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Cyclical Market Power

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"Gather ye rosebuds while ye may,
Old Time is still a-flying:
And this same flower that smiles to-day
To-morrow will be dying."[2]

"Nature's first green is gold / Her hardest hue to hold
Her early leaf's a flower / But only so an hour
Then leaf subsides to leaf / So Eden sank to grief
So dawn goes down to day / Nothing gold can stay."[3]

Abstract

This paper examines temporal aspects of market power. It explores an industry – the Israeli PVC industry – in which the dominant firm's market power fluctuates cyclically, and identifies the conditions that result in such phenomena.

The existence of cyclical market power may lead the market participants to strategic behavior that is markedly different from that in markets with either steady market power or constantly declining market power. It is suggested that in markets characterized by cyclical market power, a dominant firm may find it both possible and profitable to combat the cyclical decline in its market power by 'temporal leveraging' of its market power: policing a cartel in the downstream market in return for exclusivity in sales to the cartel members. Such a scheme may resist the criticism against the plausibility of most types of monopoly leveraging and exclusive dealing.

Table of Contents:

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[2] Robert Herrick, To the Virgins, to Make Much of Time.

[3] R. Frost, Nothing Gold Can Stay.

I. Introduction

Market power is not ubiquitous; it is limited to certain products, in certain areas, and to certain times. Understanding the limits of the market power possessed by a firm in a given case is essential to the correct assessment of the firm's behavior and its antitrust implications.

The most common method used to identify the scope as well as the strength of a firm's market power is through the definition of relevant markets, calculation of market share and identification of relevant market conditions (e.g., barriers to entry).[4] Correct assessment of suspected market power should relate to all the limits on that power. For that reason, when exploring the possibility that a certain firm possesses market power, a product market definition is of limited use without the support of the relevant geographic market definition.

This is also true of temporal restraints on market power. Some firms may be expected to possess market power (within certain product and geographical bounds) continuously, until a substantial and unexpected change in the industry diminishes their market power or changes its boundaries.

For example, the electricity grid may be a natural monopoly, given the significant fixed costs of constructing it. It might be expected that (absent substantial changes currently unforeseen) the operator of the electricity grid will possess market power, in transmitting

[4] For an illustration of this method, *see*: U.S. Department of Justice and Federal Trade Commission 1992 Horizontal Merger Guidelines, *reprinted in* 4 Trade Reg. Rep. (CCH) ¶ 13,104.

electricity in a given area, indefinitely. In the future, this may change: perhaps certain large apartment buildings or an industrial or commercial cluster would aggregate sufficient demand for electricity that would make it economically feasible to run a direct line from them to an electricity generator, or to generate their own electricity. Alternatively, technological changes might significantly lower the cost of constructing a power grid, or even devise new methods to transmit electricity other than through a power grid, again enabling the efficient provision of electricity by more than one firm.

If a firm is expected to possess market power indefinitely, unexpected future changes in the market conditions cannot be considered in analyzing market power. They remain in the domain of prophets until revealing themselves, sometime in the future.

However, Future changes may be of more immediate interest if they are expected to occur, but the timing of such occurrence is unknown. In such cases, for example, non-dominant firms[5] might free themselves from tacit or implicit collusion that was enforced by the dominant firm,[6] even as dominant firms may attempt to prevent or mitigate changes threatening to diminish their market power.

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[5] We will refer to firms that possess market power in a relevant market as **dominant firms**. Firms not possessing market power in the relevant market will be referred to as non-dominant firms.

[6] We will refer to such collusion as the dominant firm's disciplining the market. Effective discipline does not require agreement between the firms, nor any other form of communication between them. In some instances, a non-dominant firm's understanding of the dominant firm's wishes, coupled with an assessment of the dominant firm's power to punish other firms and it's willingness to do so – may result in an independent decision of the non-dominant firm to follow what it perceives as the dominant firm's wishes. The dominant firm may, in many cases, fine-tune such behavior with the slightest of signals.

It is noteworthy that not all inter-firm interaction requires enforcement by some party. Some agreements are self-enforcing, as it is in the mutual interest of the parties to abide by the agreement. *See* Benjamin Klein, *Why Hold-Ups Occur: The Self Enforcing Range of Contractual Relationships*, 34 Econ. Inquiry 444 (1996); Benjamin Klein & Keith B. Leffler, *The Role of Market Forces in Assuring Contractual Performance*, 89 J. Pol. Econ. 615 (1981). However, self-enforcing agreements may be less stable than ones enforced by a dominant party or a third party (e.g., a court), since changes in circumstances may modify incentives so that the agreement is not longer in the interest of the other party. Alternatively, parties may engage in strategic behavior in negotiating the agreement, and may renege on an

While such cases - in which expected future changes affect current business behavior - are of much interest to antitrust law, it is important to identify whether these changes are discrete or recurring events. When changes that affect market power occur on a cyclical basis, bringing about cyclical market power, behavior of the participants in the relevant markets might differ from that in the case of a one-time change: Non-dominant firms might still be disciplined by the dominant firm, if they believe the waning of the dominant firm's market power is temporary;[7] the dominant firm, on its part, having to overcome merely a temporary slump in power, rather than a permanent change in market conditions - might have a greater incentive to take measures that utilize its market power and sacrifice current profits in order to mitigate the seasonal loss of market power.[8]

For example, a dominant firm might incur costs (or relinquish some of its monopoly profits) in policing a downstream cartel in return for guarantees of exclusivity, which foreclose the cartel members from dealing with other upstream firms and make future

agreement even if it is profitable for them, in order to force the other party to surrender a greater share of the surplus created by the agreement. Finally, some agreements are inherently not self-enforcing, even if mutual adherence would lead to maximizing the joint utility. For example, if a member in a price-fixing cartel thinks its partners to the cartel will abide by the agreement and fix high prices, it would be better off lowering its own prices just below theirs (to capture some of their sales). If the same member expects the other members not to abide by the price-fixing agreement, it would certainly not abide to it himself – to do so would mean losing sales to the other firms! Therefore, regardless of what the cartel member expects, he has a strong incentive to renege on the cartel agreement. Enforcement by a third party (e.g., a court, if such agreements were legal, or a dominant firm that can detect and punish offenders, if such exists) may sustain such non-self-enforcing agreements. Thus, cartels with an effective enforcer, including one that is a dominant participant in the industry, are more stable than those that are self-enforcing.

[7] The probability of market discipline surviving a slump in market power of the dominant firm depends on many factors, including the estimated length of the slump in market power, the gains a maverick firm expects to reap from non-disciplined behavior, the maverick firm's estimate of the severity of punishment to be handed by the dominant firm when it regains market power. Assessment of the probability of such behavior is beyond the scope of this paper.

[8] The dominant firm might find such measures necessary to preserve their power to discipline the market.

entry of other firms into the upstream market unprofitable - lowering the risk of a decline in the dominant firm's market power.[9]

This type of action – utilizing current market power in order to mitigate the temporary loss of market power – may be viewed as a form of monopoly leveraging. While most forms of monopoly leveraging commonly discussed attempt to utilize market power across geographic or product market borders, this form attempts to cross temporal borders, using market power possessed at one time to fortify a weaker market position in the future. Such actions – temporal leveraging – might survive some of the criticism directed at 'garden variety' monopoly leveraging claims.

What follows in an attempt to explore cyclical market power and the dominant firm's efforts to combat the cyclical decline in power through temporal leveraging.

The temporal aspects of antitrust law are vast. The humble contribution this paper will endeavor is a case study: as analysis of an industry in which a dominant firm possesses temporal market power. We will try to trace the reasons for this phenomenon of cyclically shifting market power, as well as explore the effects of one possible response, which the Israeli Antitrust Authority pointed to as a dangerous possibility of action by the

[9] A non-dominant firm cannot usually effectively police a downstream cartel. See: Elizabeth Granitz & Benjamin Klein, *Monopolization by 'Raising Rivals' Costs': The Standard Oil Case*, 39 J. Law & Econ. 1 (1996). A non-dominant firm may pay downstream firms in other ways in return for exclusivity, but cartel policing is better currency for the upstream firm to pay with, as the value to the downstream members is usually greater than the damage to the upstream firm caused by reduced sales of inputs (much of the harm is externalized on consumers, however).

dominant firm to prevent the cyclical decline in its market power.[10] We will begin by briefly introducing the object of our case study: The Israeli PVC industry.[11]

II. The PVC Industry

PVC (polyvinyl chloride) is a plastic, based on a combination of ethylene (produced by refining petroleum) with chlorine (produced from rock salt).[12] The main raw material for the production of PVC is another plastic, called VCM.

Various types of PVC are used in a wide array of products, from piping and bottles to bloodbags, cables, fabric coating and furniture. Most of these products, however, require specific compositions of PVC suitable for that particular use, so the interchangeability of any given PVC type between uses is not high.[13] PVC manufacturers tend to be vertically

[10] In a nutshell, and as we will explain in detail *infra*, in Section III.2, the reason for the cyclicality of the market power possessed by the dominant firm in this case study seems to lie in the economic incentives foreign PVC producers have to ship their product to Israel. When the market is in a glut (i.e., prices are low), the foreign producers attempt to elevate prices in their home markets by shipping their product to markets that are isolated from their home market (e.g., to Israel). This undermines the Israeli producer's market power. However, when the market experiences excess demand (or at least, does not suffer from excess supply), foreign PVC producers do not have an incentive to rid their markets of supply (or at least of as much supply), and the dissipation of imports results in the accumulation of market power in the hands of the local producer.

