Avoiding distortion of competition from regional aid for large investment projects – theory and application in the multisectoral framework.

Leo Sleuwaegen Enrico Pennings

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#### **0. EXECUTIVE SUMMARY**

For large investment projects regional aid is subject to the Multisectoral Framework which became applicable from 1 September 1998 for an initial period of three years. The Framework was initiated because large-scale investments have the highest potential to distort competition as well as to widen the gap between richer and poorer Member States. Under the Framework the Commission determines the maximum allowable aid intensity by adjusting the regional aid ceiling laid down in the regional aid map. There are three adjustment factors, the capital-labor factor, the regional impact factor, and the competition factor. To each project under investigation, the Framework attaches a competition factor, the value of which depends on the degree to which the sector or subsector in which the project takes place suffers from overcapacity, on whether or not investment is undertaken in a declining market, and on the company's current market share in the relevant market. This study focuses on the competition factor in the Multisectoral Framework and its theoretical underpinnings.

Theory predicts that competitive distortions occur when supporting a particular firm in the market leads to accelerated exit of non-subsizidized firms and/or possibly keeps alive an inefficient subsidized firm. Such distortions are more likely when the relevant market for the good is in decline and there is cutthroat competition. Aid funds may also be used to finance the predatory exit of incumbent firms. For predatory behaviour to be profitable or sustainable the aided firm should possess market power and hold a significant market share. Hence, the competition factor should include a solid measure for market decline, the relevant market and market power.

In a declining industry capacity is substantially in excess of current and future demand. A direct measure is the degree of capacity utilization whereas a negative trend in demand is an indirect measure for a declining industry. However, capacity utilization rates may be inconsistent and future capacity utilization rates are difficult to predict. Moreover, since part of the investment projects is in the services industry, capacity utilization rates may not be defined and the current use of the manufacturing industry as reference value is inconsistent. Also, firms may hold excess capacity because of uncertainty in demand. The study argues that when using capacity

utilization rates as a measure of declining demand for the product concerned, it is better to determine the trend in capacity utilization than the level of capacity utilization. Furthermore, the Commission might consider time-series estimates of capacity utilization as an alternative for industry surveys on capacity utilization. The time-series alternative, proposed by the Federal Reserve, is a consistent measure of capacity utilization and immune to changes in definition. The time series estimator breaks output up into a permanent component (capacity) and a cyclical component (deviation of output from capacity due to demand or supply shocks).

Measuring a negative trend in demand appears to have fewer shortcomings than measuring capacity utilization. Since the reference value is defined as apparent consumption of the manufacturing industry, the reference value seems invalid for projects in the services industry. Since the study also points at aggregation problems when calculating apparent consumption in the manufacturing industry, it is recommended to change the reference value into apparent consumption of total economic activity

The Multisectoral Framework maintains a parallel treatment of decline in demand and overcapacity. However, the use of the overcapacity measure is exempted when capacity utilization data are not readily available. Therefore, for sectors in which capacity utilization data are not readily available, such as in the services industry, only the demand criterion is relevant. Hence these sectors have a higher probability of qualifying for the maximum value of the competition factor. In order to facilitate the use of capacity utilization data the previous recommendations should be incorporated.

Since the aided firm may use the subsidized production installations for producing other products than the one envisaged, the relevant product market includes not only substitutes from the viewpoint of the consumer, but also supply-side substitution. In order to consider if the firm has market power in the relevant market, the study argues that a market share measure is preferable to other measures, such as accounting-based price mark-ups. In the current version of the Multisectoral Framework only the market share for the product(s) concerned prior to undertaking the investment project is considered. Since the aided firm may increase its market share considerably after

having realized the capacity expansion, the study recommends to leave room for the use of predicted future market share by the aided firm.

Any aid to expansion investment projects undertaken by firms with considerable market power should be provided with maximum scrutiny as to prevent predatory behavior. Therefore, the measure of market power should be treated the same as the measures of a declining market and structural overcapacity. So the competition factor should not only be reduced with 25% for firms facing structural overcapacity and/or declining market share, but also for firms which are likely to reinforce a high market share for the product(s) concerned.

When there is serious structural overcapacity and/or an absolute decline in demand, market power has no effect on the competition factor under the current Framework. Since aid to investment projects undertaken by firms with market power and operating with serious structural overcapacity and/or in a market with an absolute decline in demand severely harms competition and may not lead to any progress in regional development, there is clearly a case for prohibiting aid to such investment projects.

Another case for prohibiting aid to investment projects arises in capital intensive industries. In the current Framework the competition factor and the capital/labor factor are taken as independent factors in the calculation of the maximum aid intensity for large investment projects. The study argues that cutthroat competition takes place in capital-intensive industries with a declining market and where no firm wants to adjust its capacity. Therefore, the Commission may consider a maximum aid ceiling of zero for capital intensive investment projects in a sector facing structural overcapacity and declining demand.

The Multisectoral Framework provides firms in a declining market with the opportunity to argue that there is a strong upward trend in the relative growth rate of demand for the product(s). The Commission may include a clause in which it can argue the reverse situation of a strong downward trend in the relative growth rate of demand for the product(s).

Since most of the policy recommendations point at a further reduction in the maximum aid intensity for the investment projects under consideration, there is an increased risk of 'slicing' of the projects as to avoid reaching the thresholds of the Multisectoral Framework as stated in the Introduction. In order to avoid such slicing, thresholds may be tightened at the risk of increased bureaucracy, but with a reduced risk of competitive distortions.

