The importance of competition in developing countries for productivity and innovation

Background paper for World Development Report

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1. Introduction

What has recent research taught us about the link between the strength and the character of competition and the overall levels of productivity and innovation in the economy? How can these lessons be translated into advice for public authorities wishing to use competitive forces as an ally in the interest of improving productivity and innovation? And finally, how does the usefulness of these lessons depend on the overall level of development of the economy concerned? Can poor countries borrow policies "off-the-shelf" from more prosperous ones or does there need to be appropriate technology in this as in other fields? These three issues are the focus of this paper.

We discuss what competition is, how it can be measured and what are the channels through which it can be expected to influence productivity and innovation. In doing so we emphasize five facts which are even more important for developing than for developed countries. These are that:

- There are major differences between firms, even those in the same country and the same market, and enjoying in principle access to the same technologies. These differences encompass size, culture, organization and productivity.
- Because of these differences, competition works not just through ***incentives*** (by inducing all firms to be productive) but through ***selection*** (by reallocating demand between firms with differing productivity levels, and by inducing exit and entry of firms from the market). There is overwhelming empirical evidence that competition cannot work effectively without selection.
- Selection can nevertheless be highly ***disruptive***, in the sense that it involves potentially large fixed costs of entry and exit, and the breaking of business relationships in which the parties may have made substantial investments.
- The strength of competition between firms is a function not just of the behaviour of the firms themselves towards each other, but also of the external environment within which they compete: the state of transport and communications, the framework of laws and regulations, the effectiveness of the financial system in matching investment resources with entrepreneurial opportunities, the information available to consumers and so on. We use the term "competitive infrastructure" to refer to this ensemble of external environmental conditions, and we offer reasons for thinking that it will be particularly inadequate in many developing countries.

- When this competitive infrastructure is inadequate, the incentive effect of competition will be weak. The selection effect, however, can be adversely affected in two ways, not mutually exclusive. It may be ***weak*** (in that there is relatively little entry and exit, or reallocation of demand between firms). It may also be ***inefficient*** (in that, whether weak or not, such selection as occurs involves a large amount of disruption for a small or negligible gain in productivity and innovation).

In asking what competition is and how it can be measured, we must emphasise that although the structure of markets has often been used as a description of the strength of competition, it is at best an imperfect indication of the underlying competitive process. What matters is the tendency of firms to strive after economic rewards, and thereby to improve the efficiency of their existing products and activities as well as to create new ones. A long tradition in economics has emphasised the multiplicity of the factors that contribute to such an outcome, factors that have little in common beyond their helping to liberate the energies of the entrepreneur. As we shall describe, this picture of the determinants of efficiency and innovation finds considerable support in recent empirical work, particularly that based on the analysis of panel data.

To define competition, we follow Stigler's (Palgrave 1987) preference for the classical usage of the term: competition in the product market is identified as a rivalry that arises when two or more firms strive for something that not all can obtain. He defines the central elements of competition: the freedom of traders to use their resources where they will, and exchange them at any price they will.

A consequence of the definition of competition as rivalry is that it makes clear that competition depends, paradoxically, on exclusion: I may compete with someone else to buy livestock at auction, but the keenness of our competition depends on the knowledge that the successful bidder will be able to exclude the other from enjoying the benefits fo the livestock. At a minimum, therefore, competition requires there to be some framework of expectations and rights, which may be more or less formal, and which makes it clear what are the payoffs to competitive success. These can be described as property rights, provided these are understood in a broad sense encompassing intellectual property and those other aspects of the law that circumscribe what individuals may do with their property (such as tax and regulatory laws). Since property rights enforce exclusion, moreover, it follows that the vigour of competition cannot simply be measured by the speed with which resources change hands: if resources never change hands the result is economic sclerosis, while if they change hands continually the result is likely to be anarchy.

The key to resolving this paradox is the durability of resources over time. If durability were not an issue then competition at one time would have no implications for competition at any other time: I may compete to get a reservation at a very popular restaurant, and my excluding someone else may not prevent them from competing equally vigorously with me for a table the following evening. But in practice the objects

of competition are typically *assets*: they may include anything from a durable good such as a house or bullock or building site, to capital goods such as a factory, a communications network or a licence to exploit intellectual property, to a goodwill asset such as a customer base or a brand name (whose value depends upon there being a certain persistence through time of customers' buying habits). This means that the outcome of competition in the present has implications for the character of competition in the future. In particular, the incentives to *acquire* an asset may conflict with the incentives to *use* an asset efficiently once it is acquired. We describe the nature of this conflict in more detail in section 2 below.

What conditions are necessary for competition to thrive? The importance of a competitive infrastructure has long been appreciated. In the *Wealth of Nations*, for example, Adam Smith summarized the central role of competition in improving the efficiency of a market economy and pointed to the way in which the state should target its intervention to maximize the impact of competitive forces:

"Good roads, canals and navigable rivers, by diminishing the expense of carriage, put the remote parts of the country more nearly upon a level with those in the neighbourhood of the town. They are upon that account the greatest of all improvements. They encourage the cultivation of the remote, which must always be the most extensive circle of the country. They are advantageous to the town, by breaking down the monopoly of the country in its neighbourhood. They are advantageous even to that part of the country. Though they introduce some rival commodities into the old market, they open many new markets to its product. Monopoly, besides, is a great enemy to good management, which can never be universally established but in consequence of that free and universal competition which forces everybody to have recourse to it for the sake of self-defence." (1776, Pelican edition 1970, p. 251)

"China seems to have been long stationary, and had probably long ago acquired that full complement of riches which is consistent with the nature of its laws and institutions. But this complement may be much inferior to what, with other laws and institutions, the nature of its soil, climate, and situation might admit of. A country which neglects or despises foreign commerce, and which admits the vessels of foreign nations into one or two of its ports only, cannot transact the same quantity of business which it might do with different laws and institutions. In a country, too, where though the rich or the owners of large capitals enjoy a good deal of security, the poor or the owners of small capitals enjoy scarce any … the quantity of stock employed in all the different branches of business transacted within it can never be equal to what the nature and extent of that business might admit. In every different branch, the oppression of the poor must establish the monopoly of the rich, who, by engrossing the whole trade to themselves, will be able to make very large profits." (pp. 197-198).

As these passages suggest, competition improves productivity in the following ways:

- it allows the greater efficiency from the division of labour and the associated gains from specialization to be reaped

- it extends the market for more efficient producers. This allows market selection to operate.
- it introduces new low cost sources of supply and new products
- it raises management effort and squeezes out inefficiencies.

Each of these processes comes into play because of on the one hand, the incentive of achieving at least temporary super-normal profits through innovation[1] and on the other, of the threat that innovation by existing and potential firms poses to the survival of incumbents in the market. In addition to establishing a framework for linking competition to performance, Smith identified the role for policy. The role of the state in maximizing the impact of competitive forces is:

- to extend and improve the physical transportation, communication and information infrastructure
- to establish openness to trade
- to establish the appropriate laws and institutions to facilitate new entry and to challenge entrenched monopolies.

The emphasis on the importance of both physical and institutional infrastructure to competition will strike some readers as obvious but is often overlooked in discussions of competition policy. Anti-trust policy has traditionally concerned itself with features of the *competitors*, while the overall vigour of competition requires attention also to the physical infrastructure of transportation, the legal infrastructure of contract enforcement, licensing and regulation of internal and external trade, the financial and regulatory infrastructure that allows entry and growth of new firms, and finally the communications infrastructure that allow information to flow freely between buyers and sellers and break down pre-existing informational monopolies.

In Smith's day the responsibility of the state for such infrastructure may have seemed relatively clear-cut. This remains the case in relation to the establishment and enforcement of a legal framework to uphold contracts. The state is also responsible for controlling its 'grabbing hand' (Sheifer and Vishny, 1998) and for facilitating openness to trade – not only to international trade but trade at a much more local level. But in terms of the provision of physical and communications infrastructure, more recent developments have added a new twist, which is that important elements of infrastructure may themselves be supplied by private firms. Indeed, public authorities have increasingly found themselves required to adjudicate the terms and conditions under which private firms may supply goods or services, among the main benefits of which are to facilitate vigorous competition in markets downstream. Examples are telecommunications networks, computer operating systems, airports and rail networks. In every case a difficult trade-off is involved: obliging such goods or services to be supplied too cheaply may improve the downstream competitive environment today, but at the price of diminishing the incentives for future innovation in competitive infrastructure. In certain specific contexts (telecoms access pricing for instance, or the grant of patents for intellectual property) the terms of this trade-off have been fairly rigorously explored. But

[1] We interpret innovation very broadly to mean the introduction of products new to the local market and of methods of production new to the local firms.

the fact of such a trade-off underlies a great many difficult questions in the general field of competition policy, broadly interpreted.

To diagnose the role that competition plays in developing economies and how that role can be enhanced is a complex task. This paper proceeds as follows. In section 2 we discuss alternative ways of measuring the strength of competition. In section 3, we discuss the promotion of competition, focusing on the trade-off between static and dynamic considerations. In particular, we identify how different industry and country characteristics affect the way that firms compete and spell out the implications of these differences for policy design.

In section 4 (the longest in the paper), we turn from the nature of how firms compete to the question of what effect that competition has on economic performance. We develop the argument sketched above that competition operates on aggregate performance and innovation through selection as well as having a direct influence on productivity performance within surviving firms. We summarise what is known empirically about these difference channels of influence.

In section 5, we discuss how policy can use this knowledge to affect competition in ways that enhance overall productivity and innovation. We pay particular attention to differences between countries and the differential suitability of particular policies to different country settings. Section 6 makes some concluding remarks.

2. Measuring the vigour of competition

One common and intuitive starting point for measuring competition is the extent to which production is concentrated in the hands of a few firms, each of which therefore faces comparatively little rivalry. The crudest measure of this concentration is simply the number of firms that are operating in the same or a recognisably similar market. To be useful this measure depends on there being some practical method of defining the relevant market (see Neven et.al., 1993, chapter 2), which essentially means finding goods and services that are reasonably close substitutes for each other while being distant substitutes for all other goods or services. But while the number of firms may be a useful first indicator, it may be seriously misleading when there are important differences in size, strength and productivity between firms (as there are in most markets in all countries, a phenomenon we document in section 4 below). For example, the exit of one large firm and entry of many small ones may reduce measured concentration but lower the vigour of the rivalry faced by the remaining large firms. This problem has been observed in many transition countries where the exit of one or two large enterprises from an industry along with the simultaneous entry of many new small firms has resulted in a reduction in effective competition (see Kattuman and Domanski, 1998 on Poland). One way of dealing with this is by calculating measures of market power at the firm rather than the market level, in particular by looking directly at the market share of each individual firm. Another way is to summarise the structure of the market in a way that is sensitive to dispersion: the Herfindahl-Hirschman index (the sum of the squares of the

market shares of the firms) is the best-known such measure, and one used in many policy applications.