[11] While the price of PVC is correlated around the world, some PVC producers possess a degree of market power in certain geographic areas. Therefore, for example, the Israeli PVC market is a properly defined geographic market. But compare: *F.T.C. v. Occidental Petroleum Corp.*, 1986-1 Trade Cas. (CCH) ¶ 67,071 (D.D.C., 1986); D.I. Baker & D.A. Balto, *Foreign Competition and the Market Power Inquiry*, 60 Antitrust L. J. 945, 960 (Viewing the PVC market as an international market).

[12] This description is, of course, highly simplified, but is sufficient for the purposes of this paper.

[13] Decision of the General Director of the Israel Antitrust Authority, of August 11, 1999, regarding Objecting to the Merger Between EIL Plastic Industries Ltd. And Volfman Plast Ltd., Marsh Plast Ltd., and Pipeplast (Israel) Ltd., Section 4.2(a) (at p.7) ("**The IAA Decision**").

integrated, mainly upstream to VCM production and further upstream to other petrochemical/plastics industries.[14]

Like many other plastics industries, a dominant factor in the production of PVC is the manufacturing plants,[15] which are limited in their capacity (so that when production levels need to exceed current capacity, new plants must be constructed). It takes a significant period of time (usually around two years) to construct new plants (without taking into account the time required for planning the plant).[16] This, of course, limits the ability to expand capacity quickly in reaction to growing demand. The typical strategy used in many similar industries to cope with this problem is acquiring excess capacity, and using it when changes in the market require raising output.[17]

This is not a viable solution for the PVC industry. That industry is characterized by relatively large economies of scale. Costs of production lower significantly as production rises, and peak (according to some estimates) at a production level of between 150,000 to 300,000 tons.[18] Holding unproductive capital while production is below minimum efficient scale significantly increases the average cost of the PVC produced.

Thus, production is done in large plants that must be either completely utilized or shut down. As a result of both these economies of scale and technical advantages to operating

[14] In re THE B.F. GOODRICH COMPANY, 110 F.T.C. 207; 1985 FTC LEXIS 30, at para. 78.
[15] The term 'plant' refers to each single unit of manufacturing machinery, not the entire factory. Each factory usually employs several plants.
[16] In re Goodrich, *supra* note 14, at para. 64-65.
[17] Holding a large inventory may also smoothen fluctuations in demand. However, PVC is bulky, and therefore costly to store, and the cost of holding an inventory sufficient to bridge the entire length of time required to construct a new PVC production plant is prohibitive. Also, large inventories may depress the price of PVC. See: D. B. Johnsen, *Property Rights to Cartel Rents: The Socony-Vacuum Story*, 34 J. L. & Econ. 177, 178 (1991). Finally, in warm climates (such as Israel, PVC and PVC products suffer significant attrition if stored for long periods. *See*, The IAA Decision, *supra* note 13, footnote 32 (at p. 13).
[18] In re Goodrich, *supra* note 14, at para. 60.

a plant either at full capacity or not at all, the ability to fine-tune the quantity produced - by owning production capacity in excess of normal production levels - is limited. This will be an important characteristic in our analysis later in this paper.

PVC is produced by many firms across the globe. It is not uncommon for a downstream firm to purchase PVC from a foreign producer. For the most efficient producers, transportation costs (while not negligible) may be offset by their relative advantage over a local producer in production costs.[19] However, exercising this "window of opportunity" for exporting gradually closes it, as the additional supply causes prices to decline in the foreign country until a point in which the exporter's production cost advantages no longer surpass transportation costs. Local PVC markets, therefore, are not perfectly contestable.[20]

PVC is a commodity, in the sense that it is a standardized product, with accepted standards of quality and little value for a specific 'brand name'.[21] However, no commodity exchange regularly facilitates trading in PVC.[22]

The market for PVC is arguably not a global one, though. Transportation costs, tariffs, and other costs of exporting PVC[23] are high enough to give a local producer an advantage over foreign producers who export into its market. This advantage is greater the higher

[19] A firm producing below minimum efficient scale may have higher production costs, which may offset the transportation costs of PVC imported from foreign producers with larger scales of production. However, fluctuations in relative operational costs (like fluctuations in exporting costs) are not expected to be substantially correlated to the price of PVC, and so cannot be an explanation to the correlation between price and the market share of imports (a correlation we shall describe below).
[20] On contestable markets see, *e.g.*, See W.J. Baumol, J.C. Panzar & R.D. Willig, *Contestable Markets and the Theory of Industry Structure* (1982).
[21] *See* In re Goodrich, *supra* note 14, at para.85-90.
[22] For an assessment of the availability of information as to competitors' prices, see In re Goodrich, *supra* note 14, at para. 204-215.
[23] We shall refer to all these costs as "**exporting costs**".

the transportation costs (that is, the greater the distance between the local market and the significant foreign producers) and the greater the tariff barrier.

The Israeli PVC market seems to be a local one. The amount of PVC consumed in Israel in 1998 was 72,000 tons.[24] Therefore, the minimum efficient scale for PVC production (which, as mentioned above, is approximately 150,000-300,000 tons) accounts for over 200 to 400% of domestic consumption. If we view the Israeli market as separate form other geographical markets, then PVC production is a natural monopoly.[25] Indeed, Israel has but a single PVC manufacturer IEL – Israel Electrochemical Industries Ltd.[26]

How isolated is the Israeli market made by exporting costs?

In the past, tariffs protected the local PVC producers. In 1989, tariffs on imports from the United States and the European Union were cancelled, and beginning in 1991, tariffs on PVC imports from other countries were gradually reduced, until they were completely abolished in mid-1997.[27] Aside from tariffs, anti-dumping measures are possible, but the use of such measures has been very limited; indeed, they were only used once - in 1999, they were imposed on imports from the United States, for a limited time, at a rate of approximately 9%.[28]

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[24] The IAA decision, *supra* note 13, Section 4.2(a), at p.8.

[25] If the costs of exporting from Israel were low, the actual demand facing an Israeli PVC manufacturer would not be the local demand, but the global one. While exporting PVC from Israel could sometimes be economically feasible, importing costs are significant enough (as we shall see) to partially isolate the Israeli market, making the existence of a second Israeli PVC manufacturer unfeasible.

[26] Hereinafter: "**IEL**". As noted above, most PVC producers are upstream integrated. IEL is not. The VCM market is similar in structure to the PVC market, with a single local producer, unaffiliated with IEL, dominating the market.

[27] The IAA decision, *supra* note 13, Section 4.2(a), at p. 8. At the time of issuing the IAA decision, there were proposals to reinstate a tariff on imports of plastics, including PVC, at a rate of 4%. *See* the IAA decision, *supra* note 13, Section 4.3(a), at p. 10.

[28] The IAA decision, *supra* note 13, Section 4.3(a), at p. 10.

Transportation costs are a more significant barrier, which limits imports and facilitates a narrower geographical market. The Israeli market has a very small volume of economic transactions with countries bordering with it, due to a combination of political and economic factors. There is no significant trade in PVC between Israel and the countries in immediate proximity to it (Lebanon, Syria, Jordan, Saudi Arabia and Egypt). Therefore, non-local sources of PVC and non-local markets for locally produced PVC are geographically distant.

The IAA estimates exporting costs of PVC amounted in 1998 to between $65 and $105 per ton, or approximately 10-20% of the price of PVC at that time.[29] Hence, IEL is at a considerable disadvantage when exporting to other markets, but enjoys some protection of its local market.

Indeed, between 1991 and 1997, exports accounted for no more than approximately 17%.[30] Between 1998 and 1999 the market share of exports surged dramatically, crossing the 50% mark. This cannot be explained by either tariffs or transportation costs.

Tariffs on imports from the U.S. and the EU have been eliminated since 1989. While tariffs on imports from other countries have existed (though decreased gradually) through 1998, imports from these countries had in 1998-1999 an average market share of below 10% (therefore these imports alone cannot account for the dramatic increase in importing).[31]

[29] The IAA decision, *supra* note 13, Section 4.3(a), at p. 11.
[30] The IAA decision, *supra* note 13, Section 4.2(a), at p.8.
[31] This data was given by the Israel Antitrust Authority.

Transportation costs have not changed dramatically either. In fact, imports from the U.S. grew at a higher rate than those from the EU (which is, of course, geographically closer to Israel), so the weighted average transportation costs of imports actually rose at the same time that the imports' market share rose.

Exporting costs do not explain the decline in the IEL's market share. We will try to offer an explanation in the following pages.

III. Nothing Gold Can Stay: Cyclical Market Power in the Israeli PVC Industry

1. Assessing the Evidence on Cyclical Market Power

Since change in exporting costs – mainly tariffs and transportation costs - do not explain the reduction in IEL's market share, we will attempt another explanation. PVC prices seem to be a chief factor affecting the amount of PVC imported. Assuming that importing costs are constant (or, at the least, that their fluctuations do not correlate with those of PVC prices) then the higher the price of PVC, the lower the price margin between the source country and the target country that would suffice to make importing feasible.