# 1. INTRODUCTION

The EC treaty permits the Commission to approve aid where it fulfils certain objectives, one of which is regional economic development. For large investment projects regional aid is subject to the Multisectoral Framework which became applicable from 1 September 1998 for an initial period of three years.<sup>1</sup> The framework is intended to limit the amounts of regional aid for large investment projects. Any aid planned for large-scale projects under regional aid schemes should be notified individually if one of the following two criteria is met:

- the total project cost is more than EURO 50 million and the aid intensity is higher than 50% of the regional aid ceiling and the aid per job created or safeguarded exceeds EURO 40,000;
- (ii) the aid amount is higher than EURO 50 million.

The Framework lays down rules aimed at reducing the competition-distorting effects by lowering the aid ceiling compared with the maximum ceiling of intensity in the region under consideration. Three criteria form the basis of the assessment: (i) the capital-labor ratio, (ii) the impact on regional development, and (iii) the degree of potential competitive distortions in the relevant market.

This study focuses on the competition factor in the Multisectoral Framework. To each project under investigation, the Framework attaches a competition factor, the value of which depends on the degree to which the sector or subsector in which the project takes place suffers from overcapacity, on whether or not investment is undertaken in a declining market, and on the company's current market share in the relevant market.

The aim of the study is to establish a thorough review on the economic rationale of the elements used to calculate the competition factor. Moreover it intends to give policy advice on the coefficients used by the Framework as to establish the maximum allowable regional intensity for large investment projects.

<sup>&</sup>lt;sup>1</sup> OJ C 107-7.4. 1998, p.7

The study is organized as follows. In section 2 we review the literature on the balance between regional investment aid and distortion of competition and examine the circumstances under which aid is most harmful. We verify the economic justification for the coefficients used for the competition factor. Section 3 examines how the theory on competitive distortions translates in the competition factor. Moreover it analyzes the relation between the competition factor and the capital to labor factor. Finally, section 4 draws conclusions and provides some policy guidelines.

#### **2.** THEORY

Article 87(1) of the EC treaty states that "any aid granted by a member state or through state resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between member states, be incompatible with the common market". However, although this statement seems unambiguous, it does not amount to an absolute prohibition of state aid since there are a number of exceptions to this general rule.

Article 87(2) lists three types of state aid that are always compatible with the common market: firstly, "aid having a social character, granted to individual consumers, provided that such aid is granted without discrimination related to the origin of the products concerned"; secondly, "aid to make good the damage caused by natural disasters or exceptional circumstances"; thirdly, "aid to regions of the Federal Republic of Germany disadvantaged by the division", but since the reunification of Germany in October 1990 this category has become obsolete. Article 87(3) lists four types of state aid that may be exempted by the European Commission. Article 87(3)(a) refers to "aid to promote the economic development of areas where the standard of living is abnormally low or where there is serious underemployment". Article 87(3)(b) refers to "aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a member state". Article 87(3)(c) covers "aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest". Article

87(3)(d) refers to "aid to promote culture and heritage conservation", and there is an Article 87(3)(e) that allows further categories of aid that may be exempted to be added if proposed by the European Commission.

Member states are required to notify the European Commission of any proposed state aid so that the Commission can determine whether the aid qualifies for exemption. The Commission also keeps existing aid under constant review and requires member states to provide it with annual reports.

## 2.1 The Competitive Effects of State Aid

For all cases of state aid, there is an indirect negative aspect since the provision of regional aid requires funds that are obtained through taxation. Taxation is recognized to have a distortionary effect on competition. Moreover, there is an efficiency loss if spending the tax through aid to the firm under the Multisectoral Framework is not the optimal way of aiding the region.

In well functioning markets with many players and where competition is (nearly) perfect, subsidizing one of them has a very small effect on competition because in such markets the potential of a strategic use of the subsidy is limited. However, there are no possible gains to consumers since subsidies will not be passed on to (lower) prices.

When the number of firms decreases and the good to be produced is homogenous<sup>2</sup>, the possibility of a predatory (anti-competitive) use of the subsidy by one of the firms increases. There is case for worry about market competitiveness especially when long-term strategic decisions are to be made by the firms, such as restructuring decisions. The next paragraph takes a closer look at the effect of state aid under imperfect competition.

<sup>&</sup>lt;sup>2</sup> When goods are differentiated, the consumer may directly gain from a new variety. Moreover, demand may be negatively correlated to demand of the other goods, so the analysis is less clear-cut than for homogenous goods.

#### 2.2 State Aid and Imperfect Competition

First a positive effect of state aid is considered when markets are not integrated and competition is imperfect. In this case, as in the oligopoly model considered by Brander and Spencer (1985), a profit-shifting motive would provide an incentive for the member states to give subsidies to their firms. With all member states giving subsidies in the Nash equilibrium one might think, by analogy with the Brander and Spencer model, that the outcome will be a prisoners' dilemma with an outcome that harms all countries. However, all member states will subsidise their firms in the Nash equilibrium until price is equal to marginal cost, which will lead to a Pareto-efficient outcome rather than the usual prisoners' dilemma. All member states giving subsidies eliminates the deadweight loss due to the oligopolistic distortion. Thus, imperfect competition on its own cannot provide an explanation for the question why state aid should be prohibited, but the addition of distortionary taxation or asymmetry in the allowed intensity of aid does provide a solution to the puzzle.

