can, in particular, accentuate the consequences of differences between consumers in the extent of demand for the individual items.

Thus, continuing the previous example, if "bread intensive" consumers have relatively low incomes and are highly aware of the price of bread, while "cheese intensive" consumers are mainly interested in product quality and variety, it seems unlikely that suppliers' strategies would centre on a "bread and cheese" cluster. Equally, if the growth rate of demand for bread is very different from that for cheese, and consumers have switching costs as between suppliers (so that supplier profits tomorrow depend on market shares today), then suppliers may have very strong incentives to gain current market share in the more rapidly growing product. In this case too, the likelihood will be that competitive strategies will differentiate the two items. Whether these differences are so marked as to form distinct markets, or whether they merely define segments within a cluster market, may well be a matter of some controversy.

Empirical tests

In practice, it is frequently difficult to measure the costs of unbundling; as a result, the extent of these costs cannot be readily or accurately compared with the pattern of outlays. In these circumstances, it is obviously useful to examine customer surveys and marketing information more generally, and to analyse actual patterns of consumer behaviour -- for example, in terms of the determinants of changes in market share.

While this is standard stuff of market definition, a more specific relative price test can be proposed for claims that two products form a cluster. This test (which is easily generalised to the N-product case) is as follows:

two products form a cluster only if (1) holding the relative price (as between competing suppliers) of one of these products constant, as well as (2) holding constant the other determinants of demand, (3) a reduction in a supplier's relative price for the other product in the cluster increases that supplier's share of sales of the product whose relative price has not varied.

This test is readily illustrated. Assume, for example, that the claim is that the distribution of bread and cheese forms a cluster -- that is, that consumers have a strong preference for purchasing bread and cheese from the same retail outlet. Then consumers will choose among competing stores on the basis of the cluster price for "bread and cheese". As a result, a shop which cut its price for bread relative to rivals, and left its price for cheese unchanged, could expect to increase its share of sales not only of bread but also of cheese.

In short, taken from the demand side, a set of economically distinct items should be viewed as forming a cluster market only if it can be shown that:

1. Unbundling of consumption imposes identifiable costs on consumers;

2. These costs are substantial relative to the level of outlays on the cluster of the consumers accounting for a large share of consumption;

3. Demand for the items comprised in the bundle is correlated among consumers;

4. The items are broadly similar in terms of the factors which generally shape firms' marketing strategies; and

5. Suppliers' market shares for each item in the cluster respond to the prices they charge for the other items.

A case study

The case which will be used to illustrate these concepts is that of international telecommunications, and in particular of International Direct Dial service (henceforth referred to as IDD). The specific question to be analysed is whether IDD is in a cluster market with domestic telecommunications services. Since my intention here is merely to

illustrate the approach adopted, I will limit the analysis to the supply of services to residential consumers. (These consumers account for some two-thirds of demand for IDD service).

Supply-side factors

In examining this question, I will take the following as given:

1. The provision of international services makes significant use of physical and contractual assets which are specialised to those services. As a result, a supplier of both domestic and international services could not meet an increase in demand for its international services by diverting the capacity it used to provide services domestically. Hence, these services are not close substitutes in supply to their domestic counterparts.

2. While there are some economies of scope between domestic and international services, these economies are not sufficient to infer that the two services are effectively linked on the supply side in such a way as to require them to be viewed as an integrated system.

The discussion will therefore focus on whether demand-side considerations are sufficient to warrant IDD and the domestic services being grouped into a cluster market.

The relevant issues

The questions of fact involved in determining whether domestic and international telecommunications services fall into a single cluster are:

- whether the consumers being considered do or do not face obstacles to purchasing these services from distinct suppliers, as against obtaining them from a single vendor;

- even if they do face such obstacles, whether patterns of demand for each of these items are such that any obstacles to unbundling are likely to have material effects.

The overall outcomes of this analysis can then be summarised by analysing the behaviour of market shares and of prices.

Costs of unbundling

Almost all residential consumers rely on Telstra for access lines and local service. "Unbundling" in this context therefore refers to a decision by a consumer to purchase other services -- STD and IDD -- from a supplier other than Telstra. A further unbundling decision is involved in deciding whether to obtain STD service from one supplier, and IDD service from another. Finally, a consumer could obtain some of each of these services from more than one supplier. Five types of transactions costs can affect this decision.

1. While Telstra can charge for a full set of services through a single bill, a customer shifting to say, Optus, for long distance service would be billed both by Telstra (for rental and local calls) and by Optus (for long distance calls). It might be thought that having to handle additional bills imposes some inconvenience, although it may also provide the consumer with greater float. To the extent to which there is such an inconvenience, it would seem to be in the nature of a periodic fixed cost.