Example: Suppose that the price for PVC is $600 per ton. Importing costs (into Israel) include $60 in transporting costs, and no tariffs or other importing costs. Importing costs would therefore reduce the importer's gross profits by 10% ($60 of $600, for every ton imported and sold). If the price of PVC were to double, to $1,200 per ton, transporting costs would likely not change, but now they would only reduce the importer's gross

profits by 5%, making importing into Israel feasible when the price difference between Israel and the source country is at least 5% (rather than 10%, as when prices are low).

This model assumes, then, that the higher the price of PVC, the more competitive importing will become (since transportation costs would require less of a markup), and thus the greater the market share of imported PVC.

Unfortunately for this rather simple model, reality not only does not support it, but also contradicts it. Between 1995 and 1997, the market share of PVC imports to Israel was 4.38%. At that time, the average price of PVC exported from the U.S. was $721. Between 1998 and the first quarter of 1999, the market share of PVC imports to Israel from the U.S. has been 13.1%, while the average price of PVC exported from the U.S. was approximately $500.[32] There seems to be a reverse relation – the lower the price, the lower the local producer's market shares.

PVC prices fluctuate on a cyclical basis. The Israel Antitrust Authority found that the market share pattern is cyclical; that a negative correlation exists between the price of PVC and both the absolute amount of imports and the market share of imports in the Israeli market.[33] We view the market share as a good proxy for market power. This does not have to be the case for every industry.[34] Indeed, the theory of contestable markets goes as far as finding that a firm with a 100% market share has no market power if there

[32] This data was given by the Israel Antitrust Authority.
[33] The IAA decision, *supra* note 13, 4.2(a), at. pp. 8-9 and footnote 15. The author of this paper does not have data regarding previous cycles, so the assumption that the pattern evidenced between 1995 and the first quarter of 1999 repeats itself (and thus is cyclical) relies on the IAA decision.
[34] *See* H. Hovenkamp, *Federal Antitrust Policy* (1994), ¶ 3.1b, 3.2c (pp. 81-82), ¶ 3.7d (pp. 120-122), ¶6.2b (pp. 245-246).

are no barriers to entry.[35] The degree of reliance on market share as a proxy for market power depends to a great extent on the height of the barriers to entry.

In the Israeli PVC industry, barriers to entry are rather significant. Economies of scale that extend to very large quantities (between double and quadruple the local demand)[36] limit the number of firms that can manufacture PVC, and in fact (when coupled with transportation costs that limit the profitability of outside markets) rule out the possibility of local competition. The number of foreign competitors is also limited – somewhat by economies of scale and the large sunk cost in building the plants required to produce PVC,[37] and very much by exporting costs that reach 10 to 20 percent of the price of PVC (when PVC prices are low).[38] Further, the wide fluctuations of the price of PVC create a significant risk for consumers,[39] and they attempt to minimize the risk by entering long-term purchasing agreements. In an industry with long term purchasing agreements, entry is substantially more difficult. Further, the cyclical nature of imports causes the foreign producers to be more cautious in committing themselves to long-term agreements. Indeed, the IAA notes that no foreign producer had committed itself to a long term supplying agreement with Israeli PVC consumers, instead transacting only on a 'spot' basis.[40]

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[35] *See* Hovenkamp, *id*., at ¶ 1.4b (pp.33-36); Baumol, Panzar & Willig, *supra* note 20.
[36] *See supra*, in Section II.
[37] An F.T.C. Administrative Law Judge estimated the cost of building an efficient plant at $100 million, and estimated that 75-80% of that investment would be a sunk cost, unrecoverable if not used for PVC manufacture. In re Goodrich, *supra* note 14, at para. 63.
[38] See *supra*, in Section II.
[39] This risk could have been mitigated by purchasing derivatives, but an exchange for PVC derivatives, or for PVC, does not exist.
[40] The IAA decision, *supra* note 13, Section 4.2(a), at p. 9.

Since the volume and market share of imports is cyclical, at certain stages imported PVC is hard to come by. Therefore PVC consumers (such as manufacturers of piping, plastic furniture, etc.) may find themselves forced to enter long-term contracts with IEL to secure the supply of PVC when little PVC is imported. This, again limits the check foreign competitors have on the IEL, and make the market share a good proxy for market power.[41]

Since market share was seen as a proper proxy for market power in this matter, the IAA examined, during an investigation of the industry, the correlation between the price of PVC and the market share of the imports.[42] Because price structures are different between different exporters, it examined separately the two most significant groups of exporters to Israel – U.S. firms and EU. firms. A negative correlation was found between the price of PVC and the market share (in the Israeli market) of imported PVC, both for imports from the U.S.[43] and from the EU.[44] To illustrate, the results suggest that regarding exports from the U.S., for approximately every $41.60 rise in the price of PVC,

[41] IEL itself asserted, in a prospectus from Feb. 1992, that despite the elimination of tariffs on imports, transportation costs and the reliability and immediate availability of PVC give it significant advantages over foreign competitors. See the IAA decision, *supra* note 13, footnotes 23, 24.

[42] All data below has been provided by the Israel Antitrust Authority. However, due to the confidentiality of much of the data, the information provided was not the raw data, but rather the aggregates. Note that while the aggregate data is useful, it is based on a small number of observations. The aggregate data was derived from five observations (annual information, 1995-1999). The very small number of observations has a strong negative implication on the reliability of the aggregate result. No information was given by the IAA regarding the specific model used in the regression.

[43] The coefficient of the market share (in the Israeli market) of PVC imported to Israel from the U.S., in a regression where the independent variable was the price of PVC imported to Israel from the U.S., was found to be –0.2404. The t-Stat for the regression was –3.504271.

[44] The coefficient of the market share of PVC imported from the EU was –0.014461. The t-Stat was -1.429939, making the significance of the coefficient questionable.

U.S. exporters lost 1% of the market share. For exports from the EU, a rise of about $69.15 in PVC prices results in 1% of market share lost to exporters from the EU.[45]

Because it was impossible to assess the effect on market share caused by the reduction in tariffs on imports from non-U.S./EU countries,[46] no similar examination was done regarding imports from these countries. However, the general pattern is similar, with market share rising as prices decline, and the overall effect of these imports is not substantial, since they occupy a significantly smaller market share than those of IEL, EU exporters or U.S. exporters.

The evidence indicates, therefore, that as the price of PVC rises, so does the market share of IEL, and – market share being our proxy – so does its market power. We have already seen an intuition leading to the opposite prediction. But models that succeed in predicting and explaining reality are infinitely more useful than those that contradict it. We suggest now a model of the former kind.

It is not the decline in the ratio of PVC price to exporting costs that explains the tides of market shares. Exporting costs serve, unsurprisingly, to partially insulate IEL from foreign competitors, and to secure its position as a natural monopoly.[47] But nothing gold can stay. The data we have examined shows the insulation protecting the local PVC

[45] Again it is prudent to caution against reliance on these statistics, due to the small number of observations employed to derive this aggregate, and since it is unclear how the regression model was structured. Proper vindication of the results will require a larger number of observations, which were not available to the author of this paper.

[46] As mentioned above, in Section II, tariffs on PVC imports from the U.S. and EU were removed in 1989; those on imports from other countries were gradually reduced beginning in 1991, until finally eliminating them in mid-1997. The data at hand, therefore, regards imports subject to tariffs at rates that differ from year to year.

[47] Were there no exporting costs, the demand facing any Israeli PVC producer would be the world demand, which is a great many times larger than the minimum efficient scale for PVC production. In that case, there would be room for far more than one Israeli producer.

producer wears thin when the PVC market endures a glut.[48] The exporting costs, which proved sufficient to protect the local producer when prices are high, become an insufficient barrier when prices are low. We proceed to offer why this should be.

2. A Proposed Explanation

It seems that when PVC prices are low, foreign producers export PVC to the Israeli market, while they export much less, if at all, when PVC prices are high.

Such behavior might be expected in certain circumstances from a firm wielding market power in a specific geographical market (its home market),[49] when faced with a downwards-rigid supply curve and slumping demand.[50] Firms enjoying a degree of market power will produce up to the point that the marginal cost (the additional costs incurred if another unit is produced) is greater than or equal to marginal revenue (the additional revenue from selling the last unit). The point of intersection between marginal cost and marginal revenue depends (inter alia) on the demand curve: a slump in demand shifts the demand curve downwards and leftwards, altering the revenue maximizing point (which will now be at a lower price and at lower output).