With distortionary taxation, the opportunity cost of government revenue reduces the incentive for member states to give subsidies. However, provided the opportunity cost of government spending is sufficiently low, the member states will still give subsidies in the Nash equilibrium (Neary, 1994). Then, when all member states reduce subsidies, there may be a welfare gain if the increase in the deadweight loss from the oligopolistic distortion is outweighed by the reduction in the deadweight loss from distortionary taxation (Collie, 2000).

The deadweight loss from the oligopolistic distortion decreases with the elasticity of demand. So, when an increase in prices causes a relatively large fall in demand, welfare gains from a reduction in the oligopolistic distortion are relatively low. Hence, especially in industries where competition is fierce or demand is elastic and demand is declining, possible welfare gains will be rather small, giving a strong rationale for prohibiting subsidies. We will consider declining industries in more detail in paragraph 2.3.

Whereas distortionary taxation may offset the benefit from a reduction in the oligopolistic distortion, the selective use of subsidies has a direct and clearly negative

impact on the possible benefit of the subsidy. If subsidies are allowed in some areas but prohibited in other areas and are used by firms that do not need the funds, the welfare gain from a decrease in the oligopolistic distortion vanishes because firms which are not granted with a subsidy cannot use the subsidy resources to reduce prices and to intensify competition. These companies will have to use their own resources to keep up with the subsidized firm or are forced to leave industry thereby decreasing competition. Subsidized firms may use the funds to finance predatory behavior and mould the industry structure to their advantage. Only firms with sufficient market power will find such a strategy to be profitable. (Martin, 1988) Therefore the targeted use of regional aid has a potentially more harmful effect on competition than nonexclusive aid.

## **2.3 Declining Industries**

In a declining industry, capacity is substantially in excess of current and expected future demand, and there are rigidities that retard the reallocation of capital and/or labor toward growing industries. Typical examples of declining or 'sick' industries are railroading, coal, civilian ship building, steel, and textile manufacturing. Unless there is some artificial restraint such as government price regulation or cartel agreements, competition is likely to drive prices down to the average variable cost. Since prices are well below average cost in this case, firms make negative profits so that shrinking demand creates pressure for total capacity to be reduced. When firm's cost structures include a high proportion of fixed and sunk costs, prices can continue to be below average cost for many years<sup>3</sup> since producers find it preferable to continue operation and cover at least their variable cost than to shut down and have their investments wiped out completely. Each firm in the industry has an incentive to continue operations and see its competitors make reductions in industry capacity.

Ghemawat and Nalebuff (1990) show that large firms will be the first to make capacity reductions in order to restore industry profitability. In (future) declining markets, any new investments in capacity will lead to earlier capacity reduction by the largest firm. Regional aid will distort competition in a 'sick' industry because aid may help the recipient firm to charge a price that is lower than the competitors' price and

<sup>&</sup>lt;sup>3</sup> More precisely until demand picks up or the plant reaches the end of its useful life.

hence to survive in a declining market where the competing firms reduce capacity and restore industry profitability. Although average variable costs are the same for all firms in an open market, the average costs are smaller for the aided firm, because regional aid reduces the fixed (sunk) cost of the investment.

The aid, by artificially lowering the costs of the undertaking, weakens the competitive position of other producers in the Community and therefore has the effect of further reducing capacity utilization and depressing prices, to the detriment, and possible withdrawal from the market, of producers that have hitherto survived owing to restructuring, productivity and quality improvements undertaken from their own resources. Thus, the regional aid cannot be considered as contributing to a development which, from the Community point of view, would be adequate to counteract the trade-distorting effects of the aid.

## 3 APPLICATION TO THE MULTISECTORAL FRAMEWORK

As argued in the previous chapter, regional aid has harmful effect on competition particularly in declining industries. Therefore any framework that aims to limit competitive distortions of regional aid solid needs to identify declining industries. An industry is declining<sup>4</sup> if industry demand is decreasing in a particular area and excess capacity cannot be reallocated to a growing industry.<sup>5</sup> Two observations with respect to the definition are in place, one regarding excess capacity and the other regarding falling demand. Paragraph 3.1 and 3.2 analyzes both issues extensively.

From an antitrust perspective, the growth of any firm with considerable market power in its relevant market should not be stimulated with aid. The antitrust laws prohibit

<sup>&</sup>lt;sup>4</sup> Paragraph 7.8 of the Multisectoral Framework states that 'the market for the product(s) in question will be deemed to be declining if, over the last five years, the average annual growth rate of apparent consumption of the product(s) in question is significantly (more than 10%) below the annual average of EEA manufacturing industry as a whole, unless there is a strong upward trend in the relative growth rate of demand for the product(s). An absolutely declining market is one in which the average annual growth rate of apparent consumption over the last five years is negative.

<sup>&</sup>lt;sup>5</sup> Note that investments in capital are often sunk costs, which means that they have no resale value and cannot be used for another purpose. Especially in declining markets where the prospects for making new investments are poor, it is difficult to sell equipment to other firms.

business practices that harm consumers through higher prices, lower output, or reduced product quality or choice, slowed innovation, or other anticompetitive effects. Antitrust laws must define product and geographic markets and ascertain the firm's position in those markets to determine whether, for example, the firm, after completing the investment, is using the funds to finance predatory behavior and ,in the longer run, has the ability and incentive to raise or maintain prices above levels that would exist in the absence of the investment. Such behavior is only likely and profitable if the firm has sufficient market power. (Martin, 1988) The market power inquiry is thus a valuable tool in *predicting* the potential anticompetitive effects of the regional aid. In the case of state aid, the anticompetitive effect from an increase in the firm's market power should be weighed against the positive effects on regional development. Paragraph 3.3 discusses the use of market share for the purpose of preventing any unduly distortion of competition. In paragraph 3.4 we examine the definition of the relevant market and its implementation in the Framework.