A second way of measuring competition is to look at the consequences of market structure rather than market structure itself, and specifically at the freedom firms have to choose prices (and other business strategies) independently of any concern about losing business to other firms. A natural way to do this is to estimate the so-called residual elasticity of demand for the firm's own products, namely the extent to which a price rise by the firm would lead customers to substitute away, either to rival firms or away from the product altogether. When sophisticated data are available this elasticity can sometimes be estimated econometrically (see Hausman et.al., 1992, for an application to the case of beer), and it is particularly useful to do so when products are differentiated so that the notion of a single product market may make little sense. However, even in the absence of suitable data it may be a useful organising framework in which to think about the competition faced by a firm: does the qualitative evidence suggest that the firm faces significant constraints on its ability to raise prices?

A third and altogether different approach to measuring competition is to look directly at the behaviour of firms and to infer from this the extent of the rivalry they believe themselves to face. In particular, the price-cost margin charged by a profit-maximising firm facing constant marginal costs (given by the technology and not capable of being influenced by the firm itself) will be inversely proportional to the own-price elasticity of demand for its products. If price-cost margins can be reliably measured, therefore, they may themselves be an inverse indicator of the vigour of competition in the market.

Are these three ways of measuring competition consistent with one another? Table 1 looks at the relation between these three types of measure using data from the World Bank/EBRD business environment survey:

- As a measure of market structure we use the number of competitors reported by the respondent in the market for its main product, dividing firms into those reporting respectively no competitors, between one and three competitors and more than three competitors.
- As a measure of firms' freedom to raise prices we use their response to a question asking them what would be the consequence of a 10% rise in the real price of their product by 10%, scoring from one (for firms reporting that most customers would switch to rival suppliers) to four (for firms reporting that most customers would continue to buy in similar quantities as previously).
- As a measure of firms' behaviour we use their (self-reported) price-cost margin.

We report mean values of the second and third measure for firms categorised by the first measure, and sub-categorised by ownership status (state firm, privatised firm and other) in order to control for different degrees of commitment to profit-maximising behaviour. The answers clearly indicate that in markets with no competitors firms report lower own-price elasticities of demand and higher price-cost margins than in markets with 1-3 competitors, though the effect is weaker for state firms than others (as one might expect given their weaker incentives for profit-maximisation).

Table 1

Market power (10% test) and price-cost margin by ownership and number of competitors

	Competitors: None	1 to 3	>3	Total
Privatized				
(number)	105	163	1,009	1,277
% price-cost margin	18.3	15.3	15.4	15.6
10% test (answer from 1 - *all customers switch* - to 4 - *customers continue to buy as before*)	2.65	2.38	2.13	2.20
State				
(number)	187	112	359	658
% price-cost margin	16.2	12.4	17.2	16.0
10% test (answer from 1 to 4)	3.09	2.47	2.25	2.51
New firm				
(number)	104	252	1,808	2,164
% price-cost margin	22.3	20.7	17.8	18.3
10% test (answer from 1 to 4)	2.45	2.38	2.01	2.08
Total				
(number)	396	527	3,176	4,099
% price-cost margin	18.5	17.2	16.9	17.1
10% test (answer from 1 to 4)	2.80	2.40	2.08	2.18

Table 2

Determinants of price-cost margin

ion number	1		2		3	
ation method	OLS		OLS		2SLS	
observations	3175		2037		2037	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
t power (10% test):						
would fall a lot	2.53	3.19	2.07	1.93	6.73	1.41
would fall slightly	3.23	4.01	2.82	2.60	8.83	1.72
ange in sales	5.69	5.76	5.73	4.21	12.62	3.41
t share			0.05	3.21		
er of competitors:						
mpetitors			0.99	0.33		
than 3 competitors			1.66	0.63		
rm with no competitors:			9.82	2.46		
competitors			-6.14	-1.33		
re than 3 competitors			-8.25	-2.02		
irm with no competitors:			-1.43	-0.44		
competitors			-4.11	-0.96		
than 3 competitors			2.78	0.78		
ant	14.89	29.28			11.49	4.95

Table 2 shows the significant link between market power as measured by the 10% test and the price-cost margin. It really is true that firms reporting that sales would not fall much in response to a price rise, profit from that knowledge to raise their margins. Firms replying that there would be no significant change in sales have margins nearly 6 percentage points above those replying that most customers would switch to their rivals. More interestingly still, individual market share has additional predictive power, as does the number of competitors in the market. When we take into account (as in equation 3) that market structure variables work via their effect on market power, so that we control for the endogeneity of the market power variable, the observed effect of market power on price-cost margins more than doubles. Firms replying that there would be no significant change in sales have margins more than 12 percentage points above those replying that most customers would switch to their rivals.

Indeed, the comparative insignificance of most of the market structure (number of competitors) variables in equation 2 does not mean they are unimportant: rather, they work almost entirely through their effect on market power. Table 3 illustrates:

Table 3 **Determinants of market power** **Ordered logit, n=2313, industry and country controls**	**Coefficient**	**Std. Err.**	**z-value**
Market share	0.006	0.00	3.86
State firm	0.170	0.12	1.43
New entrant	0.057	0.09	0.60
Number of competitors:			
1-3 competitors	-0.853	0.17	-5.13
More than 3 competitors	-1.163	0.15	-7.78
Threshold 1	-1.382	0.27	
Threshold 2	-0.213	0.27	
Threshold 3	1.283	0.27	

The variables for number of competitors are extremely significant, and large in absolute magnitude. They mean that, other things equal, firms with more than 3 competitors will report nearly one point less on the market power scale (which runs from 1 to 4).

What is the significance of these findings? They show that market structure, market power and behavioural measures of competition are consistent with one another, that they complement one another, and that they may give a very useful indication of the general state of competition in a market. However, this does not mean that the picture they give is complete. Far from it. In particular, all three kinds of measure focus on short-term diagnosis and ignore indicators of the longer-term competitive evolution of the markets concerned:

1) Current market structure variables leave out *potential* competitors – those that could threaten entry into the market even though they currently leave no imprint upon it. In some markets potential competitors are a more credible threat than in others, particularly where sunk costs are high (as in many physical network industries). No analysis of the state of competition can afford to ignore such differences between the circumstances of different industries (a point to which we return below).
2) Price elasticities as measured at a point in time may give an inaccurate impression of the extent to which established markets are under threat from future challenge.
3) High price-cost margins are not always an indication of undesirable market power. They may be a temporary reward for innovation, and everything depends on whether they act as a signal for rivals to emulate the success of the firms that enjoy them.

Unfortunately, there exist no simple measures of the vigour of potential or future competition with which the three kinds of measure of current competition can be

systematically compared. Inevitably diagnosis must be conducted on a more qualitative and common-sense basis as a result. Nevertheless, as we discuss below, useful conclusions for policy can still be drawn.

3. Promoting competition

3.1 Static versus dynamic considerations

Our discussions of definition and measurement have emphasized the importance of both static and dynamic perspectives on competition. Competition is about rivalry in the acquisition of assets, and also about rivalry in their use, and we cannot assume that conditions which are favourable to one will always be favourable to the other.

What does this imply for how competition can be promoted? Different approaches to competition policy can be characterised according to the relative emphasis they place on incentives for the acquisition of assets versus incentives for their use. Traditional anti-trust policy has very much concentrated on the latter, on ensuring that those in charge of productive assets use them in efficient ways, and has seen allocative inefficiency through the charging of price above marginal cost as the greatest threat. In contrast, competition policy of the Chicago school has focussed instead on removing obstacles to the efficient acquisition of assets, reasoning that owners who will not use assets efficiently once they are acquired will not wish to compete vigorously to acquire them in the first place. It seems reasonable to suggest that the intellectual pendulum has in recent years swung away from an exclusive focus on the efficient use of assets and towards a greater concern with their efficient acquisition (the increasing use of auctions for allocating such assets as radio spectrum being a logical culmination of this trend). Nevertheless, those competing to acquire assets are unable to commit very precisely to the way in which such assets will be used once they are acquired, and it is these failures of commitment that make inefficient use a potentially serious area of concern. There are several main reasons for these failures of commitment:

1) Very often information about the economic characteristics of the asset (and its compatibility with the economic characteristics of the owner) does not become available until after it is acquired. An entrant to a market may come to realise it is not as effective a competitor as it thought it would be. However, incentives for exit are not symmetric with those of entry, and frequently it may be difficult for the assets of a failing firm to be efficiently reallocated to a more efficient competitor. Something similar is true of firms that, though not misinformed about market conditions, nevertheless have skills that are suited to only temporary configurations of circumstances, but whose comparative advantage in a certain activity expires before their strategic advantage based on incumbency. Thus firms which are well suited to engage in foreign trade in a highly protectionist regime (because they have good contacts with government agencies, for example) may be very poorly suited to a more liberal environment, but their mere presence and control over distribution channels may be a major barrier to entry by other, potentially more efficient firms.

2) The owner of an asset can rarely be bound to a precise policy (say on prices) at the time of acquisition, and after entry to a market will set its prices and investments ignoring any externalities on customers or competitors. Privatized utilities have frequently behaved in this way when regulatory regimes have been weak.

3) Few economically productive assets have single owners, but are usually owned and controlled by groups of interested parties (such as shareholders), who may bargain after the acquisition in inefficient ways. Unless there is an efficient market for corporate control, firms controlling productive assets may not maximise the rents from those assets, because of the nature of bargaining between managers, workers and shareholders. Thus firms privatised to coalitions of workers (this is sometimes known as "insider" privatisation") may be unable to raise outside capital for much-needed investment because of an inability to commit to a credible repayment schedule.

Broadly speaking, public policy has focussed on the following mechanisms to overcome these three sources of commitment failure:

1) Bankruptcy law, unemployment benefit and other such means to remove barriers to exit of ineffectively performing firms.
2) The creation of competitive infrastructure (including the removal of such barriers to entry as trade restrictions, licensing regulation, switching costs between competitors and obstacles to information transmission) in order to create *ex post* rivalry, so that firms failing to use assets efficiently can be quickly challenged by others.
3) The prohibition of collusion (including collusion by merger) so that firms do indeed react to the removal of entry barriers by strenuous rivalry.
4) Direct intervention to control behaviour (such as price regulation) when the outcome of such rivalry does not internalise all the relevant ex post externalities.