Normally, a monopolist's response to a slump in demand would be to scale down output (so that is matches the now lower revenue-maximizing point). But when the supply curve is downwards inflexible – that is, it is costly if at all possible to reduce output – the

[48] Naturally, the market price of PVC is low when there is a glut in the market.
[49] In "**home markets**" we mean the geographical market or markets, in which the foreign producer makes substantial sales. Any other market would be an "**outside market**", or a "**target market**".
[50] We will examine, *infra* in Section III.3.c, an alternative explanation which views the fluctuations in import market shares as caused merely by relative price differences between the markets (that is – the price of PVC in the target market is higher than that in the home market). We find the empirical evidence does not support this explanation.

firm may find that it must produce at the pre-slump level (because of the supply inflexibility) but would profit from restricting sales in its home market to below that level (i.e., to the point where marginal cost equals the new, lower marginal revenue). In such a case, the firm will produce an 'excess' supply that it will not sell it in its home market, but instead dispose of it otherwise. This 'excess' supply may be exported to an outside market if there is little risk of the products being re-exported into the home market,[51] thus allowing the dominant firm to maintain revenue-maximizing output in its home market. Of course, this strategy is only beneficial as a short-term adjustment to fluctuations in demand. When demand in the local market increases again to pre-slump levels, there will be no 'excess' supply. And if demand becomes permanently lower (due to some structural change rather than cyclical fluctuation) the dominant firm will readjust its production facilities to reduce output (since, despite the costliness of output reduction when the supply curve is downwards rigid, it may still be less expensive to do so than to indefinitely export the excess supply). So, the exporting of 'excess' output is a phenomena that only occurs in response to cyclical (rather than permanent) reduction in demand, and only lasts so long as demand remains low but is expected to increase in the next phase of the cycle.

The 'excess' output exported into the outside market may temporarily (as long as the exporting continues) diminish market power possessed by a producer in the outside market. If such exporting is profitable on a cyclical basis (when there is a slump in

[51] If firms in the outside market re-export the output to the home market, the firm in the home market will not gain from exporting the surplus. Therefore, it will not export in the first place if it suspects a substantial amount will be re-exported back into its market. We will discuss this when considering condition 3, *infra*.

demand and before the industry adjusts to the change), then the loss of market power is also likely to be of a cyclical nature.[52]

Put in another way, a firm will produce a marginal unit and sell it in its home market if $mc \leq P_H$ and $MR_H \geq mc$ (where mc is marginal cost, P_H is the price in the home market and MR_H is the marginal revenue in the home market). A firm would produce a marginal unit and export it to a target market if: $mc \leq P_T\text{-}EC_T$, and $MR_H < mc$ (where P_T is the price in the target market and EC_T is the exporting costs to that market).[53] It will produce and then throw away[54] a marginal unit if: $mc \leq 0$, $MR_H<mc$ and $P_T\text{-}EC_T \geq 0$.[55]

When the downwards supply curve is rigid, mc is low, so mc may very well be less than or equal to P_H, or ($P_T\text{-}EC_T$), or perhaps even zero. However, where the firm has market power (therefore producing up to a point where MR_H=mc) and demand slumps, MR_H at that point would be lower than mc (and possibly negative). Since exporting costs would most likely not be greater than the product's price (at least when concerned with PVC), $P_T\text{-}EC_T$ will be positive. With a low mc (due to the downwards inflexible supply curve) and a negative MR_H (due to the firm having market power and finding the slump in

[52] For cyclical market power to occur, the exporting into a target country should be profitable only due to the increase in profits in the home market that results from reducing the supply by exporting to a target country. The cyclical market power phenomena will not occur if conditions are such that it is profitable for the foreign producer to export significant amounts to the target country even without the added incentive of raising price in its home market. For example, if prices at the target country were higher than the price at the home market plus the exporting costs, the foreign producer would export in both high and low markets, and the local producer would never possess market power.

[53] It will also export, even if $MR_H \geq mc$, if $P_T\text{-}EC_T > P_H$. We find, *infra* in Section III.3.c, that the empirical evidence does not support this as an explanation to the phenomenon of the cyclical market power in the Israeli PVC industry.

[54] Instead of throwing away, it might give the marginal unit to someone who would not be willing to pay the market price for the product (to give it to someone who would be willing to pay will cannibalize the firm's sales). However, a firm would destroy, rather than give away the product if there is a substantial possibility for reselling the product (again, cannibalizing its sales).

[55] The third condition, *infra*, differentiates between cases where the product will be exported and those where it will be thrown away.

demand lowered the point where mc=MR), the firm is likely to produce a marginal unit, and export it to a suitable target market.

Thus, we can point to three conditions, which we believe are necessary to create a situation of cyclical market power such as the one described here:

Condition 1: **The supply curve is downward inflexible**. By that we mean that it is costly to decrease output, at least in the short term. In the extreme case, we may imagine a machine that can produce up to 100 widgets in each batch it processes, but can only operate if it processes the entire amount. In this case, either 100 widgets are manufactured, or none at all.[56] A much more moderate case is when a firm operates below minimum efficient scale. In such a case, it can manufacture only 99 widgets, but the 100th widget will cost less to produce than the previous ones, lowering the average cost of the widgets. As we can see, a rigid downward supply curve is characterized by low marginal costs.

If the supply curve is very inflexible in the short term – that is, fluctuations in price might not affect the level of output in the short term, then, when supply exceeds demand, a producer may not be able to immediately reduce supply substantially as a reaction to the new demand curve. As a result, the output produced may be greater than that maximizing the producer's profits.[57]

[56] The supply curve would be downward inflexible in our example if current production level were 100 widgets, and upward inflexible if current production was 0 (though, by definition, producing zero units is downwards inflexible as well). Often, when at a given output the supply curve is downward inflexible, it would be upward inflexible as well. However, since we deal here with a reaction to reduction in demand, which normally dictates reduction in supply, it is sufficient that the supply curve be downward inflexible.

[57] If demand were absolutely stable, surpluses or shortages would be rare even if the supply curve were relatively rigid. However, demand in the PVC industry, as in most markets, is not stable.

In other words, a producer that finds itself with a surplus of supply will not bear costs to remove it, but rather cut its production. However, the downwards supply inflexibility makes a substantial cut in production very costly, and in many cases forces the firm to produce and dispose of the excessive output.

This does not dictate that the firm will wish to sell its excess output outside of its home market; especially so if shifting the excessive output out of the home market has little effect on the market: If prices in the home market are similar to, or higher than, those in the market in which the firm contemplates selling, then the firm will receive the same (or lower) revenue for exporting to the outside market, and will incur exporting costs that it would not have spent if it sold its output in the home market.

A second condition creates an incentive for the firm to bear costs to divert its output to the outside market.

Condition 2: **A foreign firm has some market power in its home market; in other words, it's production and distribution decisions have an effect on prices in its home market**. If the foreign producer possesses market power, then by directing some of its output to an outside market instead of its home market, it would raise prices and increase it's revenue; if the increase in revenue surpasses the exporting costs, the foreign manufacturer is likely to export from its home market to the outside market.[58]

Exporting a surplus to an outside market might cost the foreign firm more than the exporting costs, if the exported surplus reaches (or indirectly affects) one of the foreign

[58] Condition two – that the foreign firm possesses some market power in the relevant market – is essential to reach this result. Were the foreign producer lacking any market power, diverting its output to an outside market would not raise prices, because other firms could expand their sales in the home market to replace the output that was removed from the market.

firm's home markets: Its local market, another market to which the firm exports, or the outside market itself (if the firms has sales there other than the surplus that is exported).[59] In these cases, lower price caused by exporting to the home markets would lessen the firm's revenues from other sales in the home markets.[60] Therefore, the surplus will likely be exported to an outside market satisfying a third condition.

Condition 3: **The existence of a suitable 'Target market'. A suitable target market is one that is isolated from the foreign firm's home markets (in the sense that exporting costs make it unprofitable to export from it to a home market), and in which local firms have relative difficulty to increase exporting costs (e.g., by lobbying to raise tariffs or execute anti-dumping measures) in response to exporting into the target market**.

Once a suitable target market (satisfying condition three) is found, a foreign firm which satisfies condition two, in an industry which satisfies condition one – is likely to export its products to the target market in order to remove from its home markets excess supply that it cannot avoid producing, because of short term rigidity of supply. Such occurrences of excess supply being exported out of home markets are likely to be cyclical in nature, existing when supply exceeds demand and before long term adjustments restore the balance.

[59] The foreign firm might still decide to export the surplus, if the increase in profits from the restricted output in the home market surpasses the sum of the exporting costs and the loss of revenue in the market in which the surplus affects the foreign firm's sales. Of course, even in this case the foreign firm would prefer to export to a market that is more isolated from the markets in which it sells.

[60] This assumes that the surplus that is exported to the outside market has an effect on prices in that market. Since the foreign firm exports a quantity that effects prices in the home market, and since home markets of such firms tend to be substantially larger than outside markets that satisfy condition three, the above assumption would usually prove true.

Significant exporting from a home market to a target market will raise the price in the home market relative to the target market. Indeed, this is the exporting firm's goal – to raise or sustain prices in it's home market; and it is also consistent with the effect of diminishing the market power of the producer in the target market. However, this very effect creates an incentive to re-export the PVC back to the home market – and this will eliminate the benefits the foreign firm gains from the export. Therefore, a foreign firm will only export to a target market that is not likely to reciprocate by exporting the PVC back: To qualify as a 'target market' per condition three, a market must have characteristics that make it unlikely the PVC will be exported back.

Such characteristics may be of a temporary nature, such as differing business cycles. For example, if demand in Israel is rising while demand in France is sliding, Prices in Israel will rise while those in France will drop. If the price in Israel, less the exporting costs, is greater than the marginal revenue in France, the French firm will find it profitable to export to Israel. Yet, the Israeli firm will not find it profitable to export back to France, unless the price in Europe, less the exporting costs, is grater than marginal revenue in Israel. If this explanation is true, we would not need conditions 1 and 2 to explain the negative correlation between PVC prices and the market share of exports. However, as we will see,[61] this seems not to be a fitting explanation in the case of the Israeli PVC industry.