The competition factor is just one out of three factors that affects the outcome of the investigation within the Multisectoral Framework. The regional development factor and the capital to labor factor constitute the other factors in the Framework. Paragraph 3.5 investigates if there is, or should be, dependence between the capital/labor factor and the competition factor.

#### **3.1 Excess Capacity**

First, the mere existence of (current) structural overcapacity<sup>6</sup> is not a signal of a declining market. Firms may build excess capacity because they anticipate a growing demand and build their factories so that they can readily increase output when demand increases. The high tech (chip) industry is a good recent example for such an industry. Since decreasing demand fits neatly with the definition of a declining market, it appears a better measure for investigating potential distortions of competition. Nevertheless, a further examination of the overcapacity criterion is worthwhile.

<sup>&</sup>lt;sup>6</sup> From paragraph 7.7 of the Multisectoral Framework 'structural overcapacity is deemed to exist when, on average over the last five years, the capacity utilization rate of the relevant sector is more than two percentage points below that of manufacturing as a whole. Serious structural overcapacity is deemed to exist when the difference with respect to the average for manufacturing is more than five percentage points.

The existence of excess capacity should be defined relative to some benchmark and within some reference period. In the guidelines of the Multisectoral Framework 'the Commission will consider, at the Community level, the difference between the average capacity utilization rate for manufacturing industry as a whole and the capacity utilization rate of the relevant sector or subsector. In order to allow for cyclical fluctuations in relative capacity utilization rates, the reference period will be the last five years for which data are available.' Moreover, from a practical point of view, the right level of statistical level of aggregation for the analysis of the product concerned should be determined. Since a high level of aggregation levels out possible existence of overcapacity in the particular subsector, the level of aggregation should be as low as possible. Taking into account the scarcity of data on capacity utilization, the best level of aggregation seems to be NACE-2.

With respect to the use of the average capacity utilization for manufacturing industry as a whole as benchmark, it should be noted that not all projects under investigation in the Multisectoral Framework are within manufacturing.<sup>7</sup> Though paragraph 3.4 of the Multisectoral Framework leaves the opportunity to investigate solely whether a market is decline when sufficient data on capacity utilization are not available, it does not rule out the use of capacity utilization rate in the services industry in order to determine the competition factor.<sup>8</sup> There are no theoretical grounds for comparing the capacity utilization rate in the manufacturing industry as a whole and the capacity utilization rate in a particular sector of the services industry. For example, though manufacturing output can often be stored and put in inventories, services are 'perishable'. Hence there is a downward pressure on the capacity utilization rate in the services industry. Another point to make with regard to the exception in paragraph 3.4 is that industries for which no data on capacity utilization are available are more likely to receive the maximum competition factor of 1, so the exception of which in particular projects in the services industry will presumably profit, does not provide a fair treatment of all investment projects.

 $<sup>^{7}</sup>$  E.g., case no. N785/99, where the relevant product market is defined as hotels and motels with restaurant.

<sup>&</sup>lt;sup>8</sup> Note that capacity constraints are present in almost all sectors of the services industry. Capital as well as labor can be considered as quasi-fixed factors in the services industry through large adjustment costs of fixed capital (e.g. the number of rooms in a hotel) or human resources (because of hiring/firing cost).

From a theoretical point a view, holding excess capacity is optimal for firms under different market structures when there is uncertainty about demand.<sup>9</sup> The optimal amount of excess capacity increases with demand uncertainty, so that manufacturing firms operating in markets characterized by a relatively high uncertainty in demand hold in equilibrium more excess capacity than the average manufacturing firm. The holding of excess capacity is the result of differences in uncertainty about market demand and can therefore not be exclusively attributed to lower demand.

Besides demand uncertainty, there may be other factors why a firm produces with a capacity utilization different from the manufacturing average, such as technical requirements in the production process. Therefore, a more appropriate measure of the existence of capacity that exceeds the equilibrium or optimal level of capacity would be the trend in total capacity in the industry under consideration. A clear decline in capacity over the last years indicates that capacity is adjusting to the optimum level of capacity, most probably because of a declining market. Subsidizing the creation of new capacity, which goes against the trend in total capacity, could distort market competition. Whereas the guidelines use a reference period of 5 years for which data are available in order to allow for cyclical fluctuations in the relative capacity utilization rates, this reference period should be used to measure the trend in the capacity utilization rate of the particular industry.

#### **3.2 Falling demand**

Second, there is a need to define exactly what is meant by falling demand. For structural overcapacity to exist, demand should have been declining in the past, and expected demand should continue to decline. Not only cyclical variations in demand are excluded, also permanent, but weak, negative shocks to demand do not induce a necessity of capacity reduction. In the latter case firms benefit from the option of expanding capacity utilization when demand picks up (Harbord and Yarrow, 1998).

<sup>&</sup>lt;sup>9</sup> Sheshinki and Dreze (1976) analyze capacity utilization in a competitive equilibrium. Fagnart, Licandro and Sneessens (1997) and Gabszewicz and Poddar (1997) examine capacity utilization under imperfect competition.