2. A customer choosing to use Optus will generally "pre-select" Optus for his or her long-distance calling, thereby ensuring that long-distance calls dialled from that customer's access line will automatically be sent to Optus. Actually completing the pre-selection procedures may involve some inconvenience -- a "hassle" factor -- which is largely in the nature of a once-off cost. Customers can avoid these costs by simply staying with (or defaulting to) Telstra.

3. A customer pre-selected to Telstra or Optus can direct a call to another carrier by dialling an access code. This is generally referred to as "over-ride" and is the only means by which a customer could use (say) Optus for STD calls on a preselected basis while placing IDD calls with Telstra (through over-ride). Dialling the additional four digits required to over-ride presumably imposes some inconvenience and hence constitutes a cost of unbundling. These costs are a variable cost which varies with the number of calls.

4. Customers cannot yet pre-select non-carrier Service Providers. As a result, to use these Service Providers for STD or IDD, a customer must incur the inconvenience of dialling an over-ride code. Additionally, some Service Providers require the customer to dial a

PIN code, increasing the inconvenience involved. Here too, the costs are a variable cost which varies with the number of calls.

5. Because carriers and service providers offer volume discounts, a customer splitting his or her traffic between suppliers could forego some discount eligibility. This too is a variable cost, but it will depend on the extent of the volume discounts (the slope of the outlay schedule in a non-linear tariff) and on the pattern of consumption.

Material effect of unbundling costs

For the reasons discussed above, the impact of unbundling costs will depend on the pattern of demand. Three elements of this pattern need to be examined: the concentration of demand; the correlation of STD and IDD demand; and whether there are characteristics of STD and IDD demand which are likely to lead suppliers to market these services differently. Also important is the extent of the disincentives to unbundling which may arise from volume discount schemes.

The concentration of demand

Residential demand for STD and IDD demand is highly concentrated. Thus, the Gini coefficient for combined STD and IDD outlays is around .7. This is high compared both to the distribution of household income (the Gini coefficient of equivalent net family among individuals in Australia is around .3, that of gross family income among families around .4), and to the patterns of demand found for most items which are widely purchased by households.

These high levels of concentration imply that a relatively small number of consumers account for the bulk of outlays. Taking those consumers (starting from the largest) who in aggregate account for 90 per cent of combined STD and IDD demand, the median consumer in this group has a combined level of outlays on these services more than 10 times greater than the median consumer in the (numerically far larger) group which accounts for the remaining 10 per cent of IDD outlays. As a result, it is reasonable to suppose that the consumers who account for the bulk of demand have a high enough level of outlays (1) to face strong incentives to "shop around"; and (2) to absorb some inconvenience cost associated with unbundling long-distance demand from demand for access and local service. It can consequently be taken as given (at least at this stage of the inquiry) that the consumers accounting for the bulk of combined STD

and IDD revenues will be willing to separate outlays on these services from those on access and local calls.

Correlation of demand

The issue then is the extent to which these consumers are likely to take their supply decisions on the basis of charges for a combined package of STD and IDD, or whether they are likely to decide primarily on the basis of charges for one of these services alone. Two elements are important in this respect.

First, IDD demand is extremely highly concentrated, with a Gini coefficient of just under .9. Taking the very small fraction of consumers (starting from the largest) who in aggregate account for 80 per cent of IDD demand, the median consumer in this group has a combined level of outlays on IDD service more than 20 times greater than the median consumer in the much larger group accounting for the remaining 20 per cent of total IDD outlays. Moreover, the "high IDD outlay" consumers typically spend over twice as much on all services combined as the average household, with a much higher proportion of their expenditure being on IDD calls.

Second, these "high IDD outlay" consumers make few STD calls. Thus, the consumers in this group account for just over 10 per cent of STD revenues -- as against 80 per cent of IDD revenues. Indeed, there is a striking lack of correlation between IDD and STD expenditures among high-outlay residential consumers -- a one per cent increase in STD outlays among the largest consumers being associated, at a high level of statistical significance, with a 0.2 per cent decrease in outlays on IDD.

This pattern substantially undermines the relevance of the "cluster price" to purchasing decisions. Small disparities between suppliers in IDD prices will have a large effect on high IDD outlay consumers but virtually no impact on other consumers; by the same token, small differences in STD prices will have a large effect on high STD outlay consumers but virtually no impact on consumers of IDD.