Characteristics can also be of a constant nature: Cost advantages to one firm may enable it to profit from exporting while the other firm, burdened with heavier costs, will not find re-exporting profitable. Also, the identity of the countries in which the home and target

[61] *Infra*, in Section III.3.c.

markets are may affect the ability to reciprocate. Some countries' economic policies or relative power in the international trade arena put them in a disadvantage in protecting their industries by use of anti-dumping duties and similar measures. If a target market will not impose anti-dumping measures, while the home market may, a cost difference might occur (as exporting costs rise), possibly preventing reciprocity in exporting.

The effect of exporting the 'excess' supply is to diminish considerably any market power possessed by a firm in the target market. Therefore, a firm in a target market will possess cyclical market power in the target market (which is the phenomenon we are trying to explain), if it has market power at times when exporting by foreign firms, of the type described above, does not occur. This is parallel to condition two, which regards the market power of the foreign firm. We should therefore amend condition two as follows:

Condition 2 (amended): **At least one foreign firm and one local firm have some market power, at least some of the time, in their respective home markets**. In other words, these firms' production and distribution decisions have, at least some of the time, an effect on prices in their respective home markets.

If all the above three conditions prove true in our case, foreign PVC producers would be expected to incur exporting costs and sell PVC in the Israeli market when PVC prices are low, considerably diminishing the local PVC producer's market power at that time. When prices are high, however, the local producer is likely to regain its market power. This may explain the empirical results discussed above.

We therefore proceed to examine whether these three conditions occur in the case of the Israeli PVC industry.

3. Satisfying the three conditions

(a) **Downwards rigidity of the supply curve in the PVC industry (satisfying condition 1)**

In the PVC industry, the supply curve tends to be inflexible in the short term, due to the characteristics of the industry. Production capacity may be expanded only in the long term. As we mentioned in our brief survey of the PVC industry,[62] creating additional capacity requites a significant amount of time (usually over two years). Therefore, if, for example, demand rises above current supply, it takes time to create new supply capacity, and in the meantime a shortage might exist.

Possessing excess capacity above the current production levels, and expanding capacity as production levels approach capacity, could usually solve this problem. However, as we explained above,[63] production levels in the PVC industry need to be very close to full capacity, due to economic reasons (mainly the substantial effect of economies of scale) as well as technological reasons (by which PVC quality is lower if the machinery is operated at less than full capacity) - leaving very little room for expanding output without first expanding capacity.

Another method commonly used to adapt to fluctuating levels of demand – maintaining large inventories – is also impractical in our case. The cost of holding an inventory to respond for growing demand for over a year, until capacity can be expanded, is usually

[62] *Supra*, Section II.
[63] *See supra*, Section II, notes 15 to 18 and main text regarding them.

prohibitive. Furthermore, prices are unlikely to be affected if output is not actually restricted, but rather hoarded.[64]

The result is a rigidity of supply – both upwards and downwards – satisfying condition 1. When PVC producers face a slump in demand, they generally keep producing at regular levels until it becomes more economic to shut down an entire plant (both from technical and from economies of scale perspectives).

(b) **A tale of two (or more) monopolists (satisfying condition 2)**

Despite the subsection title's use of the term 'monopolists', we need prove much less to satisfy condition 2: not that they are monopolists, not even that they are THE dominant firms, but that each is A dominant firm (in its respective market).

IEL holds, at times, market shares of well above 80%.[65] We have discussed the utility of market shares as a proxy for market power,[66] and found that due to the high barriers to entry to the industry, and particularly the need of Israeli PVC consumers to ensure their supplies by transacting with the sole firm that maintains a constant presence in the market and that agrees to long-term supply agreements, IEL's market share is a good proxy for its market power.

We do not have sufficient data on foreign PVC producers to reach quite so strong a finding regarding their market power. However, the combination of the industry's characteristics, and particularly the extent of economies of scale (which limits the number

[64] See Johnsen, *supra* note 17.
[65] As we said *supra*, in Section II (text regarding note 30), between 1991 and 1997, exports accounted for no more than approximately 17%.
[66] *Supra*, Section III.1, main text regarding notes 34-41.

of producers likely to compete for satisfying a given demand) and the significant transportation costs (which partially isolate geographic markets from one another, thus reducing the demand facing each firm) should lead to most producers wielding some market power over the vicinity of their plants.[67]

Further in-depth examination, in particular of the empirical evidence of foreign producers' behavior, would help much to fortify this conclusion. But such work would exceed this paper's scope. We will therefore rely the above analysis to conclude that it is very likely that not only IEL, but also some of its foreign competitors, enjoy a substantial degree of market power; enough market power to cause an effect on prices in their home markets if they divert some of their PVC production from the home market to outside markets.

(c) **The makings of a 'target market' (satisfying condition 3)**

By fulfilling conditions 1 and 2, we reach a situation where surplus PVC is like a 'hot potato', which many producers worldwide attempt to dump in other markets, while attempting to block the other producers from dumping in the home market. If everyone removes surplus PVC to other markets in a circular fashion, nothing is gained by anyone (except for companies transporting the PVC, and owners of 'Put' options on the PVC producers' shares). To explain a sustained and recurring dumping into the Israeli market, we must point to some characteristic of that market, which prevents Israeli firms from re-

[67] This varies, of course, from producer to producer. The more demand for PVC exists close to the plant's location, and the lower the political and economic boundaries between the plant and the centers of demand, the less market power a producer would enjoy. Therefore, we may expect the Israeli producer, facing no demand nor any competition from firms located in bordering countries, to enjoy greater market power than an American firm, which finds much demand for its products, and several competitors, in other geographically proximate states of the United States. Still, it seems that even U.S. firms enjoy some degree of market power over the markets in vicinity to their plants.

exporting the dumped PVC (or locally produced PVC) to another market or even back to the original market.[68] Condition 3 requires such characteristics.

A target market would suit condition 3 if it is isolated from foreign firms' home markets (in the sense that exporting costs make it unprofitable to export from it to a home market), and if local firms in the target market have relative difficulty to increase exporting costs (e.g., by lobbying to raise tariffs or execute anti-dumping measures) in response to exporting into the target market.

As we have seen, non-tariff exporting costs could be as high as 10 to 20 percent of the price of the PVC itself, when PVC price is low.[69] Even at the peak of PVC prices, these exporting costs could be at the least between 5 to 10 percent of the price of PVC). Since the non-tariff exporting costs (mainly transportation and temporary storage costs) are incurred both when exporting to Israel and from it, re-exporting from Israel is more costly than from many other markets (such as Eastern Europe, EU member states, the U.S., Canada, Mexico, etc.).

The second condition seems to be true for the Israeli market as well. In the international trade arena, Israel hasn't nearly the clout possessed by the U.S. and the EU – the two main origins of PVC imported to Israel. Pressure to remove hurdles affecting EU and U.S. exporters ability to enter the Israeli market is likely to be far more effective than opposite pressure to level the playing field for Israeli firms exporting to the U.S. or the EU. Therefore, these exporters enjoy a low risk of retaliation to targeting the Israeli

[68] These Israeli firms need not be PVC producers. If PVC is dumped in Israel, presumably at a certain point the depressed prices in the Israeli market will make arbitrage profitable for anyone willing to pursue this line of business.
[69] *Supra*, Section II, in main text regarding note 29.

market for their surplus PVC. Indeed, anti-dumping measures were used only once, against exports from the U.S., while the market share of these exports has multiplied tenfold within less than five years.

While this seems to satisfy condition 3, an alternative explanation was suggested above.[70] The Israeli market may be targeted when demand for PVC in it rises at the same time as demand falters at another market. If this explanation is true, then the rise in imports is not a result of a structural weakness of the Israeli market (as condition 3 suggests), but of discrepancies between markets; naturally, supply crosses borders to meet demand if demand is sufficient to attract imports despite exporting costs.

To test this explanation, we have examined the difference between the price of PVC exported to Israel and the price of PVC sold at the foreign producer's home market at the same time. If the explanation is plausible, PVC prices in Israel should be higher than those in the exporter's home market (actually, exporting prices should be at least high enough above home market prices to cover exporting costs). Further, there should be a positive correlation between surplus prices in the Israeli market (i.e., the amount in which the price of PVC in Israel is higher than that in the home market) and the market share of exports from that home market.

The results seem to reject this alternative explanation. Exporting costs were estimated at around $65 to $105 per ton.[71] However, the difference between the prices for PVC imported from the U.S. to Israel and the price of PVC in the U.S. at the time, rarely reached the low mark of exporting costs, and never reached the high mark, seemingly

[70] *Supra*, Section III.2, in main text regarding note 61.
[71] *Supra*, in Section II, main text regarding note 29.

showing that exporting costs were not covered, and therefore that the profit per ton from PVC sold by U.S. producers in Israel was lower than that from the PVC sold by those producers in the U.S.