Moreover, demand should be (a) defined relative to some reference value and (b) expressed in the appropriate unit. With respect to the benchmark, the same argument as in the previous paragraph for the measurement of excess capacity applies. Paragraph 3.2 in the Multisectoral Framework defines the reference value as the growth rate of apparent consumption in the manufacturing industry as a whole. Though the Multisectoral Framework does not exclude projects that fall within the services industry, the reference value excludes the services industry. Considering apparent consumption of total economic activity in the EEA would be more appropriate.<sup>10</sup>

Apparent consumption is defined as production plus imports minus exports. The definition raises a theoretical and an empirical issue. The empirical issue with respect to the measurement of apparent consumption concerns the provision of the appropriate data. Up to 1988 the Eurostat Statistics on trade use the Nimexe 6-digit codes to identify different products. In 1988 Eurostat replaced the Nimexe nomenclature with CN (Combined Nomenclature). Since the manufacturing industry is determined using the NACE-code, which is an activity-based statistic rather than a product-based statistic, aggregation problems arise. For a product under consideration, identified at a lower level of aggregation than the 4-digit NACE-code through the 6-digit CPA (Classification of Product by Activity), there exist a cross-reference link between CPA and Nimexe. However, for the reference value, which consists of the manufacturing industry as a whole, such a cross-reference is arduous. Therefore, as in the first paragraph of this section, the use of apparent consumption of total economic activity rather than apparent consumption of the manufacturing industry as a whole would be more suitable for the measurement of the reference value.

The theoretical issue relates to whether to measure apparent consumption in volume or in value terms. Though theoretically, capacity utilization should be measured in volume terms, the use of value data has three distinct advantages over utilizing volume data. First, the reference value is in not in volume terms but in value terms. Second, in competitive markets with overcapacity, price wars often have a positive

<sup>&</sup>lt;sup>10</sup> Since at the moment of this writing the services industry is growing faster than the manufacturing industry, manufacturing projects are at present more likely to suffer reductions in the permitted aid

impact on the volume of the good sold, while the price of the good deteriorates. While volume increases in such markets, value decreases, suggesting a 'sick' industry. Third, value data are better available than volume data.<sup>11</sup>

## **3.3 Market Power**

Three proxies have received attention in the literature for determining whether a firm (or group of firms) has the ability and incentive to raise or maintain prices above competitive levels (or achieve other anticompetitive effects): (1) the Lerner Index; (2) market shares; and (3) the Herfindahl-Hirschman Index ("HHI"), which turns market shares into a measure of market concentration<sup>12</sup>. The Lerner Index is a method that theoretically could be used to determine whether firms possess market power, but as discussed below, it has proven impractical to apply to transactions. Instead, courts and agencies most typically employ market share and HHI analysis.

The economic definition of classical market power is the firm's ability to maintain prices above competitive levels at its profit-maximizing level of output. For a perfectly competitive firm, the competitive price level is that firm's marginal cost. The Lerner Index attempts to measure classical market power directly by subtracting a firm's marginal cost from its price, and then dividing the result by the firm's price. Firms that lack market power show ratios close to zero. As the ratio increases from zero to one, it is more likely that the firm possesses significant market power. Though the Lerner Index seems to offer a quick and easy insight into a firm's market power, the Lerner Index has not proved particularly useful to courts or agencies because it is often difficult to apply in order to assess either current or likely future market power. There are both theoretical and practical difficulties in using the Lerner Index to measure market power. The main theoretical difficulty is that the Lerner Index does not offer a competitive benchmark except in perfectly competitive markets, where the Lerner Index should be zero. The most significant practical obstacle to broader application of the Lerner Index is determining the firm's marginal cost of production at any given point in time. Without a measurement or reasonable estimate of marginal

intensity. Nonetheless, there is no indication that the difference in growth rates is permanent, so there should be no need for a differential threshold of services and manufacturing.

<sup>&</sup>lt;sup>11</sup> E.g., the Industry Federation provides value data rather than volume data.

<sup>&</sup>lt;sup>12</sup> The HHI squares the market shares of all firms in the relevant market to arrive at a statistical measure of concentration.

cost, the ratio is incalculable. Moreover, exogenous economic factors, such as shifts in consumer demand or the cost of inputs, could result in dramatic and misleading changes.

Because application of the Lerner Index may be difficult or inaccurate, courts and agencies have typically focused on other measures of market power. Foremost among these measures is market share, the percentage of sales or capacity that a firm controls in a relevant market. Market share is indirectly related to the firm's ability to set price above marginal cost.<sup>13</sup> Hay (1992) argues that market shares may provide more effective insight into market power than the Lerner Index, because prices may be higher because of a superior good rather than the exercise of market power. Hay also argues that market share calculations permit courts and agencies to determine how many sales the defendant will lose if it raises prices.

But market share analysis has attracted its share of criticism as well. Since market share calculations require product and geographic market definitions, they can become complex and expensive undertakings. If product and geographic markets are defined too broadly, market shares will underestimate the firm's ability to raise or maintain prices above competitive levels in the relevant market. Because market shares are based upon historical data, they may be less useful in analyzing potential competitive effects in volatile or dynamic markets. Historical market share data may not reflect the ability of actual and potential competitors to increase production in the relevant market through expansion or entry.