All of these mechanisms have their weaknesses due to the likelihood that they will only imperfectly be implemented: bankruptcy law may soften but not remove all barriers to exit, trade liberalisation may remove only some entry barriers and so on. But there are two problems in addition that may arise when these mechanisms work *too well*:

- First, the only way to bring about credible *ex post* rivalry for an asset such as a market presence may be to share the asset. In the case of some assets subject to large scale economies that may impose large efficiency costs. However, there has been much evolution over time in ways of sharing access to assets more efficiently than was true in the past (the unbundling of the local loop in fixed-line telephony being an important example).
- Secondly, ex post rivalry may weaken the incentives for *ex ante* rivalry, that is for the competition to acquire the assets in the first place.

How much this second problem matters depends upon whether important real investments are needed up front in order to acquire and efficiently to use the asset. If the

asset is the right to trade a certain good, very little real investment is required up front and consequently there will be little damage done by making that right subject to vigorous ex post rivalry. If the asset is a detailed piece of intellectual property that can only be achieved by intensive and expensive research and development, then strong *ex post* rivalry may have a large and damaging impact. Intermediate cases include those where the formal intellectual property (such as a trade-mark) may be slight but the complementary investments in distribution and know-how may be considerable; here the adverse effect of ex post rivalry will depend on the extent to which such investments can be recouped on exit.

The qualification "real" is important because investments purely to bid for a licence (say in a spectrum auction) do not count as real investments in this sense: if *ex post* competition reduces the rents bidders are prepared to pay up front there is no reduction in overall economic efficiency, only a reduction in the transfer which ultimately comes from consumers to the auctioneers of the asset.

What this suggests is that arguments for a general softening of *ex post* rivalry purely on the grounds that up front real investments are sometimes required should be dismissed. (Journalistic opinions can sometimes be heard to the effect that "the information economy requires cooperation, not competition".) Competitive infrastructure should indeed be directed towards creating vigorous *ex post* rivalry as a general rule. But there may be grounds for a softening of such rivalry when a clear necessity can be demonstrated for recouping up-front real investment. Intellectual property law creates a framework for such arguments within a particular class of cases, but its applicability is obviously limited to those kinds of knowledge investment that can be sufficiently codified to fall under the appropriate law. Many kinds of knowledge investment are not of this kind: how to run a franchise operation, how to organise a car assembly plant, how to train hotel staff, how to deploy a fleet of buses. Other up-front investments may require major capital resources whose value does not reside in intellectual property as such: a semiconductor plant, an oil refinery, a fibre-optic network. Many such investments will indeed be adequately protected by the natural obstacles to ex post rivalry that the existing competitive infrastructure cannot completely remove. But there will be cases where more explicit protection may be required, though these will need to be demonstrated on a case by case basis.

3.2 **Industry variation in the nature of anti-competitive problems**

To the extent that these kinds of consideration differ from industry to industry, policy will need to be sensitive to the industry type. For example, Sutton (1991) points to the difference between industries characterized by exogenous and endogenous sunk costs. The key difference between the exogenous and endogenous sunk cost industries is the source of economies of scale. In the former, it is production economies of scale and in the latter it is overheads such as advertizing and R&D. Marketing and R&D expenditures are endogenous in the sense that there is no upper limit to their scope for generating scale economies as long as extra spending generates the prospect of an 'innovation'. This

means that whereas production economies of scale are the key determinant of the concentration of exogenous sunk cost industries, they appear to have little role in the concentration of R&D and advertizing intensive industries.

Exogenous sunk cost industries can be

- low sunk cost industries, in which entry barriers are low. We would expect entry to be concentrated here and competition can probably be policed with a relatively light hand. However, there will be limited scope for productivity growth.

Alternatively, they can be

- high exogenous sunk cost industries. Here the main problem is likely to be the slow exit of loss-makers, and the consequent weak incentives for productive operation within the industry in the absence of a credible threat of exit.

However, to the extent that some of these sunk costs are the result of artificial regulations, liberalization may transform some such industries into

- endogenous sunk cost industries. Here it is important to distinguish the cases where the endogenous sunk costs are genuinely productivity-enhancing and those where they are purely exclusionary (as in pre-emptive patenting or brand proliferation strategies).

Davies and Lyons (1996) use Sutton's distinction to classify industries in Europe. Exogenous sunk cost industries, which are referred to as Type 1 industries, account for just over half of manufacturing industries and are mainly associated with the processing of materials (iron and steel, cement, foundries, grain-milling, textiles, wood-processing). These industries are the least concentrated. However, as shown in appendix 1, there are some highly concentrated Type 1 industries and potential competition problems may arise there.

Endogenous sunk cost industries (Type 2 industries) are advertizing-intensive, R&D-intensive or both advertizing and R&D-intensive. The last group are much the most concentrated. Table 4 summarizes the characteristics of industries that are relevant for understanding how competition works.

Table 4. Competition and industry type: a classification of industries in Europe

	Exogenous sunk cost industries	Endogenous sunk cost industries		
		Adv. -intensive	R&D-intensive	Adv. and R&D-intensive
Share of manuf. industries	1/2	1/8	1/4	1/8
Typical industries	iron and steel, cement, foundries, grain-milling, textiles, wood-processing	food, drink and tobacco	chemicals, engineering and transport equipment	cars, domestic electrical appliances, pharmaceuticals and soaps and detergents
Concentration?	4th	3rd	2nd	1st
Multi-nationality?	4th	2nd	3rd	1st
Traded?	mixed	low	high	high

Determinants of concentration	production econs of scale	production economies of scale weak influence

Source: Davies and Lyons (1996), chapter 14.

In appendix 1, we report the results of the Davies and Lyons' study of concentration and its likely connection to anti-competitive problems in European industry. Whilst this analysis is not of direct use to developing economies, the considerations that lie behind it are helpful in showing how policy makers should conduct a systematic analysis so as to identify potential problem industries. The following guidelines refer to the patterns displayed in Table A1 in the appendix.

- Classify industries by the domestic concentration ratio. Highly concentrated industries are the ones where competition problems are likely to be found.
- Use the EU bench-mark to help to establish the underlying industry characteristics such as the extent of production economies of scale and to classify industries into exogenous and endogenous sunk cost industries.
- Compare the extent of trade integration by industry with the EU bench-mark. The EU-benchmark gives an indication of the potential for trade integration by industry. Table A1 shows that there is considerable variation across industries in the extent to which trade can alleviate potential anti-competitive problems. Weak competition is likely to be found in highly concentrated industries with low trade.
- The limited role of trade in advertizing-intensive industries even in the European market is especially striking. Such industries constitute potential problems in respect of competition.
- Pay particular attention to Type 1 (i.e. exogenous sunk cost) industries with high concentration. Such industries may be characterized by large production economies of scale – in some cases national producers lobby for protection from market pressures for the rationalization of the industry at an international level.
- Note the role of multinational ownership. Davies and Lyons argue that multinational ownership in an industry is a method through which leading international firms control the flow of international trade and may therefore present anti-competitive problems. However, it is unlikely that policy makers in developing countries will be able to effectively deal with such problems. Similarly with the highly concentrated but highly traded R&D intensive industries, the investigation of possible anti-competitive R&D and advertizing strategies will lie outside the scope of national authorities in developing countries.
- Identify policies of public procurement. This has been a major method through which specific industries have been protected in European countries.

3.3 **Country variation in the nature of anti-competitive problems**

Similarly, to the extent that these types of consideration differ from country to country, policy may well need to be sensitive to the country type. For example:

- small open economies will be ones in which entry from foreign firms provides most of the necessary ex post rivalry (subject to the industry variation discussed above),

while large closed economies are ones in which the state of domestic infrastructure may constitute a competitive bottleneck. Trade liberalization may bring foreign goods to the border, but most consumers do not live at the border, either geographically or in the sense of having information equivalent to those of world consumers.

- Economies in which literacy levels are low and information transmission is expensive will have weak ex post competition in most spheres, so protection of up-front investments is likely to be less often a convincing argument for softening rivalry. This is because vigorous competition often requires consumers to make informed comparisons between rival products, and literacy and education greatly increase the quality of such consumer scrutiny.
- Poor countries are unlikely to need to do much primary research and development, but will need to focus on the investments required for adapting existing technologies and best practice from other markets for domestic implementation. This means that intellectual property based up-front investments are likely to be of less importance than in advanced countries
- However, the poor state of physical infrastructure in many developing countries means that both costs of investment and willingness to pay for improvements are high (particularly in such areas as telecommunications). This consideration probably diminishes the importance of ex post rivalry in the construction of physical networks.

Overall these considerations suggest that for many developing countries, policies to increase *ex post* competition are likely to be at least as important as they are for rich countries. The only significant exception concerns those physical infrastructure industries (such as telecommunications) where capacity shortages are more important than the inefficient utilisation of existing capacity.

In section 5 below we return to these issues after reviewing the empirical evidence.

4. The influence of competition on behaviour and performance

In this section, attention is shifted from the nature of how firms compete to the question of what effect that competition has on economic performance. The competitive struggle involves the growth and decline of firms, the entry of new ones and the exit of poor performers. We would view the competitive process as an efficient one if it is able to separate out the good from the bad performers, to induce the entry of low cost firms that may challenge the incumbents and to facilitate the exit of the firms with low efficiency. To identify how the competitive process operates, we therefore need data on the rise and fall of firms, the significance of entry and of exit. This is a much more onerous data collection task than is required for snap-shots of industry structure at a point in time.

As will be seen, the evidence points overwhelmingly to the fact that competition works not just by creating incentives for given firms to perform better but by sorting between more and less successful firms. It might be thought that this would be less important for developing countries than for others, because such countries have a greater need for "catch-up" and a lesser need for original innovation, and catch-up might be considered less a matter of risk-taking and more a matter of simply observing and implementing international best practice. But in fact the evidence is clear: catch-up is as risky and turbulent a process as original innovation, and so the sorting effects of competition are at least as important in developing as in industrialised countries.