Further, the correlation found between the price difference and the market share was a slight **negative** correlation., though this statistic should be taken with more than a grain of salt, as it is based on a very small number of observations.[72] A negative correlation makes no sense; it is also statistically highly questionable. More likely, there is no direct correlation between the price difference (which indicates differences in demand in the two markets) and the exports' market share.

The results regarding imports from the EU fortify the conclusion that no direct correlation exists. During the time period examined, prices in the EU market were significantly higher than those of PVC exported by EU producers to Israel. This means that even before taking transportation costs into account, EU producers made a smaller profit per ton from their exports than from their sales in their home market. Again, a very small negative correlation was found; the significance of this correlation is even lower.[73]

These results seem to reject the hypothesis that the fluctuation in market share is explained in a shift from a market with lower demand to one with higher demand. The weak **negative** correlation, with a low significance, seems to indicate that the fluctuations

[72] The coefficient was -0.138948. In other words, for every $7.20 decline in the price difference between Israel and the U.S., American exporters gained another one percent on market share. The t-Stat for this correlation was –1.497643. R square was 0.528628. As we mentioned above, this regression was done by the IAA, based on very few observations, a fact that limited the effectiveness of the regression calculations (data was examined for the years 1995-1998). The IAA did not provide information regarding the specific model used in the regression.

[73] The coefficient was -0.021443, translating into a 1% increase in market share for every $46.64 rise in the price of PVC in Europe relative to that exported to Israel. The t-stat for this correlation was –0.899007. R square was 0.287804. Again, the utility of these results is severely limited by the small number of observations on which they are based.

in market shares are not explained by lower relative prices in the home market. Our original explanation fits these results well – if exports to Israel are driven by a wish to keep supply as close as possible to the point where price equals marginal revenue, exports would continue even when net price is higher in the home market than in the target market (since this loss of potential profits in the home market is recouped by keeping the supply in the home market at a profit maximizing point).

In sum, it seems from the data we have that the three conditions have been fulfilled, and therefore, for reasons explained above, the positive correlation between the price of PVC in Israel and the local producers' market share (and market power) should be expected.

Obviously, the prospects of a cyclical market power would not satisfy the local producer. It may look for ways to fortify its position during periods of decline in market power, by using the power it has at the opposite points of the cycle - gathering rosebuds while it may. We will now explore the possibility of such actions.

IV. Gather ye Rosebuds While ye May: Temporal Leveraging in Response to Cyclical Market Power

As we mentioned before, cyclical market power decreases the monopoly rents extracted by the dominant firm. Little if any rents are extracted at the "low market power" phase. Furthermore, market discipline by the dominant firm in the "high market power" phase might prove less effective – and thus decrease monopoly rents even at this phase – when

non-dominant firms expect the dominant firm to lose its market power in the foreseen future.

We therefore might expect a dominant firm to seek ways to combat the foreseen loss of market power. We will now explore one such method, which the Israeli Antitrust Authority pointed to as a dangerous possibility:[74] Excluding foreign producers from the market by creating a cartel policing mechanism for its customers, in which exclusive dealing with the dominant firm is a key element.[75] As we shall see, such a mechanism seems to be both enforceable and welfare reducing.

1. Slowing the Effects of Time: Temporal Leveraging of Market Power

The cyclical market power of the Israeli PVC producer is caused by the penetration of imports into the local market. By getting a critical mass of Israeli PVC consumers to agree to purchase PVC only from it, the local producer may eliminate the cyclical waning of its market power.[76] However, the PVC consumers, who directly pay the cost of such market power, are unlikely to confer such power on the PVC producer, unless awarded a benefit that will outweigh the rise in cost as a result of the PVC producer's increase in market power.

[74] The IAA decision, *supra* note 13, Sections 5.2, 5.3 and 6 (pp. 14-20).

[75] The Israeli Antitrust Authority (IAA) blocked a merger of a subsidiary of the local PVC producer with several producers of PVC piping. In its decision, the IAA found the merger would facilitate the cartel policing in the PVC piping market as well as the exclusion of foreign competitors in the PVC market. Naturally, the IAA decision focused on the merger's facilitating effects. This paper shifts the focus to the mechanism that the merger facilitated.

[76] The existence of long-term contracts between the local PVC producer and local PVC consumers has not been sufficient to prevent the formation of a temporary spot market at certain times (typically, when PVC prices were low). Much of the supply in this spot market comes from imported PVC. The spot market undermines the local producer's market power. Apparently, though PVC consumers prefer the certainty of long-term contracts, they find acquisition of PVC in the spot market to be a viable alternative, when it is available. *See* the IAA Decision, *supra* note 13, Section 4.2(a), at p. 9.

The benefit, in our case, is suspected to be policing a cartel between the PVC consumers, in their capacity as producers of processed goods. The feasibility of creating a cartel (from the cartel-members' perspective) is highly dependant on the height of the barriers to entry into the industry. One reason for this is that the lower the barriers, the more likely it is that the cartel's restriction of output will attract entry, which will undermine the cartel's position.

While the "common wisdom" of antitrust clearly ties the likelihood of entry to the height of barriers to entry into the market, a careful observer might question this relationship in a sector such as the PVC industry, in which fixed costs are high relative to variable costs, adjusting outputs is very expensive, and (as a result) prices fluctuate widely and rapidly. In such industries, an incumbent has strong incentives to react to entry by reducing prices immediately to match or beat the entrant's.[77] Knowing that, a would-be entrant would hesitate to enter the market, since the up-front entry costs are significant and the likelihood and speed of their recoupment is low (given the expected reaction by the incumbent). Furthermore, the would-be entrant does not know whether the incumbent is efficient, and therefore unprofitable to compete against, or inefficient, and therefore the market is attractive to entry. A reduction of the incumbent's prices, which is a form of limit pricing, may be seen as a signal to the would-be entrant that the incumbent is an efficient producer (and can therefore profit even at lower prices), and the market is thus (according to the signal) unattractive for entry.

[77] A possible exception would occur if the entrant's capacity is very low and therefore lost profits from the price reduction offset lost profits from sales the incumbent loses to the entrant. But such limited entry is not likely to destabilize a cartel.

But this insight is not often applicable. First, it requires the absence of information asymmetries on the entrant's pricing – to react effectively to the entrant, the incumbent must know what prices are offered by the entrant – which is quite difficult in a market in which there is a significant price divergence between the many customers (and absent institutions that monitor and disseminate these prices, such as an exchange). Furthermore, to assess the viability of price competition with the entrant, the incumbent needs to know the entrant's capacity and price structure. Incomplete information would likely delay or blunt an incumbent's response, making the entry more viable.

Second, barriers to entry facilitate collusion even if they do not entirely prevent entry. Collusion is facilitated by stable market shares (because a fluctuation in market shares may change cartel participants' incentives and require costly renegotiation of the cartel terms), and by large industry coverage (i.e., high combined market share of cartel members) .[78] Barriers to entry and expansion, even when they are far from absolute, impose a cost on entry and expansion, thus stabilizing current market shares, maintaining the cartel's industry coverage, and reducing costs of reaching and maintaining a cartel.

The Israeli PVC piping industry, a major consumer of PVC, is characterized by high barriers to entry and high and growing concentration. The IAA decision explores these barriers to entry, finding that the piping industry is characterized by economies of scope (i.e., piping consumers prefer to order a variety of piping products from one piping

[78] *See, e.g.*, Andrew R. Dick, *When Are Cartels Stable Contracts?*, 39 J. L. & Econ. 241, 266 (1996) ("Wider industry coverage expands the cartel's ability to pool information within its membership and thus should improve the accuracy and cost effectiveness of monitoring. The net value of cartel services also should tend to increase with the agreement's industry coverage and should decline with cartel membership to reflect higher coordination costs… Cartels' market share also had a large economic effect on their stability. Cartels whose industry market share was above 50 percent on average survived nearly twice as long as cartels that marketed less than half of their industry's exports.").

producer), and by significant sunk costs (though not nearly as high as those in the PVC industry).[79] The industry itself is relatively risky due to widely fluctuating demand, high excess capacity and the long term supply contracts that require the piping manufacturer to commit to quantity and price of the pipes supplied.[80] The local piping industry is consolidating,[81] while competition from imports is hindered by an 8% tariff on pipes imported from Non-U.S or EU countries, by very high transportation costs due to the bulkiness of pipes, and by high costs of maintaining an inventory (since there are a broad variety of pipes, and limiting the variety stored in Israeli warehouses would cause the importer to lose significant economies of scope).[82] The IAA also found that PVC piping is of very limited interchangeability with other types of piping, due to strong relative advantages of each type of piping to different needs.[83]

These traits are conducive to creating a cartel. However, the piping producers themselves have a poor ability to police such a cartel.