Variations in three factors - fringe output (including new entry), supply substitutability, and elasticity of demand - can result in dramatically different inferences that could be drawn from market shares. Landes and Posner (1981) demonstrate that differences in supply substitution possibilities and demand elasticities can allow two firms with very different market shares (one with 23%, the

<sup>&</sup>lt;sup>13</sup> Landes and Posner (1981) note that the Lerner Index is the reciprocal of the demand elasticity facing the firm at its own profit-maximizing level of output. They demonstrate that for a given level of market-demand elasticity, a firm's own-demand elasticity decreases as its market share increases. A lower own-demand elasticity results in a higher ratio under the Lerner Index. Thus, for any given demand elasticity in a properly defined market, higher market shares reflect greater ability to set price above marginal cost.

other with 61%) to set price 20% above marginal cost. According to Landes and Posner, market share calculations based upon capacity will be more accurate than revenue-based measures because they will incorporate supply substitutability and expansion.

It is important to note that in industries with increasing returns to scale and network effects (such as industries within the new economy) a high market share per se does not indicate abuse of market power. Under increasing returns to scale, production is more efficient when output increases. In the presence of network effects the utility of consuming the good increases as the number of users grows. Examples of network goods are software, games, and DVDs. In these industries the market share of 40% above which the Framework assumes that there is a risk that the maximum level of aid normally permitted in the region concerned will unduly distort competition<sup>14</sup> is rather low. From the arguments in the previous paragraph the threshold market share may be rather low for industries with a high elasticity of demand.

Nevertheless market share seems to be the best criterion for determining market power. Though the Multisectoral Framework relates to the actual market share prior to making an application for aid, ideally the firm's market share for the product concerned after having undertaken the proposed capacity expansion should be examined. Especially when the firm's proposed capacity expansion is considerable, its future market share better reflects the potential distorting effects on competition than the firm's current market share. The main weakness of using future market share is the uncertainty about competitors' reactions to the capacity expansion by the aided firm. In spite of this weakness, there is a case for allowing a footnote with respect to the 40% market share criterion making an exception for firms with a current market share of less than 40% for the product concerned, but with a market share that indisputably will exceed 40% after having realized the proposed capacity expansion.

## 3.4 The Relevant Market

With an appropriately defined relevant market, market share appears the best measure for market power. In paragraph 7.6 of the Multisectoral Framework 'the relevant

<sup>&</sup>lt;sup>14</sup> Paragraph 3.6 of the Multisectoral Framework.

market(s) for determining market share comprises the products envisaged by the investment project and, where appropriate its substitutes considered by the consumer (by reason of the products' characteristics, their prices and their intended use) or by the producer (through flexibility of the production installations)<sup>15</sup>. The relevant geographic market usually comprises the EEA or, alternatively, any significant part of it if the conditions of competition in that area can be sufficiently distinguished from other areas of the EEA. Where appropriate the relevant market(s) may be considered to be global.'

The definition of the relevant market for determining market share and the relevant geographic market in the Multisectoral Framework closely follows the definitions of the relevant product market and the relevant geographic market in the European antitrust regulations.<sup>16</sup> There are two main distinctions. First, the definition of the relevant geographic market in the Multisectoral Framework *explicitly* takes into account supply-side substitutability. If the product installations are flexible, the aided facilities can be used for other means than its intended use. Therefore, the relevant product market should include supply-side substitution as well. Nevertheless in the Commission notice on the definition of the relevant market for the purposes of Community competition law (OJ C 372) leaves room for considering the competitive constraints from supply-side competition if suppliers are able 'to switch production to the relevant products and market them in the short term without incurring significant additional costs or risks in response to small and permanent changes in relative prices.' Another reason for this explicit statement is that the powers of legal investigation in the state aid context are limited when compared to antitrust.

Second, the definition of the relevant geographic market in the Multisectoral Framework prefers in general the EEA as the relevant geographic market, whereas the

<sup>&</sup>lt;sup>15</sup> If the investment concerns the production of intermediates, the relevant market may be the market for the final product if most of the production is not sold on the open market.

<sup>&</sup>lt;sup>16</sup> The Commission notice on the definition of the relevant market for the purposes of Community competition law (OJ C 372) states: 'A relevant product market comprises all those products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use. The relevant geographic market comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighbouring areas because the conditions of competition are appreciably different in those areas.' Footnote 1 of this notice states that the definition is not applicable to state aid.

Commission notice on Community competition law does not explicitly point at a particular region. The Commission decided in twelve out of the fourteen cases that have been under investigation in the Multisectoral Framework that the relevant geographic market comprises the EEA. The two cases in which the Commission decided the relevant geographic market as local were in the tourist (N785/99) and in the recreational (N582/99) industry.

## 3.5 The Competition Factor in Relation to the Capital/Labor Factor

Out of the regional impact factor and the capital to labor factor, especially the latter factor needs some further attention as capital plays an important role in the competitive arena<sup>17</sup>. As argued in paragraph 3.1 capacity is often sunk, difficult to adjust, and is the result of past lumpy capital investment. Since industries utilizing a relatively large amount of capital are less flexible than labor-intensive industries, cutthroat competition takes place in capital-intensive industries<sup>18</sup> with a declining market and overcapacity where no firm wants to adjust its capacity. Therefore, theoretical arguments indicate a positive correlation between the capital/labor factor and the competition factor.