In confronting the evidence, what are we looking for? A number of theoretical models help to identify how competition might affect performance. We focus on models that present testable hypotheses and for which we can provide some empirical evidence. We separate out four effects on which to focus the theoretical and empirical discussion:

- the selection effect (how the market operates to reallocate market shares from lower to higher productivity firms),
- the incentive effect on incumbents (how rivalry alters behaviour)
- the entry effect (how new suppliers enter the market and thus affect aggregate performance both by virtue of the new capacity that they bring and by influencing incumbents), and
- the exit effect (how poor performers are able to leave the market and release resources).

We begin with a model that provides an overview of the competitive process and follow this by highlighting models that provide additional insights about how competition may raise productivity within firms.

4.1 Selection, entry and internal restructuring

Aghion and Schankerman (2000) develop a simple model to investigate the effects of competition on performance. They use a model of monopolistic competitive producers of differentiated products in which location on a circle is the measure of product differentiation. Both incumbent firms and potential entrants are characterized by asymmetric production costs, either high or low cost. Unit transportation costs measure

the intensity of product market competition. They look at three cases. In the first case where there is no entry and the productivity levels of firms are fixed, the welfare effects of lowering transportation costs – i.e. of improving the competitive infrastructure – arise from the direct effect of greater competition in lowering the profit margins of both high and low cost firms and from the selection effect as the market share of the low cost firms increases. The only offsetting negative effect arises from the impact of greater concentration of market share on the product variety available. They show that welfare increases as competitive infrastructure improves and that it increases more, the greater is the initial cost asymmetry between firms. This model therefore predicts that the scope for competitive infrastructure policies to improve the selection effect depends on the level of cost asymmetries. If cost asymmetries are masked by other distortions such as subsidies or other forms of budget softness, then selection will not occur. Hence policies that reduce subsidies will complement policies that improve the intensity of competition.

The second effect introduces incentive effects for incumbents to exert effort to undertake restructuring. (We examine a broader class of models that address the question of why an increase in competition may influence firm performance below.) If effort costs are convex and there are no costs (such as bankruptcy costs) associated with a low market share, then there is a stronger incentive for low cost firms to restructure than high cost ones. This raises the degree of cost asymmetry and enhances the efficiency improving effect of market selection. The model therefore predicts that in a more developed economy, there will be a greater degree of cost asymmetry. Moreover the corollary is that since a lower level of cost asymmetry lowers the returns from increased competition, it is likely to tilt the political balance from those who may favour more competition (low cost firms) to those who will unambiguously lose from greater competition (high cost firms). The result may be a low-competition trap, characterizing developing economies.

The third result derives from the role of entry. In a standard model with homogeneous cost firms (e.g. Tirole 1988), an increase in competition in the market will have the effect of deterring entry because the rents available to a new entrant are reduced. This is a static version of the standard Schumpeterian argument that higher rents are the necessary inducement for innovation. However, Aghion and Schankerman show that this result can be reversed if potential entrants and incumbents vary in their productivity levels. An increase in the intensity of competition in the market may induce low cost entrants to come in, since although rents will be squeezed by the greater competition, low cost firms will be able to capture a greater share of the market. The net effect may be sufficient to induce productivity-enhancing entry. The entry effect of an enhanced competitive infrastructure will not work if the initial level of competition and the initial cost asymmetry are too low. The reason is that both low and high cost firms enter and the market selection effect is too weak to sort the firms.

This model is useful because it provides predictions about how an increase in competition would affect aggregate productivity through its effects on incumbents and on the entry decision, as well as via market selection. The model also brings to the fore how other reform policies (such as hardening enterprise budget constraints by reducing implicit or

explicit subsidies) interact with policies to increase competition. In addition, it identifies how a low competition- low productivity trap can persist.

4.2 Incentive effects for incumbents

There have been many attempts to model the mechanisms through which increased competitive pressure influences the behaviour of the individual firm. The puzzle arises because on the face of it, a monopolist has the same incentive to improve efficiency as a producer in a competitive market. Why should an increase in competitive pressure increase efficiency? One response is to identify increased competitive pressure as operating on the margin of slack that characterizes a firm with agency problems. We highlight two channels through which this could operate: first, the link between competition and managerial effort and second, the impact of competition on the bargained effort of workers.

Competition and managerial effort More competition may make comparison of managerial performance easier and hence elicit greater effort from managers, thereby improving efficiency (Holmstrom, 1982, Hart, 1983). Vickers (1995) extended this argument by highlighting the significance of comparisons of performance for the future rewards in the managerial labour market. Because of such 'reputation effects', greater competition will prompt greater managerial effort. It has also been argued (Willig, 1987) that tougher competition makes profits more responsive to managerial effort. This may encourage greater effort unless the offsetting impact of more competition in depressing demand for the firm's product is too large. Willig's model identifies a possible source of ambiguity in the relationship between competition and managerial effort and hence between competition and performance. Willig's point is an important one – an increase in competition is an increase in the adversity facing the firm. If this is too strong, then the effect may be counterproductive.

It is usually assumed that the manager of a firm derives a private benefit from this position, which will be lost if the firm closes down. If increased competition increases the threat of bankruptcy, then this will raise the manager's effort. However, as we will see below in the discussion of exit, the efficacy of this incentive depends on the nature and enforcement of the bankruptcy code.

The standard Schumpeterian argument is that if competition in the product market is too strong (ex post competition), it can have deleterious effects on innovation because it dissipates the rewards from innovation (ex ante competition). This means that the incentive to sink the costs necessary to innovate is reduced. However, he also emphasizes the spur to innovation that a heightened competitive threat can represent. The emergence of new competitors will threaten the temporary monopoly profits from innovation and increase the incentive of the incumbents to shorten the innovation cycle. Except in the pure entrepreneurial firm, this effect can operate through managerial incentives since introducing new products or processes involves managerial effort. The point is that effort-minimizing managers can survive by delaying innovations subject to the constraint of keeping the firm afloat. If more competition reduces profits now and in future periods,

the manager has to introduce innovations earlier in order to survive. The result is faster productivity growth (Aghion, Dewatripont and Rey 1997).

In emphasizing the role of managerial effort in establishing the link between competition and efficiency, these models rely on the existence of an agency problem between the owners of the firm and the managers. The agency problem creates a zone of managerial discretion bounded below by the threat of bankruptcy and the associated loss of private benefits to the manager and above by the ability of the owners to exert control over the manager. This suggests that the effect of an increase in competition is likely to be influenced by the significance of the agency problem and by how close to binding is the threat of bankruptcy. If there is no significant agency problem then an increase in competition will not have much purchase on performance through the mechanisms described. By contrast, if the agency problem is substantial, then the ability of competition to enhance efficiency through influencing managerial effort is greater. In this framework, at the level of the firm, corporate governance and competition are substitutes. In developing countries and transition countries, good corporate governance is likely to be rare. This highlights the potential role for competition to improve performance.

Looking at the second margin – namely, the scope for managerial slack created by the failure of financial pressure to bite – highlights the role of the bankruptcy system and its enforcement. For a given bankruptcy system, we would expect to see more managerial effort expended to improve efficiency in a firm in greater financial distress. In a similar fashion to the corporate governance argument, this will weaken the impact of an increase in competition. To put this another way, if the bankruptcy system is relatively ineffective, then an increase in competition can act as a substitute in increasing managerial effort. For firms protected from the financial discipline of bankruptcy for other reasons, competition can provide a substitute. It should be noted that the effectiveness of financial discipline will depend not only on nature of bankruptcy code and on legal enforcement but also on the state of the banking system – if banks are awash with non-performing loans, then they will expect a bail-out from the state and not call in non-performing loans. Under such conditions, firms will feel little financial pressure. Equally, introducing harsh competition in a situation in which firms are close to bankruptcy will have little pay-off.

Competition and bargained effort A second channel through which more competition can raise productivity arises if workers also share in the firm's rents and engage in a bargain over wages and effort. In a static context, effort can refer to manning levels and in a dynamic context, to the introduction of new technology. A bargaining model predicts that in the static case, for example, bargained productivity levels will increase when workers' bargaining power is reduced and when the rents available to firms in the product market are reduced. Hence for a given structure of union organization and bargaining power, greater competition will lower rents, raise bargained effort and hence productivity (Grout, 1984, Haskel 1991)

Numbers of competitors – non-linear or non-monotonic effects Both Schumpeterian and Sutton-inspired models predict that the number of competitors in the market (as measured for example by a standard indicator of market concentration) is not necessarily

a good measure of the effective rivalry in the market, once account is taken of both static and dynamic considerations. In particular, innovators need the prospect of some market power as a reward to innovation, but monopolists that face no challenge will merely rest on the laurels of their past success. It is likely, therefore, that markets with many competitors will undertake little innovation, though this may not be true if firms can find "niche" markets in which to enjoy some perhaps temporary market power. Likewise, it seems probable that monopolists with no competitors will be inefficient and not particularly innovative. The most important lesson is the need to challenge monopolists, not to increase the intensity of competition once a certain threshold has been reached. The important question will therefore be: how much competition is "enough"?

We summarise the main messages of the theoretical literature in section 4.3

4.3 Key theoretical findings

- If both incumbents and potential entrants have varying productivity levels, a better competitive infrastructure will raise aggregate productivity by shifting market shares to more productive firms and by encouraging entry by more rather than less productive firms. In addition, it may increase the relative rewards to more rather than less productive firms from improvements in performance.
- Less productive firms will definitely lose out from increased competition and will therefore oppose measures to improve the competitive infrastructure.
- A given improvement in the competitive infrastructure will have a greater effect on aggregate productivity, the greater is the initial extent of heterogeneity in productivity levels between firms. Hence other policies that mask productivity differentials such as current or capital subsidies or condoning tax arrears will weaken the impact of improvements in competitive infrastructure.
- The impact of heightened competition on 'within-firm' performance will be greater, the weaker is the quality of corporate governance and the less actual financial pressure from the threat of bankruptcy the firm is under. Improvements in the effectiveness of the bankruptcy code will not only raise managerial effort but also contribute to aggregate productivity growth by expediting the exit of poor performers.
- There may not be a monotonic relationship between the number of competitors in a market and the intensity of rivalry. There may be more intense rivalry with "a few" competitors than with either many or none.