The PVC producer is in a much better position: As piping usually requires a fixed proportion of PVC, the PVC producer knows how much piping each of his customers is producing (assuming they all buy only from it), and because the cost of PVC is the

[79] The IAA decision, *supra* note 13, Section 4.3(b), at p. 12.
[80] The IAA decision, Id. Note that these long term contracts lead to a need for long term PVC supply contracts. As we mentioned above, none of the foreign PVC producers consent to such contracts.
[81] There are seven piping producers of any meaningful market share. Two of them jointly distribute their products, and another two were denied the IAA's permission to merge with each other and with IEL, and are now appealing the decision. The IAA decision, *supra* note 13, Section 4.2(b), at p. 10. The IAA estimates that if the merger would be allowed, three firms (the merged firm, the joint distribution firm and a third piping producer) would have together 83.1% of the market's production capacity. The IAA decision, *supra* note 13, Section 6, at p. 19.
[82] *Id*. The largest importer has a market share of approximately 4%, and no other importers have a significant market share.
[83] The IAA decision, *supra* note 13, Section 4.2(b), at pp. 9-10.

dominant element in the cost of producing PVC pipes,[84] the PVC producer is able to accurately estimate the costs of each producers (again, under the same assumption). The PVC producer is also in a very good position to punish firms cheating the cartel, by delaying the supply of PVC, limiting the supply (either by price or quantity limitations) to them or refusing to sell altogether.[85]

The effectiveness of the PVC producer as a cartel policeman depends to a large extent on having the piping companies buy their PVC solely from it: Regarding a piping firm that buys its PVC from another producer, it has no more information or punishing ability than the rival piping firms. Therefore, the piping firms might find it in their interest to agree to exclusive dealing with the PVC producer. More important to the stability of the exclusive dealing agreements, the piping firms are likely to be zealous in monitoring and reporting any infringement by their competitors of the exclusive dealing requirement (in order to enable the cartel to be policed more efficiently).

Unlike most exclusive dealing agreements, this agreement is likely to be policed by the parties conferring the exclusive position - rival PVC pipers. This significantly reduces the costs of enforcing the agreement and increases the agreement's stability. In effect, the scheme presented is a barter of policing of agreements: The PVC producer polices a cartel agreement between the piping firms, and in return the piping firms police exclusive dealing agreements which benefit the PVC producer. The policing of the exclusive dealing agreements not only creates an incentive for the PVC producer to police the

[84] Normally, the cost of PVC composes 60% of the overall cost of the piping. The IAA decision, *supra* note 13, Section 4.2(b), at p. 10.

[85] An outright refusal to sell or overt discriminatory conditions as to price or quantity are likely to be detectable antitrust violations. However, the costs of the litigation might make refusal or discrimination an effective weapon. Also, the PVC producer may employ other, less detectable or provable methods, such as delaying the supply or conditioning it on encumbering, but less obviously objectionable, terms.

piping cartel (to keep its end of the bargain), but is also necessary to enable it to effectively police the cartel. This ties the mutual obligations quite tightly.

2. Monopoly leveraging through exclusive dealing: Theory and criticism

Let us consider the criticism against schemes of this sort from two perspectives: First, the direct ends of the scheme: use of market power in one market (the PVC market) to gain advantages in another market (cartel policing the piping market); in other words – monopoly leveraging. Second, the means to this end: exclusive dealing agreements between the upstream dominant firm and the downstream firms.

The theory of monopoly leveraging – actions taken by a firm that possesses market power in one market, to create market power in another market – has been criticized by many scholars.[86] Simply put (and quite oversimplified), a firm would usually find either that it does not profit from monopoly leveraging; that it is unable to succeed in monopoly leveraging; or both. This is generally the case with vertical monopoly extension into a downstream market that uses the upstream products in fixed proportions:

> "Consider an admittedly extreme example. A monopolist supplier sells to a perfectly competitive industry. Assume that the monopolist extends its monopoly downstream, acquiring the competitive industry through a series of vertical mergers…
>
> The result is that the monopolist gains nothing by monopolizing downstream. Profit is the same pre- and postmerger. The motor monopolist [upstream

[86] *See*: R. Bork, *The Antitrust Paradox* (1993) 231; Hovenkamp, *supra* note 34, ¶ 7.9; L. Kaplaw, *Extension of Monopoly Power Through Leverage*, 85 Colum. L. Rev., 515, 516.

> monopolist – A.A.] is able to extract all of the potential profit by choosing its price of motors. And from society's viewpoint there is absolutely no difference. Price and output are unaffected also. Presumably, in cases where fixed-proportions production obtains, vertical monopolization must have some motivation other than increased monopoly profits."[87]

As we mentioned above, the relationship between PVC and most of its main downstream applications (particularly pipes, pipe fittings and bottling) is one of fixed proportions. However, this does not diminish the plausibility of the cartel-policing scheme in our case; the criticism above regards vertical monopoly leveraging as a method of increasing direct monopoly profits. Our scheme has another goal: policing a cartel between downstream firms.

Some have doubted the plausible threat of vertical restraints facilitating a downstream cartel.[88] Such danger is dependant on the ability to reach a stable agreement (due to the lack of incentive for the upstream policing firm to create or strengthen a cartel by its customers), the ability of such cartel so succeed (obviously no danger arises from a cartel policing agreement which, despite the policing, cannot sustain itself); and by the ability of antitrust enforcers to detect the horizontal aspects of the cartel (making an attack on the vertical facilitating features unnecessary).[89]

Our case seems to raise concerns regarding all three points. First, IEL has an incentive to police a cartel of its customers (despite losing some sales and allowing the creation of

[87] W.K. Viscusi, J.M. Vernon & J.E. Harrington, *Economics of Regulation and Antitrust* (2nd ed., 1995), at pp. 235-236.
[88] *See* Bork, *supra* note 86, at pp. 292-293.
[89] Bork, *Id*.

monopsony power that can be used against it), because it enlists in return the cartel members to police its exclusive dealing agreements, which greatly diminish the threat from imports, and thus the cyclical decline in its market power. In effect, through this scheme IEL agrees to a loss of a portion of its market power against its customers, in return for stability in its market power over time. The scheme may also have spillover effects on other markets that use PVC as an input, without losing any market power against the firms in those markets. The assessment of these effects is, however, beyond the scope of this paper.[90]

The second point – the probability of success of the downstream cartel - seems to raise concerns as well. We noted above the relatively high barriers to entry to the piping industry, as well as the efficiencies (from the cartel members' standpoint) in policing by IEL. As long as the barriers to entry remain significantly high, the cartel consisting of firms accounting for a large proportion of the market share, and the cartel members purchasing their PVC exclusively from IEL, the cartel enjoys a significant probability of success.

Finally, the third point – the ability of antitrust enforcers to identify the horizontal aspects of the cartel and enjoin them – is questionable. Unlike many vertical cartel-policing schemes, the upstream policeman is not coerced into aiding the cartel, but enjoys in return protection from temporal fluctuations in its power. As Robert Bork notes:

[90] The existence of a spillover effect depends on the residual demand for the type of PVC used for piping, and on the minimum efficient scale for importing such PVC. If the residual demand for this type of PVC, by Israeli industries other than the piping industry, is lower than the minimum efficient scale, the cost of importing PVC will be high (and increase the larger the difference between MES and residual demand), so the amount imported will diminish. As said above, an empirical examination of this issue is beyond the scope of this paper.

> "Reseller cartels are very easy to detect because the large number and disparate interests involved make such cartels notoriously difficult to organize, administer, and police. Observation of some such cartels shows the necessity for open meetings, fight talks, advertisements and stories in trade papers, complaints by dissident resellers and so forth. Reseller cartels tend to be so visible that they are hard for an enforcement agency to miss."[91]

But this is not the case here. Most of the administration of the cartel is done through existing, vertical channels between IEL and its customers. The information used to police the cartel is that which normally is in the hands of a supplier, and there are many ways IEL can punish a violation of the cartel rules without being conspicuous (e.g., unexplained delays or decrease in the reliability of deliveries). The more exposed element of the scheme is that of the piping firms policing the exclusive dealing agreements of IEL and the other piping firms. But even this would be relatively easy to miss, especially since the number of piping producers (unlike Bork's resellers) is limited.

Scholars have similarly pointed to the doubtful basis for competitive concerns from exclusive dealing (which is the flip side of the scheme discussed).[92] One argument points to the difficulty of foreclosing a market by exclusive dealing:

> "The competitive threat, if any, is generally less in exclusive dealing than in more durable and extensive forms of vertical integration, such as vertical mergers. Unlike mergers, exclusive dealing contracts usually do not govern every aspect of an independent firm's business. Further, exclusive dealing contracts are of limited

[91] Bork, *supra* note 86, at p. 292.
[92] *See*: Bork, *supra* note 86, at p. 299-309; Hovenkamp, *supra* note 34, ¶ 10.8a.

> duration. Every so often, depending on contract terms that could range from a few months to many years, the supplier must bid anew against competing suppliers."[93]

However:

> "Exclusive dealing might foreclose competition inefficiently if the upstream firm has a dominant market position and there is some kind of limitation on entry in the downstream market. As long as new downstream facilities can be constructed, effective foreclosure is unlikely. But suppose that geographic location is critical to business survival, and two or three sites for resale locations are substantially better than alternatives. In that case, a dominant upstream firm could 'foreclose' competition – this making entry more difficult – by entering into exclusive dealing contracts with all the preferred downstream locations."[94]

As we have seen, the Israeli PVC piping industry - while neither being a natural monopoly nor suffering from the geographical barriers to entry used in the example above - is characterized by significant barriers to entry. IEL enjoys, as we have explored in Section III above, significant market power during portions of the cycle, and the scheme is expected to prevent (or at least mitigate) the loss of that market power. It follows that the exclusive dealing agreements may, if reached and maintained, harm competition in the PVC market.