Empirical evidence, however, does not support this view. The correlation between the competition factor and the capital/labor factor in the fourteen decisions that were made since the adoption of the Multisectoral Framework is negative.<sup>19</sup> The reason that no positive correlation is found might be that projects in a sector facing structural overcapacity are not in a sector with a declining market or vice versa.<sup>20</sup> Though it is not entirely clear whether the competition factor is correlated with the capital/labor factor or not, it is not difficult to understand that subsidies to a capital-intensive industry in a declining market are especially harmful. Cut-throat competition and sick industries prevail in industries which are not flexible. Sick industries in the past such

<sup>&</sup>lt;sup>17</sup> The capital-labor factor is defined as the total amount of proposed capital divided by the number of jobs created or safeguarded.

<sup>&</sup>lt;sup>18</sup> Conform paragraph 3.10 of the Multisectoral Framework a project is defined as capital-intensive when the ratio of new capital to the number of jobs created or safeguarded exceeds Euro 500k. Furthermore it is assumed that capital-intensive projects take place in capital-intensive industries so that the term capital-intensive refers both to projects and industries.

<sup>&</sup>lt;sup>19</sup> To be precise, -0.273.

<sup>&</sup>lt;sup>20</sup> In order to test this hypothesis, both capacity data and market demand data are needed. Under the current Framework, these data are not readily available because the competition factor only depends on the existence of overcapacity and/or a declining market rather than the existence of overcapacity *and* a declining market.

as railroading, coal, civilian ship building, steel, and textile manufacturing, point out that they are capital intensive and have lumpy capacity. Labor-intensive industries are more flexible and are less likely to lead to competitive distortions because adjustments in capacity incur less sunk costs.

#### **4 POLICY RECOMMENDATIONS**

In balancing the need for a reduction in state aid and the aim to achieve more economic and social cohesion among member states, it should be accepted that some regional aids have to be accepted for development reasons even if they distort competition to some extent. The most important aspect in granting regional aid is maintaining the greatest possible transparency and control in the Multisectoral Framework. Lack of transparency and non homogeneity of national granting is a reason for distortion of competition in the field of regional aids. This is due to the fact that some Member States adopt their aids via duly published legislative instruments (and thus known to the Commission and to all interested third parties) whereas other Member States use, for similar aids, administrative instruments which are not made public.

With regard to the competition factor that is used in the Multisectoral Framework to calculate the maximum aid intensity for the companies in the assisted area concerned, the following recommendations are made.

1. The threshold market share is especially relevant when there is structural overcapacity or the market is in decline. However, any aid to expansion investment projects undertaken by firms with considerable market power should be provided with maximum scrutiny as to prevent predatory behavior. Since the Multisectoral Framework aims to balance benefits from increased social and economic coherence against the disadvantages from possible competitive distortions, the measure of market power should be treated the same as the measures of declining demand and overcapacity. So there is a case for revising the project as defined under 1-(iii) of paragraph 3.10 in the Multisectoral Framework to 'Project which result in a capacity

expansion in a sector facing structural overcapacity and/or a declining market *and/or* which is likely to reinforce high market share'.

2. Also, when there is serious structural overcapacity and/or an absolute decline in demand, market power has no effect on the competition factor under the current Framework. Since aid to investment projects undertaken by firms with market power and operating with serious structural overcapacity and/or in a market with an absolute decline in demand severely harms competition and may not lead to any progress in regional development, there is clearly a case for prohibiting aid to such investment projects.

3. Another case for prohibiting aid to investment projects arises in capital intensive industries. In the current Framework the competition factor and the capital/labor factor are taken as independent factors in the calculation of the maximum aid intensity for large investment projects. Given the arguments in paragraph 3.5, the Commission may consider a maximum aid ceiling of zero as well for capital intensive projects in a sector facing structural overcapacity and declining demand.

4. From the arguments in chapter 2 and 3, the Commission should reconsider the parallel use of declining market and overcapacity and the exemption of the overcapacity measure when capacity utilization data are not readily available. It should consider the use of trend in capacity rather than the level of capacity utilization as to examine whether there exists (structural) overcapacity or not. Furthermore, as to facilitate the use of capacity data, the Commission might consider time-series estimates of capacity utilization as an alternative for industry surveys on capacity utilization. The time-series alternative, proposed by Kennedy (1998) of the Federal Reserve is a consistent measure of capacity utilization and immune to changes in definition. The time series estimator uses the Hodrick Prescott filter as to break output up into a permanent component (capacity) and a cyclical component (deviation of output from capacity due to demand or supply shocks). The time series estimator is easy to use because it only requires output data. Further details can be found in Appendix 1.

5. In paragraph 7.7, the Multisectoral Framework provides firms in a declining market with the opportunity to argue that there is a strong upward trend in the relative growth rate of demand for the product(s). It is recommended that the Commission include a clause in which it can argue the reverse situation of a strong downward trend in the relative growth rate of demand for the product(s); e.g. in the case that the growth rate of apparent consumption was significantly less (>15%) than the reference value during the last *two* years and industry studies point at further doom in the relevant sector, while the average growth rate of the apparent consumption of the product(s) in question over the last *five* years is less than 10% below the reference value.

6. As argued in paragraph 3.1 and paragraph 3.2, the reference value for capacity utilization and apparent consumption would be more appropriately defined with respect to total economic activity (manufacturing and services) rather than manufacturing industry as a whole.

7. Paragraph 3.3 argues that there is a case for allowing a footnote with respect to the 40% market share criterion making an exception for firms with a current market share of less than 40% for the product concerned, but with a market share that indisputably will exceed 40% after having realized the proposed capacity expansion.