This, in turn, implies that even if the high IDD outlay customers did seek to source all of their long distance services from a single supplier, it seems very likely that their choice of suppliers would be primarily affected by the prices on offer for international service, rather than by those for other services.

Significant demand characteristics

The effects of these demand patterns on the structure of rivalry are likely to be accentuated by significant differences between the IDD and STD services in terms of market growth and more generally, consumer behaviour.

IDD demand has grown more than twice as quickly as STD demand. Although some easing of growth rates has occurred, there are good grounds for expecting continued rapid expansion of IDD demand. As a result, suppliers have incentives to invest relatively heavily in brand image and market share for the IDD service, notably on streams (such as those to Asia) likely to experience particularly strong growth. They are consequently likely to separately target IDD consumers in their marketing strategies.

At the same time, IDD consumers appear to be especially aware of service prices, and relatively highly responsive to them. Several forces are at work.

From an analytical point of view, price awareness will generally depend on the incentives consumers have to monitor prices and on the ease or difficulty of doing so. Generally, the greater an item's weight in a consumer's consumption basket, the greater will be the incentive that consumer has to bear the largely fixed costs involved in monitoring price trends. At the same time, consumers are more likely to be aware of prices which are easy to understand than they are of prices structured in complex ways. Finally, the pattern of price changes in a market may itself influence price awareness: evidence from many markets suggests that frequent, well-publicised, price movements, although they may also confuse consumers, do give prices greater visibility than they would have in more stable environments.

Each of these factors contributes to consumer responsiveness to prices for international services.

To begin with, as has been shown above, demand for international services is concentrated among a relatively small number of consumers, each spending heavily on international services (but with relatively low outlays on other services). This means that the typical purchaser of IDD has substantial incentives to monitor the prices on offer in the international market.

Second, the consumers accounting for the bulk of IDD sales tend to make relatively stable, repeated use of the international service. Their demand is, in other words, recurrent and predictable, giving information about price greater value than it would otherwise have.

Third, price awareness is accentuated by the demographic features of demand. Migrants account for a large share of residential demand for IDD. Reflecting this, market studies show that many of the residential consumers with high outlays on IDD calls currently have, or in the near past have had, relatively low incomes. Given that charges for IDD calls have traditionally been high, these consumers have been keenly aware of the possible cost of calls and have treated IDD calling as a considered purchase -- that is, one in which price plays a significant role.

Fourth, prices for international services, and notably for IDD, are relatively easy for consumers to understand. By and large, consumers of international services tend to communicate with only one or two foreign destinations. Charges for international services are generally defined and advertised in the form of prices to particular destinations (for example, "a three minute call to Hong Kong") and although they do vary by time of day, the peak/off-peak distinction is relatively simple. As a result, charges are readily recognisable to the consumers whose calling concentrates on any particular place. In contrast, consumer price awareness for STD is somewhat undermined by the kilometric structure of charging bands, the more complex system of time-dependent charges and the diffuse nature of consumer calling patterns.

Fifth, IDD has been subject to relatively frequent promotions and more generally, price changes, with the result that IDD pricing has especially great visibility to consumers. Thus, the share of service revenues generated during "specials" (temporary promotions) has been consistently greater for IDD than for other services. With specials being heavily advertised, promotional activity is likely to have a major influence in reinforcing consumer price awareness.

Given these factors, it is not surprising that "high outlay" consumers of IDD are especially well aware of IDD prices. Combined with the high growth rate of the market, this makes it all the more likely that IDD prices will be the object of fairly strong rivalry in their own right.

The effect of volume discounts

While the material reviewed above suggests that the IDD and STD services are likely to form separate spheres of competitive activity, it might be thought that the volume discounts offered by the carriers will ensure that consumers treat the purchase of these two services as joint. Two consequences would follow:

1. Consumers would select a carrier on the basis of a cluster price, determined by the volume discount on the two services combined, rather than on the basis of the individual charges.

2. Consumers would be reluctant to split their consumption so as not to reduce the volume discounts they could secure.

The extent of these effects will depend on the extent of the volume discounts relative to the pattern of consumption. Two points can be made in this respect.

First, in practice, the volume discounts available to high IDD outlay consumers are largely determined by their expenditures on IDD. This is because outlays on STD account for so low a share of their long-distance expenditures. As a result, the discounts are best viewed as altering the effective price of IDD; and it is by this means, rather than through a notional cluster price, that they appear to affect customer's choice of supplier.

Second, again in practice, the volume discounts built into Telstra's residential Flexiplans are now relatively small.