4.4 Evidence on the role of competition in productivity growth in market economies – advanced and less developed

4.4.1 The selection effect: the contribution of entry, exit and growth to overall productivity change

What effects of competition on performance are found and what is their economic significance? The recent availability of census data in the form of panels has allowed the dynamics of competition to be documented in market economies for the first time (though we shall also refer where appropriate to some of the conclusions of older cross-

sectional studies). By tracking the entry, exit, growth and merger of firms over a period of time, it is possible to measure how each process contributes in an accounting sense to the improvement in productivity. Why do we want to know this? As we have seen, different policy tools impinge on different aspects of the competitive process and if some dimensions appear to be important in well-functioning market economies but are much less evident or absent in developing ones, then we have a clearer diagnosis of the source of the problem and a better idea of how policy can best be targeted.

Advanced market economies

As we shall see, the information available on the contribution of entry and exit, selection and within-firm changes to aggregate productivity growth in developing countries is fragmentary. To make sense of the available data, it is necessary to establish a bench-mark from an advanced market economy. This tells us what can be expected in a reasonably well-functioning economy. In this regard, Baldwin's detailed study of Canadian industry is very instructive (Baldwin, 1993). The data relate to the manufacturing sector for the decade of the 1970s. He separates the contributions to the competitive process of greenfield entry (entry of a firm by opening a new plant) and closedown exit (exit of a firm by closure of a plant/s), merger (entry of a firm to the industry by acquisition of an existing plant and exit of a firm from the industry by divestiture of a plant) and the change in the relative position of incumbents. The latter combines the two effects of market selection (more efficient incumbents secure increases in market share) and the improvement in the efficiency of incumbents.

Baldwin identifies considerable mobility of firms in Canadian industry. Looking on a year-to year basis, the effect of greenfield entry for manufacturing looks insignificant (accounting for about 1% of employment). Entrants are initially small and about one-half die before they are 10 years old. But the competitive impact of entry – even in an accounting sense – is substantial over a ten year time frame. After a decade, firms that did not exist at the beginning of the decade but are still there at the end, account for 16% of output. Firms that were present at the beginning of the decade but not at the end accounted for 18% of output at the beginning.

- This means that greenfield entry and closedown exit are substantial determinants of the evolution of the industry. It is incorrect to view the industry as characterized by a stable complement of firms with 'churning' at the margins.

Second, although entry by merger or exit by divestiture does not change the capacity in the industry it changes the control: a new owner is present in the industry. Only about 1% of employment is affected by this on an annual basis. But over a decade about 12% of output is produced by plants that were acquired by firms outside the industry in that period and the same amount of start-or-period output is accounted for by plants taken over during the period.

- Changes in control therefore exert a significant impact on industry structure over a decade.

- Greenfield entry and exit and entry and exit by merger/divestiture seem to be substitute mechanisms that are characteristic of different industries – the former in less concentrated industries and the latter in more concentrated industries.

Third, for survivors – i.e. firms that were present at the beginning and the end of the decade – about one-third of firms declined in absolute size and these were about 50% larger at the beginning of the decade than were the firms that grew. Hence there is regression to the mean in firm size. On average, the three largest firms in an industry lost nearly 25% of their market share in the decade.

- Even within survivors, competitive pressure produces significant reallocations of market shares.

But what is the effect of this competitive process on productivity? The Canadian data show that

- survivor firms open plants that have much higher than average productivity; the plants that they close do not have productivity levels lower than the average for the industry.
- exiting firms close plants that are much less productive than average (even allowing for size differences)
- entering firms come in smaller and with lower productivity than average; learning by those entrants that survive results in growth and their productivity rises to the average in about 10 years.

In terms of productivity growth over a decade,

- just over one-half is due to productivity gains within survivors and this is overwhelmingly in the firms that are gaining market share
- one-fifth is due to the market selection effect as higher productivity survivors gain market share
- the remaining contribution of nearly 30% comes from the effects of plant entry and exit. New firm entrants are found to replace other small firms that exit (20%). And amongst surviving firms, new plants supplant old plants that are closed (7%). Hence, there is a substantial impact of entry and exit on productivity growth.

Table 5. Effects of competition on industry structure and performance: Canadian manufacturing

1. Changes in market share over 10 years				
	Total market share transferred from unsuccessful to successful firms over a decade	Due to: greenfield entry and closedown exit	Due to: acquisition entry and exit	Due to: reallocation between survivors (selection)
market share	44%	20%	7%	17%
industry type		less concentrated	more concentrated	
2. Changes in productivity over ten years				

Accounting for productivity growth	Due to: new plants of new firms replacing plants of exiting firms	Due to: plant openings by survivors that replace plant closures by survivors	Due to: reallocation between plants of survivors (selection)	Due to: productivity growth within survivors
100%	20%	7%	21%	53%

Source: Baldwin, 1993.

Baldwin's results establish a clear picture of mobility and productivity growth. Bartelsman & Doms (2000) report many, though not all, of the other important findings of the literature on mobility and productivity from longitudinal micro data-sets.

- Even in apparently competitive economies such as the United States there is a large dispersion in measured productivity between the most and the least productive firms at any point in time. Caves et.al. (1992) report that US firms on average are only 67% as efficient as the most efficient firms in their industries, and give comparable findings for the UK, Australia, Korea and Japan. At the plant level, Haskel (2000) confirms for the UK that the ratio of productivity at the 90^{th} to that at the 10^{th} percentile of plants in a narrowly defined sub-industry within a region was still 2.5; for the manufacturing sector as a whole it was 4.8. These findings confirm the extent of the heterogeneity of productivity across plants and firms in well-functioning market economies.
- Bartelsman and Doms (2000) conclude that observed productivity differences are unlikely to be due to measurement error because productivity differences are correlated with wages, use of technology and export success. Moreover, higher productivity plants are found to have higher output growth and to be less likely to exit.
- In line with Baldwin's findings for firms, the change in productivity *within* existing *plants* accounts for less than half of overall productivity growth over time, the remainder being accounted for by a combination of entry and exit, and reallocation of market shares between existing producers (see Foster, Haltiwanger and Krizan, 1998, for the US and Disney, Haskel and Heden, 2000, for the UK).
- This effect is asymmetrically distributed across the business cycle, with within-plant growth becoming negligible or negative during recessions. This suggests that business cycle fluctuations may have contradictory effects: entry may be more inefficient in booms but booms may foster within firm productivity growth, whilst recessions may hasten the exit of weak firms but dampen productivity growth in survivors. Unfortunately there is no clear evidence on these inferences. Some indication that too many low productivity plants enter in booms is provided in Disney, Haskel and Heden, 2000.
- Dispersion of productivity does not necessarily decline over time; indeed Dhrymes (1991) estimated for a balanced panel of large plants in US high-tech industries that the ratio of TFP in the 90^{th} to the 20^{th} percentile increased from about 2 to about 2.75 between 1972 and 1987. This phenomenon is particularly likely to occur in innovative industries where the pace of innovation by leading plants may be faster than the speed of dissemination of best practice from them to others.

These results mean that the process of reallocating market shares amongst existing firms and between firm births and deaths is *empirically* a major part of the mechanism through which productivity advances. In this sense, competition is central to productivity growth. If competitive pressure also influences productivity growth *within* survivors, then the 'accounting contribution' of exit, entry and market selection is a lower bound for the influence of the competitive process on overall productivity performance.[2] After looking at the evidence on mobility in developing countries, we turn to studies that look for the effects of competitive pressure on performance within surviving firms.

Developing countries

Tybout (2000) discusses points of comparison between productivity in manufacturing firms in advanced market economies and in LDCs.

- The most striking difference between the manufacturing sectors in developed and developing countries is the difference in the size distribution of plants and firms (Tybout 2000 Table 1). In the US, 70% of employment is in plants with more than 100 workers and less than 5% in plants with less than 10 workers. In middle income countries, the proportion in large (>100) plants is 50-60% and in micro plants (<10) about 20%. But in 14 poor countries, the mean share of employment in micro plants was 60%.
- The degree of measured cross-sectional productivity dispersion does not appear to be systematically higher in LDCs than in advanced market economies (Tybout, 2000). Caution should be attached to these findings because of their dependence on controversial methods of estimation. In particular, the fact that LDCs are likely to have fewer firms operating at or near best-practice levels makes it more likely that observations of these firms will be treated as reflecting measurement error in stochastic methods of estimation. This possibility is reinforced by the work of Corbo & De Melo (1986) which found Chilean firms to have very low productivity using deterministic estimation methods, and merely average productivity (relative to other countries) using stochastic methods.
- Rates of entry and exit appear to be as high or higher in LDCs than in advanced market economies, though there is evidence that fewer entrants attain large sizes; this may indicate that the degree of competitive pressure they exert on incumbents is more limited (Tybout, 2000).
- The exception to this generalization for LDCs is that there are some signs that in middle income countries such as Taiwan and Korea where the entry costs into higher size categories are very low, market share turnover rates (i.e. the percentage of the market captured over say, five years, by new entrants) are even higher than in advanced (and more slowly growing) market economies (Tybout, 2000).
- In a longitudinal micro study of Israeli manufacturing, Griliches & Regev (1995) find most productivity growth to have come within firms. This was during a period (1979-88) when TFP growth was negligible overall. These results may reflect the weakness of the competitive infrastructure, which inhibited the role of selection and entry

[2] Other studies of panel census data provide similar results as to the mobility of firms and the intensity of the competitive process (e.g. between the US and Canada (Baldwin, 1993, ch. 6, 15), between US and UK, Disney et al. 2000 Table 11). Direct comparisons are difficult because of differences in data sources and in decomposition methods.

effects, as compared with its effectiveness in a more advanced market economy (where as we have seen only about one-half of productivity growth is accounted for by within-firm effects).

- Evidence from Chile, Colombia, Israel and Taiwan show that exiting plants have lower than average productivity and that their productivity declines prior to exit (Griliches and Regev's 'shadow of death' effect). Tybout (2000) also reports that the entering plants are less productive than incumbents on average in Chile and Colombia – this may indicate that the entry process is LDCs is skewed toward the small single-plant firm component of entry, whereas in advanced market economies as discussed above, there is a second entry process of high productivity plants owned by multi-plant firms.

These results indicate that the competitive process is not operating in the same way in LDCs as it is in advanced economies. The problem is not one of stasis but of a more disorderly and less creative turbulence process than is characteristic of advanced market economies. From the limited evidence available, there appears to be a serious problem in the competitive infrastructure that prevents small firms from growing to become serious rivals for the large firms in many industries. Barriers that are maintained by the state between the informal and the formal sector may play a large part in this (Tybout 2000).