Since most of the policy recommendations point at a further reduction in the maximum aid intensity for the investment projects under consideration, there is an increased risk of 'slicing' of the projects as to avoid reaching the thresholds of the Multisectoral Framework as stated in the Introduction. In order to avoid such slicing, thresholds may be tightened at the risk of increased bureaucracy, but with a reduced risk of competitive distortions.

Applying the policy recommendations to the previously mentioned fourteen decisions that were made since the adoption of the Multisectoral Framework shows, however, that most decisions are unaffected by the proposed policy changes; see Appendix 2. Since (1) and (2) of the policy recommendations point at an extended use of the market share criterion in determining the competition factor, foremost reason for the modest impact of the policy changes is that in none of the fourteen cases the firm has

a market share of more than 40%, nor is expected to have a market share of more than 40% after realizing the investment project.

Policy change (3) affects three cases. Cases N553/99, N787/99 and N291/00 are capital-intensive projects under the definition of footnote 18 *and* are noted to take place in a relevant market with structural overcapacity (N787/99) or in a relevant market that is in decline (N553/99 and N291/00). Since capacity utilization data are not available for the float glass market in which both project N553/99 and project N291/00 are proposing to invest<sup>21</sup>, the precise effect of the policy change cannot be examined for the two proposals.<sup>22</sup> As a second best solution, the competition factor is calculated using a 50% probability of overcapacity, resulting in a competition factor of 0.38 for both cases within the float glass market.

The relevant product market of case N787/99 is the cement industry. From the 2000 Annual Report on the cement industry, published by the Cembureau, there seems to be evidence that the cement market is in decline. Given the existence of overcapacity in the cement market, and taking into account the amount of capital in relation to the number of jobs created or safeguarded, the competition factor is zero under the proposed policy change.

The proposed policy changes under (4)-(7) are of a more general nature. In order to assess if there is a case of a strong downward trend in the relative growth rate of demand for the product(s) or a market share of more than 40% after the investment project has been realized requires a thorough knowledge of every request for aid, which is built up during the investigation of each case. The impact of including the service industry in the reference value for capacity utilization and apparent consumption will have a positive impact on the reference value during the recent years due to the relatively large recent growth in the services industry. As a consequence, some of the 14 cases might have taken place in a declining market rather than in a non-declining market or in a market with structural overcapacity where this was differently judged under the current Framework. Since there appear to be few 'borderline' cases, the impact is expected to be small.

<sup>&</sup>lt;sup>21</sup> As stated in the Commission's decision letter to the relevant Member State.

<sup>&</sup>lt;sup>22</sup> With output data of the float glass market within the EEA, the time-series estimate might be applied.

#### APPENDIX 1: TIME SERIES ESTIMATES OF CAPACITY UTILIZATION

The Hodrick-Prescott (HP) filter decomposes a time series in a permanent and a transitory component. The permanent component can be regarded as the trend or growth component while the cyclical component comprises the variations that occur at higher frequencies and cannot be explained by slowly changing demographic and technology factors and the accumulation of capital stocks. The permanent component of output can be used as a measure of capacity. Subsequently, capacity utilization is the ratio of output and the HP permanent component of output.

More formally, let y(t) be output at time t, and let T denote the total number of observations. Then y(t) can be written as y(t)=g(t)+c(t) where g(t) is the estimated permanent component and c(t) is the estimated cyclical component. The permanent component is solved as follows:

$$\min_{g(t)} \left\{ \frac{1}{T} \sum_{t=2}^{T} (y(t) - g(t))^2 + \frac{\lambda}{T} \sum_{t=2}^{T-1} (\Delta g(t) - \Delta g(t-1))^2 \right\},\$$

and c(t) follows by the definition of y(t). Parameter  $\lambda$  is set prior to estimation and controls the smoothness of the trend component. If  $\lambda$  is set to zero, there is no penalty for variation in the second difference of the growth component, in which case g(t)=y(t) for all t. At the other extreme, as  $\lambda \rightarrow \infty$ , the minimization requires that  $\Delta g(t)$ - $\Delta g(t-1)=0$  for all t, and the problem reduces to minimizing the first term at the right-hand side of the equation. The solution to this expression is a linear trend.

Kennedy (1998) suggests a parameter value  $\lambda=1/6$  for capacity utilization purposes. Using quarterly data from 1952 to 1992, he shows that the correlation between the Federal Reserve Board's series on capacity utilization and the capacity utilization time-series estimated with the HP-filter is 0.81 for the manufacturing industry. The result suggests that the HP time-series alternative is worth considering when capacity data are not readily available.

Case	Competition Factor	<b>Revised Competition Factor</b>
N94/99 (Spain)	1	1
N553/99 (Greece)	0.75	0.38
N582/99 (Italy)	1	1
N583a/99 (Italy)	0.75	0.75
N583b/99 (Italy)	0.75	0.75
N735/99 (Italy)	0.75	0.75
N736/99 (Italy)	1	1
N737/99 (Italy)	0.75	0.75
N750/99 (Germany)	1	1
N785/99 (Italy)	1	1
N787/99 (Italy)	0.75	0
N35/00 (Germany)	1	1
N291/00 (France)	i) 0.75 ii) 1	1) 0.38 ii) 1
N480/00 (UK)	1	1

# APPENDIX 2: RESULTS OF PROPOSED POLICY CHANGES

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