The relevant issue here is the gap between average and marginal prices -- that is, the difference, to the consumer, between the (per-unit) average charge for calls and the charge for the marginal call (which may be negative in schemes where discounts depend on threshold levels of outlay). This difference corresponds to the slope of the outlay schedule under the discount plan.

In practice, this slope will vary on a customer-by-customer basis, depending not only on the total bill but also on the structure of each customer's consumption, notably in terms of the mix of services consumed. These consumption basket effects can be significant when a customer has access to a range of discount plans, more or less tailored to different average levels and structure of outlays. Given these effects, Flexiplan prices (both average and marginal) need to be analysed with

respect to a broad range of individual consumption baskets, with the results then being used to estimate the aggregate form of the outlay schedule.

This analysis, based on a large sample of customer records, shows that the gap between average and marginal prices in Telstra's Flexiplans has virtually disappeared. In contrast, the volume discounts built into the charges posted by Optus and by non-carrier Service Providers remain substantial. As a result, for Telstra's IDD customers, but not those of its rivals:

1. Effective cluster prices do not differ significantly from the disaggregated prices for IDD and STD taken separately, so that it is in terms of these prices that competition occurs; and

2. Splitting STD and/or IDD purchases does not impose a material penalty.

The behaviour of prices and market shares

The material reviewed suggests that it would be inappropriate to treat IDD as grouped in a cluster market with the STD service. Rather, given that material, one would expect purchase decisions for IDD to be made on the basis of IDD prices, and not on the basis of prices for the "IDD and STD" cluster.

This proposition can be tested by examining the determinants of suppliers' IDD market shares. If the services were, in fact, grouped in a cluster, IDD market share should, holding all other things constant, respond to relative STD prices. The appropriate test is consequently whether there is a statistically significant loss in information associated with dropping an STD price term from an IDD market share equation.

The price series used to implement this test take account of volume discounts by calculating average prices across a fixed (time invariant) range of consumption baskets:

1. The prices are average prices in that they reflect the average per-unit charge in each basket; marginal charges can differ from these average charges. One would expect the average charges to affect pre-selection decisions; the gap between marginal and average charges can be expected to affect the use of over-ride.

2. Charges are calculated on the assumption that consumers choose the volume discount scheme which minimises their outlays.

3. As a base-weighted index, the series will somewhat understate the effective fall in prices.

The appropriate specification of the market share series should reflect the fact that competition is a relatively new phenomenon in the market, and that consumer awareness of competitive options will be rising over time. As a result, the equation used is based on a generalised logistic model of the form:

IDD share == b1/(1+exp(b2*IDDpr + b3*STDpr).

The independent variables are prices measured in terms of the Telstra-Optus price differential. Maximum likelihood estimates of the parameters clearly indicate (1) that IDD market shares respond relatively strongly to relative Telstra-Optus relative IDD prices; and (2) that the hypothesis that the coefficient on the STD price term is zero cannot be rejected at any reasonable level of confidence. Similar results are obtained when simpler, OLS, models of the relationship are used.

Strong as these results are, they are subject to several limitations. In particular, price adjustment processes in duopolies with switching costs are sufficiently complex that the hypothesis that the price series are random walks cannot simply be ruled out. Were these series in fact random walks, they would not have a finite variance, and OLS estimates would not yield consistent parameter estimates.

Applied to the price series, the Dickey-Fuller unit root test does not allow rejection of the hypothesis that the series are a random walk. While this casts doubt on the validity of conventional significance tests, it does allow co-integration models to be used to test for a cluster market.

In effect, were STD and IDD in a cluster market, one would expect the price movements between them to be co-integrated, reflecting the responsiveness of purchase decisions to the cluster price. In fact, the data reject the hypothesis that the series are co-integrated, with this result being robust across a range of specifications.

Overall, the behaviour of the price and market share series confirms the view that STD and IDD are in separate markets.

Conclusions

This paper has examined the concept of a cluster market and set out tests for the analysis of demand-side clusters. In particular, it has been argued that a set of economically distinct items should be viewed as forming a cluster market only if it can be shown that:

- Unbundling of consumption imposes identifiable costs on consumers;
- These costs are substantial relative to the level of outlays on the cluster of the consumers accounting for a large share of consumption;
- Demand for the items comprised in the bundle is correlated among consumers;
- The items are broadly similar in terms of the factors which generally shape firms' marketing strategies; and
- Suppliers' market shares for each item in the cluster respond to the prices they charge for the other items.

Applying these criteria to the supply of IDD shows that IDD is not in a cluster market with domestic telecommunications services.