4.4.2 The incentive effect: competition and within-firm performance

Advanced market economies

One approach to measuring the impact of competitive pressure on performance within survivors is to estimate the determinants of total factor productivity, looking particularly for the influence of various measures of competition. The idea is to use the change in output as the dependent variable so as to test for the impact of competition on (a) productivity growth using a level term for the competition variable and on (b) the level of productivity using a change in competition term. Panel data is required in order to be able to control for firm fixed effects. Surprisingly, serious empirical analysis of the relationship between competition and productivity levels and growth has taken place only recently even in advanced economies. Using UK data, Nickell (1996) found evidence that the extent of competition measured at firm level affects both the level and the growth of productivity. It was also the case that firms in less concentrated industries had higher TFP growth rates. Nickell found that a 25% increase in market share was associated with a 1% fall in the level of TFP in the long run. He found that the difference in productivity growth between firms at the 80^{th} and 20^{th} percentile of the rents distribution to be about 4 percentage points. However, correcting for the selection bias that exists in a sample of surviving firms suggests that Nickell's estimates are biased upwards.[3]

[3] Disney, Haskel and Heden (2000) argue that small firms are likely to be more prevalent in more competitive markets, and are less likely to be able to withstand adverse shocks. Hence only those with positive shocks survive. This implies a positive correlation between competition and productivity between survivors. They confirm the presence of the selection bias by comparing the estimated elasticities for the competition variables across samples that include survivors only, large firms only and survivors as well as

It was argued earlier that if one of the routes through which competitive pressure raises performance is by its effect in increasing managerial effort, then one would predict that the quality of corporate governance and financial pressure would each be substitutes for competition. Nickell, Nicolatsis and Dryden (1997) tested for this effect using the same data set as Nickell (1996). They find that the impact of competition on productivity growth is lower when firms are under financial pressure or when there is a dominant external shareholder from the financial sector.[4]

Hay and Liu (1997) use the motivation of a 'Willig-type' mechanism to link managerial effort in reducing costs to market share and price-cost margin. When competition is fiercer, the relationship between efficiency and performance is tighter and therefore the incentive is stronger for the manager to raise efficiency. They investigate this hypothesis by estimating the efficiency of 174 large firms in 17 UK manufacturing sectors (using a frontier production function to identify the relative efficiency of firms). Their first finding is that in all but two industries, there are efficiency differences between firms that persist over time and in all but four industries, there is also significant time-varying firm inefficiency. They find that the relationship between relative efficiency and market share varies across sectors, indicating the existence of differences in the pressure of competition across industries. This is quite consistent with the picture of mobility within industries described above and with the hypothesis that competition will work differently in different kinds of industries. They find that the pressure of competition as indicated by a fall in market share leads to subsequent improved performance.

Developing countries

A number of studies have examined the extent to which trade liberalisation exerts competitive pressure on firms. Levinsohn (1993) finds evidence that liberalisation reduces price-cost margins in Turkish industries where pricing above marginal cost was previously significant (he does not test the possibility that marginal costs themselves might respond endogenously). Other studies have examined a more direct link between trade liberalization and productivity levels, and have tended to find a positive association, though Tybout (2000) cautions that problems of endogeneity cannot be ruled out (inefficient industries may lobby harder for protection). In a careful study using panel data on manufacturing firms in Indonesia from 1982-1995, Bartel and Harrison (1999) find that public sector firms that have been protected from import competition are poor productivity performers.

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entrants and exitors. Once selection bias is corrected for, the productivity growth difference between firms at the 80th and 20th percentiles of the rents distribution is only about 1 percentage point. The productivity level effect is reduced by about 50%.

[4] Ng & Seabright (2000) use a panel study of the airline industry to look at the effects of competition and state ownership on costs of operation, exploiting data on employee remuneration to test the hypothesis that firms with market power or weak corporate governance share the resulting rents with employees. They find a strong adverse impact of state ownership on costs, and a weaker but still significant association between costs and market power, but are unable to find a significant interaction between the two kinds of influence.

4.4.3 Other results on competition and performance

- There is some evidence from cross-sections that plants are more productive if they belong to relatively productive firms (see Baily et.al. 1992). If supported by panel evidence this would reinforce what common sense and case-studies already suggest, namely that ownership is an important means whereby know-how is transferred between plants.
- A related aspect of ownership is the finding by Disney et.al. (2000) that, of the part of UK productivity growth that is due to entry and exit, the overwhelming share comes from entry and exit of plants belonging to multi-plant firms (this is a much higher contribution than that found by Baldwin for Canada, for reasons that are not yet clear). This indicates that managerial decision-making guided by market signals is playing a very significant role in overall productivity growth: "pure" market selection is less important (for reasons that may have to do with the inefficiencies induced by barriers to entry and exit).
- A very few studies consider the possibility that competitive pressure may have a non-linear or even non-monotonic (first increasing then decreasing) relation to efficiency. Green & Mayes (1991) show on UK data what was earlier demonstrated by Caves & Barton (1990) for the US, namely a non-monotonic relation between the 5-firm concentration ratio and efficiency, in which the greatest efficiency is associated with intermediate levels of concentration. Bresnahan & Reiss (1991) find a (weakly) monotonic but decidedly non-linear effect of entry on prices, with most of the competitive impact coming from the first two entrants to challenge a monopolist, and a levelling out once market participants number around five.
- Direct evidence on competition and innovations is provided by Blundell, Griffith and Van Reenen (1995, 1999). They find that decreases in domestic concentration ratios and increases in openness to trade are associated ceteris paribus with higher numbers of innovations and patents. This is consistent with the results of a quite different methodology (bench-marking using case studies) in which Baily and Gersbach (1995) found that 'head-to-head' competition in the same market resulted in faster innovation in several manufacturing industries.
- Gonenc, Maher and Nicoletti (2000) surveyed the effect of pro-competitive regulatory reform in previously regulated industries in OECD countries. The study included largely competitive industries such as road freight, air passenger transport and retail distribution. They found clear evidence that liberalization of entry and prices in most cases resulted in improved static and dynamic efficiency, enhanced quality and lower prices to consumers.

We now summarise the evidence that has accumulated on the impact of liberalization and the introduction of competition in the transition countries. We look first at performance and then at policy.

4.5 Competition and performance in transition economies

The transition of the former communist economies represents a dramatic exogenous change in competition. This upheaval may teach us a great deal about how competition becomes established and how it affects the economy, although the large number of changes taking place simultaneously makes for considerable difficulties in establishing causality. The planned economies operated without competition and without entrepreneurs. Ironically, from a Marxian as well as a Schumpeterian perspective, this was a recipe for stagnation. Although many analysts expected substantial productivity gains for transition countries as resources were reallocated *across industries* following price liberalization, this has not occurred. Carlin, Fries, Schaffer and Seabright (2000) show that cross-industry reallocation contributed less than 5% of overall productivity growth in Poland, Hungary and the Czech Republic from 1991-6, a slightly lower proportion than in Austria and France over the same period. The fact that even in Poland in the period of output growth, such cross industry effects have been small, suggests that the first order effect of the introduction of competition is to improve performance *within* industries.

The impact of competition on performance through managerial incentives and through innovation all have resonance in the transition context. In transition (as in the context of developing countries), product innovation refers much more to the introduction of products new to the market than to the introduction of products that are new *per se*. As we have argued above, this might be expected to be a less risky task than that of innovating at the technological frontier. However, the evidence reviewed for developing countries suggests that 'copying' best-practice products, processes and organizational structures by existing firms is by no means straightforward. The analysis of transition reveals that in the short-run, the introduction of a market economy and of the opportunity to copy best-practice can have a deleterious impact on firm performance if it produces 'disorganization'.

To see what this means let us summarize the arguments of Blanchard & Kremer (1997). They model the initial situation prior to widespread market liberalization in transition economies as one of long chains of production involving bilateral monopoly relationships between firms. In a bilateral monopoly, there is one supplier and one buyer. The outcome of a bargaining game between the two is inherently indeterminate. Under central planning, targets were imposed on the pairs of buyers and sellers and this solved the indeterminacy. But once planning ended and markets were introduced, the bargaining problem between pairs of buyers and sellers re-emerged. A collapse in the existing convention could trigger a breakdown of the production chain. The entry of new sources of supply would put an end to the underlying problem but may take considerable time. Until new chains of supply are established, there may be a collapse in output and hence productivity within existing firms. Hence in the short-run more competition may worsen firm performance. Only when the 'disorganization phase' is over, can more competition raise performance. Evidence for the initially deleterious impact of increased competition because of its effects on disorganization has been found by Konings and Walsh (1999) as well as by Blanchard and Kremer (1997).

There are rather few systematic studies of the impact of competitive conditions on enterprise performance in transition countries. As yet, there is no analysis of industry evolution during the transition using census panel data to include entrants, exits, selection effects amongst survivors and performance changes of survivors. The generally poor quality of data and the absence of good measures of competition at firm level suggest that the results may not be robust. Djankov and Murrell (2000) pool 13 studies and report a positive impact of competition on performance. For the countries outside the CIS, they find that both domestic and foreign competition are effective, whilst for CIS countries, it is domestic competition that appears to matter. Brown and Earle (2000) estimate TFP equations for a large panel of Russian firms (firms with more than 100 employees) and find evidence that better transportation infrastructure (in addition to more standard indicators of competition in the product market such as concentration indices and import competition – which were included in the Djankov and Murrell meta-analysis) has a large positive effect on performance. Brown and Earle (2000) also find evidence in the Russian data of the substitution effect between corporate governance and competition found in the UK by Nickell, Nicolatsis and Dryden (1997). The effect on TFP of competition is less in non-state firms.

One specific focus of the joint EBRD and World Bank enterprise survey conducted in 1999 across 25 transition countries was the examination of the role of competition in enterprise performance. Early results were published in the EBRD's *Transition Report* of 1999; more thorough analysis is found in Carlin, Fries, Schaffer and Seabright (CFSS, 2000). They find that competition has an important effect on sales and productivity growth, though there the effect is non-monotonic: some degree of perceived market power is associated with *higher* performance, but competitive pressure is also important, especially pressure from foreign suppliers. Firms with 1-3 competitors in the market for their main product have clearly better performance than either monopolists or firms with more than three competitors. A similar non-monotonic effect is found upon firms' decisions to develop and improve their products, but market power has an unambiguously negative impact on purely defensive (cost-reducing) restructuring activity.

Carlin, Haskel & Seabright (2000) use data from the same survey to show that restructuring activity has a much weaker association with improved performance in countries characterised by poor competitive infrastructure. They conclude that "not only does the absence of a stable business environment make productivity improvements harder to achieve. It also makes it likely that any improvements in productivity that are attained will come at a much greater cost in broken business relationships, needlessly squandered assets, and pointless business failure".