Another argument viewing exclusive dealing as unlikely to be harmful is similar to the first point of criticism on monopoly leveraging discussed above: Emphasis on the

[93] Hovenkamp, *supra* note 34, at p. 384.
[94] Hovenkamp, *Id*.

efficiencies created by some exclusive dealing agreements and on the fact that most of the anticompetitive benefits conferred on the supplier in an exclusive dealing argument are likely to directly harm the suppliers that are party to that agreement. Therefore, when such an agreement is observed, it is more likely that it creates efficiencies (the benefits of which are shared between both parties and eventually reach the end consumer), than that it confers monopoly power (which would harm, first and foremost, the suppliers party to the agreement):

> "Let us begin by examining the case in which Alpha has, say, 30 percent of the can market. Is there a possibility that it may be able, as Areeda suggests, to sign up 100 percent of the canners? Why do not some of them sign requirements contracts with Alpha's various rivals or, if there are no particular efficiencies in such contracts, simply continue to buy from Alpha's rivals? Because Alpha makes a better can? But then Alpha would get all the customers for that reason, and the requirements contract would have nothing to do with it. Because Alpha offers some extra inducement, such as a lower price? But that sounds like competition, and surely Alpha's rivals can be relied upon to meet competition. If they cannot, the market is destined for monopoly anyway, because of Alpha's superior efficiency.
>
> It is important to see that Alpha must offer something to the food canners to get them to sign requirements contracts, and it must offer that something for the life of the contract…"[95]

[95] Bork, *supra* note 86, at p. 304.

Other scholars contended that in certain circumstances downstream firms would enter exclusive dealing agreements, even though they would raise competitive concerns.[96] For example, a small downstream firm may know its refusal to enter an exclusive dealing agreement would not prevent the supplier from foreclosing competition (because exclusivity agreements with other downstream firms would suffice). Because of a collective action problem among the downstream firms, each would agree to enter exclusivity agreements with the supplier, rather then risk being offered worse terms after the supplier gains exclusivity from other firms and forecloses competition.[97]

But in our case, there is a competitive concern even under Bork's analysis. IEL, the supplier, is in a unique position to police a cartel in the piping industry. Its dominant position and constant presence in the Israeli market make it the only PVC supplier that can offer the piping firms that service at such probability of success). Thus, IEL can offer the downstream firms a benefit others cannot match, for the duration of the contract (in fact, the cartel policing is tied to the exclusive dealing, as it is the exclusive dealing that enhances the policing abilities of IEL).

In other words, while exclusive dealing agreements often cannot be negotiated because the benefit to the upstream firm is derived from exploiting the downstream firm, in our case the exclusive dealing agreement serves to police a cartel, which enlarges the size of the pie the upstream and downstream firms can divide between them. It is this extra slice

[96] See: Kaplaw, *supra* note 86; M.H. Riordan & S.C. Salop, *Evaluating Vertical Mergers: A Post-Chicago Approach*, 63 Antitrust L. J. 513; E.B. Rasmusen, J.M. Ramseyer, & J.S. Wiley, *Naked Exclusion*, 81 Am. Econ. Rev. 1137; C. Stefanadis, *Selective Contracts, Foreclosure and the Chicago School View*, 41 J. of L. & Econ. 429.
[97] Rasmusen, Ramseyer & Wiley, *id.*

of the pie that makes it profitable for the downstream firms to agree to exclusive dealing, and for the upstream firm to agree to cartel policing.[98]

This extra slice did not materialize from thin air. It is not an efficiency created by the agreement between the PVC and piping producers. Rather, it is the portion of the piping consumers' wealth transferred to the piping manufacturers because of the cartel. And like most cartels, a 'dead weight loss' is created, reducing the overall welfare.[99]

The result of the above analysis is that a stable and difficult to detect scheme may emerge between IEL and the piping firms, in which the dominant firm would police a cartel among the piping producers, in return for the piping producers policing each others' exclusive dealing agreement with the dominant firm. Such a scheme may lead to both a cartel in the piping market and a reduction in threats to the market power of the dominant PVC producer. The outcome would be a sustained monopolistic price in both the PVC and the PVC piping markets. The 'stacked monopoly' problem is not likely to emerge, as price coordination between the industries would be facilitated by the IEL policing the piping cartel.[100]

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[98] Normally, an upstream firm has little incentive to police a cartel, as the cartel will restrict output in the downstream market, which in turn will reduce demand for the upstream firm's products. However, under certain conditions such an arrangement might prove profitable to the upstream firm. *See*: *JTC Petroleum Company v. Piasa Motor Fuels, Inc*., 190 F.3d 775 (7th Cir, 1999); Granitz & Klein, *supra* note 9. The relationship between the Israeli PVC and PVC piping industries may present such a case.

[99] Claims have been made that by taking actions to prevent the entry of exported PVC into Israel, IEL is privately enforcing anti-dumping measures. For a somewhat related discussion see: R.P. Alford, *Why a Private Right of Action Against Dumping Would Violate GATT*, 66 N.Y.U. L. Rev. 696 (1991). The merits of this claim in our case seem feeble. Even disregarding GATT or other formal limitations, IEL is a heavily biased enforcer; it does not utilize a right of action but rather self-enforcement (the latter lacking the scrutiny of an unbiased court), and the specific action discussed affects - in fact, eliminates competition - not only in the market in which the alleged dumping occurs, but a downstream market as well.

[100] On stacked monopolies, see Hovenkamp, *supra* note 34, ¶9.2c, at pp. 335-336.

A recent decision of the Seventh Circuit vindicated the plausibility of a scheme such as the one before us:

> "So what JTC has tried to show is that the applicators enlisted the producers in their conspiracy, assigning them the role of policing the applicators' cartel by refusing to sell to applicators who defied the cartel…
>
> … an antitrust claim which makes no economic sense can on that ground be dismissed on summary judgment… And it might seem to make no sense from the producers' standpoint to shore up a cartel of their customers. Cartels, as we have pointed out, raise price above the competitive level and by doing so reduce the demand for their product…
>
> But if the producers have nowhere else to turn to sell their product… the applicator defendants may be able to coerce them into helping to police their cartel by threatening to buy less product from them or pay less for it…
>
> Alternatively, and more plausibly (at least on this record), the cartelists may have been paying the producers to perform the policing function, rather than coercing them, by threats, to do so…
>
> Given the evidence of cartelization at both the applicator and producer level, the suspicious producer price behavior (suggestive of the producers' having been "paid off" by the cartel to boycott JTC and other upstarts), and the pretextual character of the reasons the producers gave for the refusal to deal, a rational jury

could conclude that JTC was indeed the victim of a producers' boycott organized by the applicator defendants."[101]

V. Conclusion

Market power – like the market structures that create it - comes in all shapes and sizes. This paper explored a phenomenon of cyclical market power in a geographic market with a single local producer and fluctuating competition from foreign producers – The Israeli PVC market.

We have found a negative correlation between prices and the market share of foreign producers.[102] This observation may be explained by the industry characteristics, which make it very costly to rapidly decrease output. Firms wielding market power naturally restrict output, and must reduce it further (if they are to maximize their profits) when demand slumps. The high costs of reducing output when demand slumps make it more plausible for those firms to maintain the current output, restrict the local sales to the optimal level, and export the remaining output to a market that does not affect the firm's other sales.

Another possible explanation – that the fluctuations in imports to Israel are explained by growing demand in Israel concurrent to a slump in demand in the exporting firms' home markets – was examined, but an empirical analysis seems to reject this explanation.

We have formulated three conditions that, if satisfied, should result in cyclical market power such as that observed: (1) The supply curve of the industry is downwards

[101] *JTC Petroleum Company*, *supra* note 98, at 778-779.
[102] The empirical evidence, while generally pointing to the correlation above, suffered from consisting of a small number of observations, which lowered the reliability of the empirical analysis.

inflexible; (2) There are at least two firms which wield some market power, each in a separate geographical market; (3) At least one of these geographic markets is isolated from the other markets (in the sense of having significant costs to export from the former market to the latter ones), and local firms in that market have relative difficulty to raise exporting costs into their market (e.g., by lobbying to raise tariffs or execute anti-dumping measures). The Israeli PVC industry satisfies these conditions.[103]

An inquiry into the actions the dominant firm might take to mitigate the cyclical decline in its market power revealed that it may be profitable and possible for the dominant firm to perform 'temporal leveraging' of its market power, by reaching a set of agreements with downstream firms, in which the dominant firm would police a cartel among the downstream firms in return for the downstream firms policing each others' exclusive dealing agreements with the dominant firm. As the exclusive position of the dominant firm is required for effective downstream cartel policing, the exclusivity agreements are likely to be stable and well enforced, raising barriers to entry in the upstream market and thus mitigating the tides of imports which cause the fluctuation in the dominant firm's market power.

Such a scheme may lead to both a stable cartel in the downstream market and a reduction in threats to the market power of the dominant upstream firm. These are compelling reasons to condemn such a scheme. It may be that, though the market power flower that smiles today tomorrow will be dying, and despite the poem's advice – The dominant firm may not gather rosebuds.

[103] Again, limitations of the data available reduced the reliability of the empirical analysis, though the results did support the proposed explanation.