4.6 Competition and competition policy

Evidence from transition countries is also informative about how competition policy law and implementation may influence competition. There does not appear to be systematic evidence on this question from either developing or advanced countries. Dutz and

Vagliasindi (2000a, 2000b, 2000c) present the first attempt to collect systematic data on competition law, implementation and its impact on competition in 20 transition countries. They report wide cross-country differences in both competition policy rules and in implementation. As shown in Table A2 in appendix 2, they classify both laws and implementation along three dimensions: enforcement against anti-competitive acts (legislative bans), advocacy (directives) and institutional effectiveness (legal safeguards). They find a strong correlation between the quality of rules and their implementation across countries.

They investigate the impact of competition policy rules and implementation on competition using two measures of competition. In the first study (Dutz and Vagliasindi 2000b) they measure competition by enterprise mobility: an economy-wide indicator that captures the frequency with which private enterprises expanded employment over the 1997-1999 period, weighted by the corresponding proportion of expanding firms that increase labour productivity. In the second study (Dutz and Vagliasindi 2000c) their dependent variable is the average frequency with which enterprises face a more competitive environment (the proportion of firms facing at least one competitor in the domestic market) in 1999. Both measures are constructed at the country level from the World Bank/ EBRD enterprise survey data used in CFSS (2000).

They find that both rules and implementation (as measured by the indices constructed on the basis of Table A2) improve enterprise mobility and that the effect of implementation is more important (18 observations). They also find that better corporate governance and stronger foreign competition increase economy-wide enterprise mobility. In the second study (20 observations), the proportion of firms facing at least one competitor in the country is regressed on the twice-lagged competition policy implementation variable and the change in implementation over the previous two years. They also use the overall state of privatisation and variables assessing the hardness of enterprise budget constraints as explanatory variables. They find that more effective competition policy implementation results in more intense competition.

5 Regulating competition

Competition has to be adequate to do two things: first, to keep up pressure on existing firms to operate efficiently and innovatively, and secondly, to replace firms that fail to do so with others, without causing excessive and wasteful industrial turbulence. By “turbulence” we refer to those aspects of industrial restructuring that involve substantial fixed costs: most notably the entry and exit of firms and plants, but also the breaking of business relationships that represent significant specific investments, and the abandonment of fixed or intangible assets. Entry and exit of plants and firms are lumpy processes, and they create casualties. The immediate liquidation value of a firm’s assets is rarely anything like the firm’s value as a going concern, even if these assets may eventually be redeployed in more productive combinations elsewhere. Market entry is

notoriously at the mercy of imperfections in capital markets as well as in markets for products, services and human resources.

It seems likely that an adequate competitive infrastructure matters not just because it makes competition more intense, but also because it reduces the turbulence and waste that can sometimes be associated with the selection effect of competition. When market signals are informative, when customers are able to choose on the basis of good information between rival suppliers, when finance is available for productive investments, when the success of firms is determined more by the intrinsic quality of their products than by the accidents of their location or their relations with government, then the selection that occurs through competition is more likely to favour genuinely productive firms. Fortunately, too, these conditions are also ones that favour the maintenance of effective pressure on existing firms, which will be more motivated to improve their productivity if they know that productivity is the most important determinant of business survival.

5.1 Pressure on existing firms

As far as the first task is concerned, most of the evidence we have cited strongly corroborates the economists' hunch that unchallenged monopolists are substantially less efficient than firms that face a credible challenge. The difficulty lies in establishing what constitutes a credible challenge. In most industries in most countries it seems reasonably clear that around three to five[5] seriously competing firms in each market are enough to ensure that most of the benefits of competition are realised without too many of the associated costs (three may of course be too many if economies of scale are very important, an issue we take up again below). This suggests that (again with the exception of a very few industries with unusually large sunk up-front investments) the issue is not so much whether the right degree of rivalry varies between industries or between countries – it does not, or not very much. The issue is rather what it takes for three to five firms to be in the same market, and to be competing seriously. The evidence that would allow one to conclude that this is so will indeed be very sensitive to country and industry circumstances as discussed in section 1.

It is evident that for three to five firms to be in the same market is not an all-or-nothing matter but depends on how closely their products are perceived as substitutable in the minds of buyers. Sometimes this is just a matter of product definition (an issue familiar to anti-trust enforcers). A large volume maker of small cars, a maker of luxury sports cars and a maker of people-carriers will exert rather little competitive pressure on each other. The question is not whether they are or are not in "the same market", but rather that,

[5] Nickell (1996) uses a survey question 'Have you five or fewer competitors in the market for your product(s)?' He writes: 'the evidence provided by Stewart (1990) indicates that this variable has considerable discriminatory power. For example, union wage effects are considerably smaller in 'competitive' firms.' He adds: "Somewhat fortuitously the number five appears to be quite important according to the evidence in Bresnahan and Reiss (1991). They find that increases in the number of firms operating in a market up to around five have significant effects in reducing market power"

given their relatively low substitutability, the presence of three of them is unlikely to constitute “enough” competition.

Even for products that are in principle close substitutes, competition may be relatively weak if there are geographical or informational barriers between them. Defining the relevant geographical market is often treated as a relatively straightforward matter in industrialised countries: it is usually national, sometimes international for certain highly-traded goods, and sometimes sub-national for certain services or for goods tied to service after-markets. In many developing (and transition) countries the poor state of local infrastructure may make it inappropriate to assume national markets even for goods that are in principle highly tradeable. If there are barriers to acquiring premises so that only one producer has an outlet in each town, a consumer wishing to purchase from a rival producer may have to undertake a costly and time-consuming journey that may make the purchase uneconomic. This may encourage *both* producers to raise their prices since their residual demand elasticities are lower (in consequence, firms may specifically seek to strengthen the “switching costs” that make it harder for consumers to arbitrage between them; see Klemperer, 1995). Opportunities for local officials to gain from maintaining such barriers through regulations will reinforce the detrimental impact of weak competition.

Note that this will be a less serious problem for durable products whose purchase price is high relative to the transport costs, and also for those that can be sufficiently precisely described (in a catalogue, say) for consumers to make informed comparisons without seeing the goods in person. However, it is important to note that the theoretical possibility of informed consumers’ arbitraging prices (through internet shopping, for example) is not enough to establish real competition between the producers, unless enough consumers are actually willing to do so to exert powerful downward pressure on producers’ prices. In the case of homogeneous products one would not necessarily expect to see significant inter-regional shopping, since its mere possibility might keep producer prices closely aligned. But for differentiated products where it would be implausible that consumers’ preferences were precisely determined by their location, unless significant inter-regional shopping were observed competition would clearly not be “enough”.

In developing countries it may be also much harder to conclude that the presence of imported products implies realistic competition with those produced domestically. This is partly because of the infrastructural constraints we have already discussed: in large countries, most consumers do not live on or near the border, and may not be in a position to purchase goods that can theoretically be imported (this is particularly important for those products that depend on after-sales service). It is also because of product differentiation; many imports will be of very different quality or specification to those produced domestically. This does not make import liberalisation any less important: indeed, the transfer of know-how through gaining familiarity with imported products is a very important part of the process of development, especially where there is a systematic need to upgrade product quality (as in many transition economies; indeed as we have noted, CFSS 2000, find that perceived pressure from foreign competitors is a more significant determinant of firm performance than perceived pressure from domestic

competitors). But it may limit the strictly competitive benefits that can be expected to flow from trade liberalisation, and suggest that additional measures to strengthen domestic competition may be necessary.

If three or more firms can indeed be said to be in the same market, what determines whether or not they are competing seriously? The credibility of domestic policies to police collusion is only part – though an important part - of the answer. Many LDCs do not have a tradition of forbidding collusion, nor a tradition of press openness that makes it easier for evidence about collusion to surface. Policing collusion may in consequence be far from straightforward, especially if an attempt to do so succeeds only in replacing collusion between firms with collusion between those same firms and their supposed regulators (see Laffont, 1999). These considerations strengthen the argument for improving competitive infrastructure, especially in removing entry barriers and barriers to inter-regional and international trade, since such measures bring into the market competitors that, by history and culture, are less likely to seek collusion with incumbent firms. They also strengthen the case for improving information flows in the economy (the fear that these will help firms to collude more than customers to shop around is largely unfounded, since firms are probably colluding anyway).

Asymmetries in the size or financial power of the competing firms may also be an important obstacle to serious competition. As noted in section 3, in many LDCs firms are on average much smaller than in industrialised countries, yet this is often compatible with the presence of one or two large firms in many industries. Baldwin (1993)'s conclusion for Canada that entry and exit are not just about churning at the margin while a stable core of large firms continues unaffected probably does not apply so clearly to many LDCs. In many instances these asymmetries arise because of regulatory and other obstacles to the growth of small firms. In some cases, therefore, it may be appropriate for competition authorities to take a similarly asymmetric attitude to mergers: to encourage them among second-rank firms while strongly discouraging them among leading firms.

Indeed, collusion through merger is all the more to be feared because some quite good arguments will be marshalled in its favour. Significant competition in the previously sheltered environment of many LDCs is certain to lead to a great deal of exit from the industry, and often rationalisation of industry assets through merger will be less wasteful than their exit and subsequent re-entry. However, many firms seeking to collude through merger will exaggerate the competitive threat (say from imports) in order to justify mergers as a route to increased competitiveness. The competition authorities will need to be particularly vigilant to ensure that mergers are not used among the only existing competitors in an industry in the face of a largely theoretical threat from imports that compete only slightly with domestic production. Conversely, permission of mergers among firms that appear to have large domestic market shares makes sense only if there is visible commitment to strong competition with foreign firms (something that has been conspicuously present in the industrial policy of South Korea – see Amsden & Singh, 1994 – and conspicuously absent from the industrial policy of India, to take two striking examples).

This brings us to the aspect of competition as a source of pressure on existing firms. How can the few industries that are exceptions to the "Three-to-Five" Rule be recognised? There seem to be two distinct types of industry concerned. One kind is industries based on physical networks producing mainly non-traded services. Electricity, gas and water services are the most important; telecommunications used to be considered such a service but it has now become accepted that the scope for competition in telephony is much greater than was once thought. In the case of these services the record of state management has been very poor in almost all LDCs, so that reforms to introduce more commercial behaviour are highly desirable, but the dangers of allowing such behaviour to be unregulated are very great. Here the challenge to a monopoly has to come in part from public institutions and not from competing firms. Fortunately there is by now a large literature on the application of regulatory experience in LDCs, so we need not consider the issue further here.

The second kind of industry where scale economies matter is those where large up-front investments are required to produce traded goods, and particularly industries where the scale of the investment required is endogenous to the intensity of competition perceived by firms. These are industries where (as Sutton, 1991, argues) increasing the size of the domestic market by improving the competitive infrastructure may simply lead to increased concentration. For industries where the up-front investments consist primarily of R&D, international competition can provide most of the necessary ex post competitive challenge. Pharmaceuticals, aerospace, and semiconductors are obvious examples, but it is equally obvious that for most LDCs, investing heavily in these industries is neither a feasible nor a desirable option. High-technology industries do not all have to be large scale, as the success of the Indian software industry has recently demonstrated (see Banerjee & Duflo, 2000), and it is more important to find a balance between a country's skill base and the appropriate use for those skills than to invest in technology per se.

More complex issues, though, are raised by industries where advertising is the main source of endogenous sunk costs (foods, consumer goods, and other branded products being most important). Fortunately the growth of international communications (including satellite television) means that imported goods may need lower investments to break into the domestic market, and therefore it may be feasible to expose domestic producers to foreign competition without limiting their ability to grow domestically. Very few developing countries have markets big enough to support three or more domestic producers of, say, household appliances – but that need not prevent a single such producer from being exposed to vigorous competition from imported brands. In many ways, import competition can be presented as an opportunity and not just a threat to many LDCs: it is what allows them to obtain the benefits of scale without the costs of monopoly. The more vigorous and dynamic developing countries have long ago begun to absorb this message.

5.2 Replacement of poor performers: exit and entry

What about the second task, that of replacing firms that fail to perform? The evidence we have cited suggests that reallocation of production towards more efficient plants, and the

entry and exit of plants, both play an extremely important role in productivity change. In practical terms, this means that the authorities in LDCs need to be prepared for the fact that in many industries, over a decade or so, establishments producing anything between a tenth and a quarter of current output will disappear. This is a natural and more or less inevitable process even in healthy growing economies. Ill-considered attempts to prevent it from happening, by propping up failing firms or by regulations preventing firms from closing subsidiary plants, will only undermine the productivity growth that is the best hope for employment and income growth in the long run. Indeed, it is doubtful whether policy is even capable of preventing exit; attempts to do so usually make the exit process more random rather than reducing its overall incidence. To the extent that plant closure imposes significant social costs, these are best met by explicit retraining and relocation measures and not by barriers to closure in the first place.

Similarly, barriers to entry of new firms and plants need to be streamlined: many LDCs face serious barriers already because of imperfect financial markets and poor infrastructure; it is therefore doubly important to remove unnecessary regulatory obstacles (complex licensing procedures or taxation systems, restrictions on letting of premises or changes of use). Finally, it is important to remember how many obstacles exist not just to entry of new firms but growth from small size to large. (Many policies designed to "favour small firms" inadvertently contribute to this by abruptly removing favourable measures when firms reach a certain size).

Overall, entry and exit of both firms and plants play a role in productivity and innovation that is as inevitable as it is important. Misguided policies may shift their incidence (fewer large firms may fail, but more small firms, for example) but cannot realistically be expected to abolish them altogether. The task of public policy is to ensure that as far as possible this turbulence serves to augment productivity and innovation rather than to undermine them.

6 Concluding comments.

A set of obstacles to the growth of small firms appear to characterize LDCs. These comprise regulatory barriers between the formal and the informal sectors (taxation, business registration and regulation costs, labour costs), physical and communications infrastructure that limit the size of the market and prevent local firms from competing in an extended market. Such obstacles appear to impose a heavy inefficiency on LDCs not just because they preventing the exploitation of economies of scale (which appear often to be surprisingly modest according to Tybout (2000)), but chiefly because they prevent competition from operating effectively. There is plenty of turbulence amongst small firms but the obstacles to entering the formal sector of the economy appear to prevent the 'normal' process through which a proportion of small firms grow to challenge established operators in the market.

This implies that competition policy (in the familiar sense of anti-trust intervention) is only one of the tools that governments need to use to promote competition in LDCs, and

is often far from the most important. The state of transport, telecommunications, finance, regulation and licensing provisions, all contribute to ensuring that new firms can pose a realistic challenge to established firms. This challenge will often be resisted, not least by the lobbying activities of established firms that will deploy arguments about the responsibility of government to prevent “wasteful” competition. These arguments will appear all the more seductive because there is plenty of evidence that competition can indeed be very wasteful at times. However, the clue to making it less wasteful lies not in softening the impact of competition altogether, but rather in improving the competitive infrastructure so that firms recognise that their most effective response to increased competitive pressure lies in productivity and innovation.

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Appendix 1: Concentration and competition in European industries

Table A1 lists the most concentrated industries in the European economy. This data comes from Davies and Lyons (1996). These are the 3-digit NACE industries (of the total of 100) that have a 5-firm concentration ratio in the European market of more than 25% or for which the average national 4-firm concentration ratio is more than 45%.

Industries are classified into three groups according to the extent of trade. 'Local' industries have intra-EU imports relative to apparent EU consumption of less than 15% and extra EU-trade intensity of more than 50%; 'Global' industries have extra EU imports plus exports relative to apparent consumption of more than 80%. 'Intermediate' are all the other high concentration industries.

Type 1 industries are exogenous sunk cost industries and the endogenous sunk cost industries are divided into 2A (advertizing-intensive), 2R (R&D-intensive) and 2AR (both advertizing- and R&D-intensive).

Davies and Lyons argue that the set of industries listed in Table A1 contains most of those that have a potential anti-competitive problem (at a more disaggregated level, some other industries may enter). In particular, the list of industries in the first panel 'Local' is likely to present the most problems for the competition authorities. Even in the European market, these industries are not traded extensively. This 'natural protection' is reinforced by government intervention in several industries through public procurement and regulation as indicated in the table. Most industries in the list have been the subject of competition policy investigations. It is striking that many are advertizing-intensive, which highlights the anti-competitive role that can be played by marketing in industries where international trade is not an effective way of delivering competitive pressure.

They emphasize that for the highly concentrated industries in the third 'Global' panel, all except four are R&D-intensive and highly multinational. These characteristics imply that strategies (e.g. R&D budgets) are being designed at a global level and that competition issues cannot be judged at national or even EU level alone. Of more direct concern to competition authorities are the four Type 1 industries. These are industries producing standardized products with substantial production scale economies and are 'sensitive sectors' in which governments have frequently intervened to protect national firms from being eliminated through restructuring under the pressure of international competition.

Table A1. The most concentrated industries in Europe

Industry	Type	Econ. of scale	Public procure.	Regulation	Multinationality
LOCAL					
cement	1				
sugar	1				
shipbuilding	1			X	
starch	1				
beer	2A			X	
soft drinks	2A			X	X
tobacco	2A	X			

oil and fat	2A				X
chocolate	2A				
rail stock	2R		X		
insulated wire & cable	2R			X	X
soap & det.	2AR				X
paint & ink	2AR				
INTERMED	Type	Econ. of scale	Public procure.	Regulation	Multinationality
glass	1				X
asbestos	1				
fish products	1				
steel-forming cold	1				
distilling	2A				
rubber	2R				X
telecom/measuring equip	2R			X	X
basic chem	2R	X			X
cycle & motor cycle	2R				
tractors/ag. machin.	2AR	X			X
GLOBAL	Type	Econ. of scale	Public procure.	Regulation	Multinationality
steel tubes	1				
non-ferrous metal	1	X			X
abrasives	1				X
iron & steel	1	X			
computers & office mach.	2R		X		X
domestic/office chem.	2R				
man-made fibres	2R	X			
electrical equip.	2R				X
transmission equip.	2R				X
aerospace	2R	X	X		
electric lighting	2R				X
medical instruments	2R		X		X
motor vehicle parts	2R				X
ind. & agric. chem.	2R				
optical instru.	2AR				X
radio & TV	2AR				X
motor vehicles	2AR	X			
domestic electr.	2AR				X

appliances					

Source: Davies and Lyons (1996), pp. 242-243. Economies of scale is defined as MES>500; public procurement and regulated are classified as such in *European Economy* 1990 (cited by Davies and Lyons, Table 14.1); multinationality refers to above average multinational production in the industry.

Appendix 2. Classification of competition policy law and implementation in transition countries (Dutz and Vagliasindi, (2000a, 2000b)

Table A2. Scoring for cross-country comparisons of competition policy law and implementation

	Law		Implementation	
1. Enforcement against anti-competitive acts				
enterprises	*abuse of dominance* IF definition includes more than market share and if abuse of dominance rather than just dominance	0.25	IF violations at least 10% of decisions; half for at least 1 violation	0.25
	hard core cartels IF exemptions exclude practices that restrain competition	0.25	IF violations at least 10% of decisions; half for at least 1 violation	0.25
	IF *horizontal and vertical agreements* are prohibited only if they limit competition	0.25	IF violations at least 10% of decisions; half for at least 1 violation	0.25
	IF only *mergers* that lead to sign. limit of competition are illegal	0.25	IF in at least 10% cases, mergers are modified; half for at least 1 case	0.25
state executive bodies	IF anti-comp. activities of regional or local state exec. bodies are illegal	1	IF violations at least 10% of decisions; half for at least 1 violation	1
fines	IF penalties are not unduly limited	1	IF one of 3 largest fines per year is in 'hard core cartel'	1
2. Advocacy				
infrastructure	IF agency has power to change rules or introduce new rules to promote competition	1	IF at least 50% comments on infrastructure regulations accepted; half if 1	1
privatization	IF agency has power to break up assets (including pro-competition restructuring before privatization)	1	IF at least 50% comments on privatization regulations accepted; half if 1	1
education	IF agency has mandate to disseminate reports to Parliament, public.	1	IF at least one speech directed to consumers; half if to small bus.	1
3. Institutional effectiveness				
independence	IF head of competition authority is either formally independent (appointed/answerable to Parliament) or sufficient checks and balances	1	IF political independence of competition authority not compromised	1
appeal	IF law ensures right of appeal to independent entity	1	IF appeals judged on economic content (rather than on due process)	1
transparency	IF all decisions required to	1	If general public deemed	1

	be published or publicly available		almost always aware of competition law provisions	

Source: Dutz and Vagliasindi (2000a, 2000b, 2000c).